PROJECT MANUAL FOR

SANGER ED COMPLEX – PHASE III

SANGER UNIFIED SCHOOL DISTRICT
1905 7TH STREET
SANGER, CA 93657

PREPARED BY:

DARDEN ARCHITECTS, INC.
ARCHITECTURE•PLANNING•INTERIORS
6790 N. WEST AVENUE
FRESNO, CALIFORNIA 93711

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-120779 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 11/6/2023

LICENSED ARCHITECT
MICHAEL K. FENNACY
No. C23724
Ren. 4-30-25
STATE OF CALIFORNIA

ARCHITECT:

REGISTERED PROFESSIONAL ENGINEER
ALFRED A. SCHUCHARD
No. 4838
STRUCTURAL
STATE OF CALIFORNIA

STRUCTURAL ENGINEER:

REGISTERED PROFESSIONAL ENGINEER
MICHAEL D. CANTELMI
No. M23598
Exp.9-30-25
MECHANICAL
STATE OF CALIFORNIA

MECHANICAL ENGINEER:

REGISTERED PROFESSIONAL ENGINEER
WILLIAM A. THOMA
NO. 10757
ELECTRICAL
STATE OF CALIFORNIA

ELECTRICAL ENGINEER:

LICENSED LANDSCAPE ARCHITECT
DAVID B. BIGLER
RLA # 3887
31 JULY 24
RENEWAL DATE
STATE OF CALIFORNIA

LANDSCAPE ARCHITECT:

REGISTERED PROFESSIONAL ENGINEER
LANE R. BADER
No. 47033
CIVIL
STATE OF CALIFORNIA

CIVIL ENGINEER:

END OF SECTION

© Darden Architects, Inc.

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 02-120779 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 01/16/2024

darden architects | ARCHITECTURE INTERIOR DESIGN PLANNING
www.dardenarchitects.com
6790 North West Avenue Fresno, California 93711

ADDENDUM NO. 1 **DATE: 12/1/2023**

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 02-120779 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 02/08/2024

darden architects | ARCHITECTURE INTERIOR DESIGN PLANNING
www.dardenarchitects.com
6790 North West Avenue Fresno, California 93711

ADDENDUM NO. 2 **DATE: 12/7/2023**

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 02-120779 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 02/12/2024

darden architects | ARCHITECTURE INTERIOR DESIGN PLANNING
www.dardenarchitects.com
6790 North West Avenue Fresno, California 93711

ADDENDUM NO. 3 **DATE: 12/7/2023**

APPROVED
DIV. OF THE STATE ARCHITECT
APP: 02-120779 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 01/17/2024

darden architects | ARCHITECTURE INTERIOR DESIGN PLANNING
www.dardenarchitects.com
6790 North West Avenue Fresno, California 93711

ADDENDUM NO. 4 **DATE: 12/12/2023**

PROJECT MANUAL
TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS GROUP

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

INTRODUCTORY INFORMATION

00 01 01	PROJECT TITLE PAGE
00 01 10	PROJECT MANUAL TABLE OF CONTENTS
00 23 13.03	SUPPLEMENTARY INSTRUCTIONS FOR BIDDERS

PROCUREMENT REQUIREMENTS

Provided by Owner

CONTRACT REQUIREMENTS

Provided by Owner

SPECIFICATIONS GROUP

GENERAL REQUIREMENTS SUBGROUP

DIVISION 01 – GENERAL REQUIREMENTS

01 11 13	SUMMARY OF WORK
01 23 00	ALTERNATES
01 25 00	SUBSTITUTION PROCEDURES
01 26 00	CONTRACT MODIFICATION PROCEDURES
01 29 73	SCHEDULE OF VALUES
01 31 13	CONTRACTOR'S PROJECT MANAGEMENT
	USAGE AGREEMENT FOR ELECTRONIC FILES
01 32 16	CONSTRUCTION SCHEDULES
01 32 26	FORMS AND REPORTS
01 32 26 .01	FORMS ATTACHMENTS
01 33 00	SUBMITTAL PROCEDURES
01 40 00	QUALITY REQUIREMENTS
01 41 00	REGULATORY REQUIREMENTS
01 42 00	REFERENCES
01 45 23	TESTING AND INSPECTING SERVICES
01 45 29	TESTING LABORATORY SERVICES
01 50 00	TEMPORARY FACILITIES AND CONTROLS
01 64 00	OWNER-FURNISHED ITEMS
01 71 23	FIELD ENGINEERING
01 73 29	CUTTING AND PATCHING
01 74 19	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
01 77 20	PROJECT CLOSEOUT
01 78 36	WARRANTIES
01 78 39	PROJECT DOCUMENTS
01 81 22	ACOUSTICAL PERFORMANCE REQUIREMENTS
01 81 23	NOISE AND VIBRATION CONTROL
01 91 13	GENERAL COMMISSIONING REQUIREMENTS

FACILITY CONSTRUCTION SUBGROUP

DIVISION 03 – CONCRETE

03 11 01	CONCRETE FORMWORK
03 15 14	DRILLED ANCHORS
03 20 00	REINFORCEMENT
03 30 00	CAST-IN-PLACE CONCRETE
03 35 10	POLISHED CONCRETE FINISHING
03 39 01	MOISTURE EMISSION REDUCING CURING AGENT

DIVISION 04 – MASONRY

04 22 00	CONCRETE MASONRY UNITS

DIVISION 05 – METALS

05 12 00	STEEL AND FABRICATIONS
05 12 25	BUCKLING-RESTRAINED BRACES
05 15 16	STEEL CABLE SYSTEM
05 30 00	METAL DECK
05 52 00	RAILING SYSTEMS

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

06 10 00	ROUGH CARPENTRY
06 22 00	MILLWORK
06 41 23	MODULAR CASEWORK

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 14 16	FLUID-APPLIED WATERPROOFING
07 18 50	VAPOR-ALKALINITY CONTROL
07 21 00	INSULATION
07 40 00	METAL PANELS
07 40 12	MCM PANELS
07 42 43	FIBER-CEMENT PANELS
07 51 13	BUILT-UP ROOFING
07 54 00	SINGLE-PLY ROOFING
07 60 00	SHEET METAL
07 72 00	ROOF ACCESSORIES
07 81 16	FIREPROOFING
07 84 00	FIRESTOPPING
07 92 00	SEALANTS

DIVISION 08 – OPENINGS

08 11 00	METAL DOORS AND FRAMES
08 14 16	WOOD DOORS
08 31 13	ACCESS DOORS AND FRAMES
08 33 00	COILING DOORS
08 34 73	ACOUSTICAL DOORS AND FRAMES
08 41 00	STOREFRONTS
08 42 26	ALL-GLASS ENTRANCES
08 56 59	SERVICE WINDOWS
08 63 01	TRANSLUCENT PANELS
08 70 00	HARDWARE
08 70 00.01	HARDWARE SCHEDULE
08 80 00	GLASS
08 91 00	LOUVERS

DIVISION 09 – FINISHES

09 22 16	METAL FRAMING
09 24 00	CEMENT PLASTER
09 29 00	GYPSUM BOARD
09 30 00	TILE
09 50 00	ACOUSTICAL CEILINGS
09 64 66	RESILIENT WOOD FLOOR
09 65 10	RESILIENT BASE AND ACCESSORIES
09 65 16	RESILIENT SHEET
09 65 19	RESILIENT TILE
09 65 66	RESILIENT ATHLETIC FLOORING
09 67 23	RESINOUS FLOORING
09 68 40	CARPET
09 72 00	WALL COVERINGS
09 91 00	PAINTING

DIVISION 10 – SPECIALTIES

10 05 00	MISCELLANEOUS SPECIALTIES
10 11 00	VISUAL DISPLAY BOARDS
10 14 00	IDENTIFYING DEVICES
10 14 53	ROAD AND PARKING SIGNAGE
10 21 13	TOILET PARTITIONS
10 26 00	WALL AND CORNER GUARDS
10 28 13	TOILET ACCESSORIES
10 44 00	FIRE PROTECTION SPECIALTIES
10 51 13	METAL LOCKERS
10 51 16	PLASTIC LAMINATE LOCKERS
10 56 26	MOBILE STORAGE UNITS

DIVISION 11 – EQUIPMENT

11 40 00	FOOD SERVICE EQUIPMENT
11 61 23	PORTABLE PLATFORMS AND SEATING SYSTEMS
11 61 33	PRODUCTION RIGGING SYSTEMS
11 61 83	PRODUCTION LIGHTING CONTROL SYSTEMS
11 62 00	MUSIC EQUIPMENT
11 66 00	ATHLETIC EQUIPMENT
11 66 43	SCOREBOARDS

DIVISION 12 – FURNISHINGS

12 66 13.02	TELESCOPING BLEACHERS
12 66 23	TELESCOPING SEATING
12 93 13	BICYCLE RACKS

DIVISION 14 – CONVEYING EQUIPMENT

14 24 23	HYDRAULIC ELEVATORS

FACILITY SERVICES SUBGROUP

DIVISION 21 – FIRE SUPPRESSION

21 00 00 FIRE SPRINKLER SYSTEM

DIVISION 22 – PLUMBING

22 00 00 PLUMBING

DIVISION 23 –HEATING VENTILATING AND AIR CONDITIONING

23 00 00 GENERAL MECHANICAL PROVISIONS
23 00 01 HEATING, VENTILATING AND AIR CONDITIONING
23 09 23 DIRECT DIGITAL CONTROL AND ENERGY MANAGEMENT SYSTEM

DIVISION 26 – ELECTRICAL

26 05 00 COMMON WORK RESULTS FOR ELECTRICAL>J ecy6
26 05 13 MEDIUM VOLTAGE CABLES (ABOVE 600 VOLTS)
26 05 19 LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 33 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
26 05 34 CABINETS
26 05 35 PRODUCTION SYSTEMS ELECTRICAL INSTALLATION
26 05 46.13 ELECTRIC UTILITY SYSTEMS
26 05 53 IDENTIFICATION OF ELECTRICAL SYSTEMS
26 05 73 OVERCURRENT PROTECTIVE DEVICE COORDINATION
26 08 10 ELECTRICAL ACCEPTANCE TESTING
26 09 00 CONTROLS AND INSTRUMENTATION
26 09 23 OCCUPANCY SENSORS
26 09 43 NETWORK LIGHTING CONTROLS
26 12 00 MEDIUM VOLTAGE TRANSFORMERS
26 13 00 MEDIUM VOLTAGE SWITCHGEAR (ABOVE 600 VOLTS)
26 13 02 SWITCHES. MEDIUM VOLTAGE (ABOVE 600 VOLTS)
26 22 00 LOW VOLTAGE TRANSFORMERS
26 24 12 MICROPROCESSOR-BASED METERING EQUIPMENT
26 24 13 SERVICE AND DISTRIBUTION SWITCHBOARD
26 24 16 PANELBOARDS
26 27 26 WIRING DEVICES
26 43 00 SURGE PROTECTION DEVICES
26 51 00 INTERIOR LIGHTING
26 56 00 SITE LIGHTING
26 56 70 LIGHTING ACCEPTANCE TESTING
26 77 00 ASSISTIVE LISTENING SYSTEM
26 91 15 ELECTRICAL COMMISSIONING REQUIREMENTS

DIVISION 27 – COMMUNICATIONS

27 13 00 INTERCOMMUNICATIONS SYSTEMS
27 41 16 PRODUCTION AV SYSTEMS

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 31 00 FIRE ALARM AND DETECTION SYSTEMS
28 55 00 EMERGENCY RESPONDER RADIO COVERAGE SURVEY
28 55 10 EMERGENCY RESPONDER RADIO COVERAGE SYSTEM

SITE AND INFRASTRUCTURE SUBGROUP

DIVISION 31 – EARTHWORK

31 11 00	SITE CLEARING
31 20 00	EARTHWORK FOR BUILDINGS
31 20 00	EARTHWORK FOR SITE: EXCAVATION, FILLING AND GRADING
31 22 22.01	SOIL MATERIALS
31 23 33	TRENCH EXCAVATION AND BACKFILL
31 31 00	SOIL TREATMENT

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 12 00	PAVEMENT
32 19 19	ORNAMENTAL METAL
32 28 70	TENNIS COURT CONSTRUCTION
32 28 71	TENNIS COURT SURFACING
32 31 13	CHAIN LINK
32 84 00	LANDSCAPE IRRIGATION SYSTEM
32 90 00	LANDSCAPE CONSTRUCTION

DIVISION 33 – UTILITIES

33 12 00	WATER UTILITIES
33 30 00	SITE SEWER SYSTEMS
33 40 00	STORM DRAINAGE

APPENDICES

APPENDIX "B" – INTERIOR COLOR SCHEDULE
APPENDIX "C" – EXTERIOR COLOR SCHEDULE

END OF SECTION

SECTION 002213.03 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Supplementary Instructions to Bidders consisting of procedures and conditions for the use of documents of various types and formats for bidding of this project.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Hard Copy Format: Documents printed on paper medium.

B. Electronic Image Format: Electronic Files consisting of Bid Documents in an image format such as PDF's, TIFF's and etc. These files are to be READ ONLY.

1.3 SUBMITTALS

A. Submit in accordance with the following:
   1. Bidder's Usage Agreement for Bid Documents:
      a. Hard Copy Format Form.
      b. Hard Copy and Electronic Image Format Form.
   2. Bidder's Usage Agreement for Partial Documents.
      a. Partial Bid Documents Form.

PART 2 - PRODUCTS
(NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SCHEDULES:

A. BIDDER'S USAGE AGREEMENT FOR BID DOCUMENTS:
   1. HARD COPY FORMAT: When the Bid Documents are being issued in a printed medium, the HARD COPY FORMAT FORM shall be used.

a. This form shall be submitted and signed as a condition of receiving Bid Documents.

2. HARD COPY AND ELECTRONIC IMAGE FORMAT: When the Bid Documents are being issued electronically, the HARD COPY AND ELECTRONIC IMAGE FORMAT FORM shall be used.
   a. This form shall be submitted and signed as a condition of receiving Bid Documents.

B. BIDDER'S USAGE AGREEMENT FOR PARTIAL BID DOCUMENTS.
1. When the Bidder is requesting additional documents which are part of the Bid Documents, the PARTIAL BID DOCUMENTS FORM shall be used.
   a. This form shall be submitted and signed as a condition of receiving Partial Bid Documents.

3.2 BIDDER'S USAGE AGREEMENT FOR BID DOCUMENTS HARD COPY FORMAT

Project Name: _____
DA Project No.: _____
I, _____, as duly authorized agent of
_____ ("Bidder") as prospective bidder on the above named project ("Project") is requesting a copy of the project BID DOCUMENTS (bidding requirements, contract requirements, specifications, contract drawings, resource drawings if any, and addenda to date).

A. Bidder is being provided copies of Bid Documents for the Project in a Hard Copy Format, acknowledges that Bid Documents are being provided as the official record set of documents issued for bidding. It is the Bidder's responsibility to review and obtain all information from the Bid Documents necessary for a complete and accurate bid. This request is subject to the following conditions, which the Bidder hereby agrees to abide by:

B. Bidder shall pay a refundable deposit for the Bid Documents in the amount of $_____ per set. In the event the Bidder is not the successful bidder, the bidder agrees to return all Bid Documents within 15 calendar days after the bid date. If the Bid Documents are not returned within 15 calendar days after the bid date, the Bidder will forfetit the deposit.

C. Bidder acknowledges that these Bid Documents will be re-issued as Construction Documents following the bid. The Bidder agrees to return all Bid Documents in "Good Condition" with all the sheets unmarked and in their original order. The returned Bid Documents will be reviewed and the condition of the Bid Documents will be determined. If the Bid Documents are determined to be in "Good Condition", the Bidder's Deposit will be returned.

D. In the event that the Bid Documents are returned and are not in "Good Condition", the Bidder understands that the Architect and Architect's Consultants will incur certain costs in replacement of missing items and to repair the Bid Documents to their original condition, in order to be issued as Construction Documents. The bidder agrees to pay the Design Team a service fee of $105.00 an hour (with a two-hour minimum of $210.00). The service fee will be deducted from the Bidder's deposit, and the remainder refunded to the Bidder.

E. Bidder understands and agrees the Bid Documents are instruments of Architect's and Architect's Consultants' **("Design Team")** professional service and are intended for one-time use by Bidder in the bidding of the Project. All information contained in the Bid Documents are and shall remain the property of the Design Team, who is deemed to be the author of the drawings and data, and the Design Team shall retain all common law, statutory law, and all other rights, including copyrights, with respect to Bidder.

F. The Bidder shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from Bidder or any other person or entity that gains information from the Bid Documents or copies any part of the Bid Documents, or uses the Bid Documents or copies any part of the Bid Documents, for purposes other than the bidding of this project, and will be liable to the Design Team for fees equal to the fees paid by the client pursuant to developing the documents for this project.

DARDEN ARCHITECTS, INC.

Number of Sets Requested:_____

_____ _____
Print Name (Bidder) Title

_____ _____
Signature Date:

3.3 BIDDER'S USAGE AGREEMENT FOR BID DOCUMENTS HARD COPY AND ELECTRONIC IMAGE FORMAT

Project Name: _____
DA Project No.: _____
I, _____, as duly authorized agent of
_____ ("Bidder") as prospective bidder on the above named project ("Project") is requesting a copy of the project BID DOCUMENTS (bidding requirements, contract requirements, specifications, contract drawings, resource drawings if any, and addenda to date).

A. Bidder is being provided copies of Bid Documents for the Project, which consists of two parts. One part of the Bid Documents is in the Hard Copy Format ("HCF") and the other part is in the Electronic Image Format ("EIF") on CD-ROM. Bidder acknowledges that HCF Documents and the EIF Documents are being provided as the official record set of documents issued for bidding. It is the Bidder's responsibility to review and obtain all information from both the HCF and the EIF documents necessary for a complete and accurate bid. This request is subject to the following conditions, which the Bidder hereby agrees to abide by:

B. Bidder shall pay a non-refundable deposit for the Bid Documents in the amount of $_____. In the event the Bidder is not the successful bidder, the bidder agrees to permanently dispose of the HCF and EIF on the Project CD-ROM.

C. Bidder acknowledges that neither the EIF documents nor the CD-ROM will be updated by the Design Team. The CD-ROM contains the original documents and will not be updated regardless of when Bidder obtains the CD-ROM. Any changes to the contract documents will be issued as a separate document.

D. Bidder is further warned that while the EIF information appears to be extremely accurate, this apparent accuracy is an artifact of the techniques used to generate it and is no way intended to imply actual accuracy. The Bidder acknowledges and takes full responsibility for the accuracy, correctness of measurements, areas, inventories derived, conclusions drawn, and information extracted from the EIF documents.

E. Bidder understands and agrees the HCF and EIF documents are instruments of Architect's and Architect's Consultants' **("Design Team")** professional service and are intended for one-time use by Bidder in the bidding of the Project. All HCF and EIF documents are and shall remain the property of the Design Team, who is deemed to be the author of the drawings and data, and the Design Team shall retain all common law, statutory law, and all other rights, including copyrights, with respect to Bidder.

F. The Bidder shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from Bidder or any other person or entity that gains information from the Bid Documents or copies any part of the Bid Documents, or uses the Bid Documents or copies any part of the Bid Documents, for purposes other than the bidding of this project, and will be liable to the Design Team for fees equal to the fees paid by the client pursuant to developing the documents for this project.

DARDEN ARCHITECTS, INC.

Description of the HCF Documents and the EIF Documents on CD-ROM, provided:

_____
_____
_____

_____	_____
Print Name (Bidder)	Title
_____	_____
Signature	Date:

3.4 BIDDER'S USAGE AGREEMENT FOR PARTIAL BID DOCUMENTS

Project Name: _____
DA Project No.: _____
I, _____, as duly authorized agent of _____ ("Bidder") as prospective bidder on the above named project ("Project"). The Bidder acknowledge having received at least one (1) complete set of the Bid Documents for the subject project and all Addenda issued to date in either Hard Copy Format ("HCF") and/or an Electronic Image Format ("EIF").

A. The Bidder is requesting partial copies of the Bid Documents ("Partial Documents") in the format originally issued and that was prepared by the Architect and/or Architect's Consultants ("Design Team") on the subject Project, so that the information therein may be utilized in the Bidder's work on the same project. The Partial Documents are strictly intended for the Bidder's convenience and are not recognized as part of the official record set of Bid Documents issued for bidding. This request is subject to the following conditions, which the Bidder hereby agrees to abide by:

B. The Bidder shall pay for all costs in reproducing the requested Partial Documents directly to the Printers. In the event that the Bidder is not the successful bidder, the Bidder agrees to permanently dispose of the Partial Documents.

C. The Bidder recognizes that the value of the Partial Documents far exceeds the cost of printing. The Bidder further agrees that the Bidder will make no other copies of the Partial Documents. Any copying, and/or reuse of the Partial Documents without written authorization of Darden Architects, Inc. is prohibited.

D. The Bidder understands that the accuracy of the information is an artifact of the techniques used to generate it and is in no way intended to imply actual accuracy. The Bidder agrees that by using these Partial Documents, the Bidder is in no way relieved of the responsibility to review and obtain all information from the complete set of the Bid Documents necessary for a complete and accurate bid.

E. The Bidder understands and agrees to that any documents provided are instruments of the professional service by the Design Team and are intended for one-time use solely in the bidding of this Project. They shall remain the property of the Architect or the Architect's Consultants, who is deemed to be the author of the documents and who shall retain all common law, statutory law, and all other rights, including copyrights, with respect to the Bidder.

F. The Bidder shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from Bidder or any other person or entity that gains information from the Partial Documents or copies the Partial Documents, or uses the Partial Documents or copies the Partial Documents, for purposes other than the bidding of this project, and will be liable to Design Team for fees equal to the fees paid by the client pursuant to developing the documents for this project.

G. In the event that the Bidder is a successful bidder, the Bidder agrees that all Bid Documents issued to the Bidder, and Partial Documents obtained by the Bidder, along with any other documents utilized by the Bidder in preparing the bid, will be included in the Escrow Bid Documents when required by the General Conditions. Any and all documents prepared and issued by the Design Team, which are included as part of the Escrow Bid Documents, will be returned to Darden Architects, Inc. at the close of escrow.

DARDEN ARCHITECTS, INC.

Description of the requested documents:

_____
_____
_____
_____
_____
_____

_____	_____
Print Name, (Bidder)	Title
_____	_____
Signature	Dated:

END OF SECTION

SECTION 011113 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Construction of the work for SANGER EDUCATION COMPLEX - PHASE III, Sanger, California. The work is defined as all material, labor, equipment and services necessary to do all work shown on the drawings and called for in the Specifications.

B. This Section includes the following:
1. Summarizes the Work of the Contract.
2. Establishes requirements governing the Work.
3. Identifies the Work that will be performed under separate contracts and the coordination.
4. Project Site access.
5. Restrictions under which the project will be constructed.

C. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. The words "OWNER" and "DISTRICT" are synonymous and interchangeable, when used throughout this Project Manual.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.
1. Quality Assurance/Control Submittals:
   a. Certificates:
      1) Submit three (3) copies of certificates indicating compliance with the Asbestos Hazard Emergency Regulations Act.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Contractor's Qualifications:
   a. Contractor shall have experience and have successfully completed three (3) projects of similar scope and size to that indicated for this project.
   b. Contractor shall have demonstrated that they have the resources to perform all of the requirements of this project.

B. Regulatory Requirements:
1. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work, and in accordance with Specification Section - REGULATORY REQUIREMENTS:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Certifications:
1. The Contractor shall certify in writing that no materials containing Asbestos are incorporated in the work, in accordance with the Asbestos Hazard Emergency Regulations Act.

D. Contractor's Duties:
1. Except as specifically noted, provide and pay for:
   a. Labor, material and equipment.
   b. Tools, construction equipment and machinery.
   c. Heat and utilities required for construction. See Specification Section - TEMPORARY FACILITIES AND CONTROLS.
   d. Other facilities and services necessary for proper execution and completion of Work.
2. Pay legally required sales, consumer and use taxes.
3. Secure and pay for all site specific as necessary for proper execution and completion of Work.
   a. Licenses.
   b. Permits and Fees.
   c. Government Fees .
   d. Royalties.
4. Give required notices.
5. Promptly submit written notice to Architect of observed variance.
6. Enforce strict discipline and good order among employees. Do not employ on Work:
   a. Unfit persons.
   b. Persons not skilled in assigned task.

1.5 WORK UNDER OTHER CONTRACTS

A. General Requirements:
1. Work under separate contracts will occur throughout the duration of the project. The work being installed under separate contracts will occur around adjacent to the Contract project site.
2. Contractor shall coordinate its work with the work under separate Contracts and shall cooperate with the Contractors of these separate Contracts as they occur.
3. Should the Contractor damage and/or otherwise alter work installed under separate contracts, the Contractor is responsible for the repair and/or correction of installed work.
4. Prior to the installation of the Work, coordinate the work installed or to be installed by separate contracts relative to this project scope of work.

B. Work by Owner:
1. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this contract or work by Owner. Coordinate the work of this Contract with work performed by Owner.

2. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be constructed simultaneously with work under this Contract.
   a. Items that are Owner Furnished Contractor Installed and Owner Furnished Owner Installed as indicated on the Contract Drawings and as defined in Specification Section - OWNER FURNISHED ITEMS.
3. Security and Intrusion Alarm System: Owner's Vendor will design the Intrusion Alarm System and identify pathways that need to be provided under the Contractor's Construction Contract.

C. Work Under Separate Contracts by Others:
1. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the work of this Contract with work performed under separate contracts.
2. Concurrent Work: Owner will award a separate contract(s) for the following construction operations at the Project Site. Those operations will be conducted simultaneously with work under this Contract.
   a. Off-Site Development: Construction of the Streets Improvements, City of Fresno Municipal Street Utilities and Public Utilities along Fowler Avenue and Church Avenue.
   b. Off-Site Electrical: The Relocation of Off-Site Electrical Transmission and Distribution lines will be provided by PG & E adjacent to the boundaries of the site.

D. Future Work:
1. The Contract Documents include requirements that will allow the Owner to carry out future work following completion of this Project; provide for the following future work:
   a. Alternate Bids not accepted as part of this construction contract.
      1) Sizing, Routing and Stub outs of underground utility lines.
      2) Earthwork and Grading.
   b. Construction of Future Buildings and associated site improvements per Master Site Plan.
      1) Sizing, Routing and Stub outs of underground utility lines.
      2) Earthwork and Grading.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Access to Site:
1. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of the Project.
2. Contractor shall be responsible for coordinating access to and from the site throughout the duration of the project. Access to and from the site may vary, based upon timing and duration of separate contracts.
3. The Contractor shall not use the Off-Site areas, with the exception of the Site Access per Specification Section - TEMPORARY FACILITIES AND CONTROLS, and shall not interfere with the work in these areas.

B. Contractor Use of Premises:
1. Confine operations at sites to areas permitted by:
   a. Laws.
   b. Ordinances.
   c. Permits.

d. Contract Documents.

2. Do not unreasonably encumber site with materials or equipment.
3. Assume full responsibility for protection and safekeeping of Contractor's and Owner's material stored on premises, and keep the site and building secure at all times.
4. Obtain and pay for use of additional storage Work areas needed for operations.
5. Limit use of Site Work and storage.

1.7 SCHEDULING

A. The Work of this Project will be constructed under a single contract.

1. It is anticipated that the start of construction will be around:

a. [Enter anticipated date for start of construction].

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 012300 – ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install or remove all materials, accessories and other related items necessary to add or delete from the Project as indicated by the alternates in the Contract Documents.
      a. Any services such as utilities that are meant to pass thru the Alternate areas that serve other areas not involved shall be maintained as part of the Base Bid whether indicated or not.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the BID FORM for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
   1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the work. No other adjustments are made to the Contract Sum.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Quality Assurance/Control Submittals:
      a. Notification Letter:
         1) Submit three (3) copies of Notification Letter to all concerned on the status of all ALTERNATES.

1.4 QUALITY ASSURANCE

A. Procedures:
   1. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into the Project.

a. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

b. Provide Lump Sum Price (and all itemized prices) for construction of the Base Bid and each Alternate Bid on the BID FORM.

2. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
3. Execute accepted alternate under the same conditions as other work of the Contract.
4. Schedule: A schedule of Alternates is included at the end of this Section.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. General: All Alternate descriptions are general in nature. Refer to the contract drawings for specific scope of work.

ALTERNATE BID 1

B. ALTERNATE BID NO. 1: North Parking Lot Expansion

1. All associated work with the construction of the North Parking Lot Expansion, as shown on the drawings.

C. ALTERNATE BID NO.2: Tennis Courts and Lights

1. All associated work with the construction of the Tennis Courts and Lights, as shown on the drawings.

D. ALTERNATE BID NO.3: Athletic Turf Fields

1. All associated work with the construction of the additional Soft Ball and Baseball Fields, as shown on the drawings.

BASE BID

E. ~~ALTERNATE BID NO.4~~: Building L

1. All associated work with the construction of Building L.

END OF SECTION

SECTION 012500 – SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all approved substituted materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
   2. See the INSTRUCTIONS TO BIDDERS or the GENERAL CONDITIONS for time limits set for the submittal of substitutions.
   3. Substitutions can be requested in two ways: a. "Prior to Bid Opening", and b. "After Award of the Contract":
      a. "Prior to Bid Opening": The Contractor or Bidder must insure that proposed substitutions of materials by the Contractor or Bidder are submitted to the Architect's office no later than fourteen (14) calendar days prior to the Bid Opening for review and possible approval of any equipment or materials thought to be equal to or better than those specified in the drawings or specifications. An Addendum will be issued no later than three (3) calendar days prior to Bid Opening including all equipment and materials deemed equivalent to those specified and approved by the Architect.
      b. "After Award of the Contract": In accordance with the provisions of Section 3400 of the California Public Contract Code, the Contractor awarded the Contract will be provided a period of thirty-five (35) calendar days after the award of the Contract for submission of data substantiating a request for a substitution of "an equal" item or items.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
      a. 01 26 00 CONTRACT MODIFICATON PROCEDURES for additional requirements for substitution of items relating to structural, fire safety, life safety or accessibility.
   3. SPECIFICATION SECTIONS IN THE FACILITY CONSRUCTION SUBGROUP.
   4. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Claimant: Bidder, Sub-Contractor, Contractor, Distributor, Supplier, Manufacturer or other entity that is submitting a claim for a substitution.

B. Substitutions: Substitutions are not a part of the Submittal Process described in Specification Section – SUBMITTAL PROCEDURES. Substitution Requests by a claimant must be reviewed and approved by the Architect before any submittal will be accepted. It is the claimant's responsibility to provide clear and concise documentation to expedite the Architect's review. If the Substitution Request requires re-submission(s) due to the Claimant's inadequate documentation, no time extension will be allowed.

C. "Or Equal" / "Or Approved Equivalent": Claimant shall request a substitution in accordance with this Specification Section – SUBSTITUTION PROCEDURES.

D. The Project Manual employs the following methods of specifying products. Claimant shall conform to the directives below for this Project:
   1. Product, system or design specified only by reference standards:
      a. Select any product, system or design meeting reference standards.
   2. Product, system or design specified by naming several products, systems, designs and/or manufacturers:
      a. Select any product, system, design and/or manufacturer named.
   3. Product, system or design specified by naming several products, systems and/or manufacturers and reference standards:
      a. Products, systems, designs and/or manufacturer names indicate products, systems, designs and/or manufacturers that (in the Architect's opinion) meets the reference standards.
      b. Select any of the named manufacturer's products, systems or designs meeting the reference standards.
   4. Product, system or design specified by naming one or more products, systems, designs and stating "or equal to", "or approved equivalent" with the specified products, systems or designs:
      a. Select product, system or design specified, "or approved equivalent".
   5. Product, system or design specified by naming only one product, system or design:
      a. Select product, system or design specified, "or approved equivalent".
   6. Product, system or design specified by naming only one product, system or design and followed by the statement "DISTRICT STANDARD – NO SUBSTITUTIONS":
      a. Provide product, system or design specified. No substitutions allowed.

E. Cost to Claimant for review of Substitution Request:
   1. Each review of a Substitution Request by the Architect and/or it's Consultant(s) will be billed to the Claimant at an hourly rate of **$200.00** an hour, two hour minimum for each review, whether approved or rejected.
      a. Waiver of review fees:
         1) When the product has been discontinued or is unavailable.
            a) EXCEPTION: Where the claimant has failed to order in a timely manner and waits until the last minute, no consideration of the waiver of fees will be allowed; no time extensions will be allowed.
         2) When the Owner has requested a substitution.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - INSTRUCTIONS TO BIDDERS:

B. Content of Request:
   1. Check made payable to DARDEN ARCHITECTS, INC. for the minimum two hour review period for **$400.00**, non-refundable.
      a. When additional time is required to review a substitution request beyond the first two hours, the Architect or its consultants will bill the claimant for the time expended in the review process.
   2. Complete the attached **SUBSTITUTION REQUEST FORM** substantiating compliance of proposed substitution with Contract Documents. **NO OTHER FORMS WILL BE ACCEPTED.**

3. Attach to the SUBSTITUTION REQUEST FORM an itemized comparison of proposed substitution with product, system or design specified.
4. For products or systems, attach to the SUBSTITUTION REQUEST FORM:
   a. Product, system or design identification, including manufacturer's name and address.
5. Manufacturer's product information: MUST BE HIGHLIGHTED AND PROJECT SPECIFIC. SUBMITTALS NOT ADEQUATELY MARKED-UP ACCORDING TO PROJECT SPECIFICS WILL BE REJECTED:
   a. Literature including product, system or design description, performance and test data and reference standards.
   b. Samples.
   c. Warranties.
6. For construction methods, attach to the SUBSTITUTION REQUEST FORM:
   a. Detailed description of proposed methods.
   b. Drawings illustrating methods.

C. Submit three (3) copies of Substitution Request including all attached data.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Product, system or design qualifications:
   a. In making a request for substitution, Claimant certifies that:
      1) Claimant has personally investigated proposed product, system or design, and determined that it is equal or superior in all respects to that specified.
      2) Claimant shall provide the same guarantee or warranty for substitution as for product, system or design specified.
      3) Claimant shall coordinate installation of accepted substitution into the Project, making such changes as may be required for the Project to be complete in all respects.
      4) Claimant waives all claims for additional costs related to substitution which subsequently become apparent for integrating the substituted product, system or design into the Project.
      5) Claimant waives all claims for time extension(s) due to improper documentation requiring re-submission(s) of a Substitution Request Review.

B. Regulatory Requirements:
1. Per Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. Products (and installation standards), systems or methods used for this Project shall comply with CARB standards in effect at the Project Site, and at the time of installation.
2. Substitutions affecting structural, life safety, and accessiblity shall be considered a Construction Change and shall be approved by DSA prior to fabrication and installation. Refer to Specification Section CONTRACT MODIFICATION PROCEDURES.

C. Acceptance of Substitutions:
1. Procedures:
   a. The Contract is based on products, systems or designs described in the Contract Documents.
   b. Architect will consider proposals submitted in accordance with time limits set within the Specification Section - INSTRUCTIONS TO BIDDERS.
   c. Architect is solely responsible for judging the acceptance of substitutions.

1) Acceptance of a substitution does not waive the product manufacturer's responsibility for product liability. The Architect will judge (based on the substitution submission data) for function and use – product liability shall remain the responsibility of the product manufacturer.

d. Substitute products, systems or designs shall not be used unless the substitutions have been specifically approved for this Project by the Architect.

1) Substitute products, systems or designs that are related to structural, fire and life safety or access compliance shall not be used unless such substitution have been specifically approved for this Project by the Architect and the appropriate authority having jurisdiction.

2. Substitutions will not be considered if:

a. They are indicated or implied on product submittals in accordance with Specification Section - SUBMITTAL PROCEDURES. Substitutions are not Submittals, and must be reviewed and approved prior to being submitted as a Submittal.

b. Acceptance will require substantial revision of Contract Documents.

c. They are submitted after the date set for substitutions within this Contract, unless:

1) The specified or drawing item that has been verified to be discontinued or is otherwise unavailable.

2) The Owner proposes a cost savings for the product, system or method.

3) The Owner proposes early occupancy, and the proposed substitution allows for that convenience.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

A. Substitution Request Form:

1. See the form attached to the end of this section.
2. The attached form will be reproduced (and sequentially numbered by the Contractor after the award of the Contract) by the Claimant for any and all proposed substitutions.
3. **<u>NO OTHER FORMS WILL BE ACCEPTED.</u>**

(Attachment)

SUBSTITUTION REQUEST FORM

TO: DARDEN ARCHITECTS, INC.
6790 N. West Avenue
Fresno, CA 93711

_____ Check attached for minimum review $400.00.

CHECK APPROPRIATE LINE:

_____ Substitution Request Prior to Bid (During Bid Period)

_____ Product or System Substitution
_____ Design Change Substitution

_____ Substitution Request After Award of the Contract
_____ Product or System Substitution
_____ Design Change Substitution

The Contractor Awarded the Contract for this Project shall assign sequential Substitution Request # below.
Leave blank if submitted during the Bid Period.

SUBSTITUTION REQUEST #_____

WE HEREBY SUBMIT FOR YOUR CONSIDERATION THE FOLLOWING PRODUCT OR METHOD AS SUBSTITUTION FOR THE SPECIFIED OR DRAWING ITEM FOR THIS PROJECT:

PROJECT: _____

SPECIFIED ITEM: _____

_____	_____	_____	_____
Specification Section #	Page #	Paragraph #	Description

OR
DRAWING ITEM: _____

_____	_____	_____
Drawing #	Detail Cut #	Description

PROPOSED CREDIT IF ANY: _____

PROPOSED SUBSTITUTION:
_____
_____
_____
_____

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents to which the proposed substitution will require for its proper installation.

The undersigned claimant certifies: (Modifications by the claimant to the following list is cause for automatic rejection without further review)

1. The proposed substitution does not affect dimensions shown on drawings or code requirements indicated.
2. The undersigned claimant shall compensate the Architect at a rate of **$200.00** an hour, two hour minimum for each review (check for **$400.00** must be attached to this form), for investigation and comments whether or not the request is approved for changes required to the building design, including engineering design, detailing, and construction costs caused by the requested substitution. The Architect is herein defined as any of those firms or individuals listed by reference on the Drawings, including all Consultants identified herein.
3. The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts will be locally available for the proposed substitution.
5. Attach information for a minimum of three projects where the substitution has been used locally within a 200 mile distance of this project, including names, addresses and telephone numbers of Owners who have accepted this product into their projects.
6. Attach all cost data with explanations if different from Specified or Drawing item. Include in that explanation a discussion on quality of proposed substitution and cost differential.
7. The undersigned claimant shall pay for any subsequent changes in incorporating the proposed substitution that were not apparent at the time of approval into the Work, including compensation to the Architect as described in item 2 above.

The undersigned Claimant(s) declares under penalty of perjury per the California Government Code Section 12650, et seq., that the claim of function, appearance and quality are equivalent or superior to the specified or drawing item, and further know and understand that submission for certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.

SUBMITTED BY CLAIMANT:

Signature_____
Firm_____

Address_____
_____
Date_____
Telephone_____

ADDITIONAL CLAIMANT SIGNATURE REQUIRED:

The Contractor or Construction Manager if submitted after the Award:

Signature_____
Firm_____

DESIGN CONSULTANT USE ONLY:

___ Check Not Attached - Not Accepted
___ Accepted
___ Accepted as Noted
___ Not Accepted
___ Received Past Time Period Allowed by Public Contract Code #3400.

By _____Date _____
Remarks_____

END OF SECTION

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:
1. 012500 SUBSTITUTION PROCEDURES for administrative procedures for handling requests for substitutions made after the Contract award.
2. 013100 PROJECT MANAGEMENT AND COORDINATION for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on form included in Project Manual or web-based Project management software.

1.4 CONSTRUCTION CHANGE DOCUMENT

A. Changes to the structural, accessibility, or life-safety portions of the DSA-approved Contract Documents shall be submitted to and approved by DSA as a Construction Change Document, as required by California Administrative Code, Title 24, Part 1, Section 4-338, prior to commencement of the Work. Program Management Team shall prepare and submit Construction Change Documents to DSA in compliance with DSA Interpretation of Regulation IR A-6.

B. Construction Change Documents shall be signed by all of the following:
1. Architect of Record.
2. Structural Engineer, when applicable.
3. Delegated Professional Engineer, when applicable.
4. Division of the State Architect.

1.5 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    e. Quotation Form: Use forms provided by Owner. Sample copies are included in Project Manual.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form provided by Owner. Sample copy is included in Project Manual.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on form included in Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012973 – SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the administrative and procedural requirements necessary to prepare and process the Schedule of Values, Unit Price Schedules, and Application for Payment.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Schedule of Values: A statement furnished by the Contractor allocating portions of the Contract Sum to various portions of the Work. The statement shall be used as the basis for reviewing the Contractor's Application for Payment.

B. Unit Prices: Unit Prices are applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work. If the Scope of Work or estimated quantities of Work required by the Contract Documents is increased or decreased, Unit Prices are added to or deducted from the Contract Sum by appropriate modification.

C. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring and controlling the construction project. Activities included in a Schedule of Values and Payment Request consume cost for time and resources.

D. Activity Code: Identifies each activity so as to be organized, group and sorted into Sub-Schedules, Areas of Work, and Reports.

E. Allowances: Contract amounts allocated for specific activities of the project as identified in the contract documents.

F. Application for Payments: A statement furnished by the Contractor allocating portions of the Contract Sum to various portions of the Work stipulating the amount of work that has been completed to date.

G. Contingency: Contract amounts allocated for non-specific activities, to cover changes in the contract document work, unforeseen conditions and added scope of work to the project.

H. Major Scope: Significant portions of work identified as, but not limited to, Base Bid, Alternate Bids, and Construction Phases, and Funding Criteria.

I. Responsible Party: Entity that is responsible for performing the work of each activity as identified, but not limited to, General Contractor, and Sub-Contractor, second and tertiary tier Sub-Contractors, Manufacturers, Fabricators and Vendors.

J. Scope Type: Segments of work identified as, but not limited to, Building ID, On-Site, and Off-Site.

K. Sub-Schedules: Separated activities identified as part of the same element of work and arranged to show correlation with related elements.

1.3 SUBMITTALS

A. General:
1. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.

B. Format for Submittals: A tabular form type schedules.
1. Provide a working electronic copy of schedule file.
   a. Provide schedule files on Compact Disc (CD) or Digital Versatile Disc (DVD) (WINDOWS Formatted Disks) in a form that can be reviewed and used by the Owner, and Architect.
2. Provide PDF electronic copy of schedule file.
3. Provide Two (2) paper copies of schedules.
   a. Sheet size shall be of adequate size to clearly show the required information for the entire construction period.
   b. All required documentation shall have the Submittal number posted in the upper-right hand corner of the page.

C. Assurance/Control Submittals:
1. Schedule of Values.
   a. Schedule of Bid Values.
      1) Submit within fourteen (14) days after the Award of Contract.
   b. Complete Schedule of Values.
      1) Submit at the earliest possible date, but no later than fifteen (15) days prior to the date scheduled for submittal of initial Application for Payment.
2. Application for Payment and Certification.
   a. Application for Payment and Certification Forms.
      1) Submit along with the Complete Schedule of Values submittal.
   b. Initial Application for Payment.
      1) Submit seven (7) days prior to due date.
   c. Application for Payment for Progress of Work.
      1) Submit by the twentieth (20th) day of the month unless otherwise agreed upon by the District.
   d. Application for Payment at Substantial Completion.
      1) Submit after Architect issues the Certificate of Substantial Completion.
   e. Final Application for Payment.
      1) Submit after competing Project Closeout requirements.
3. Schedule of Unit Price.

1.4 SYSTEM DESCRIPTON

A. General:

1. The Architect considers the project Schedule of Values requirements to be significant to both the Contractor and the Owner. The development, submittal, and acceptance of the Schedule of Values, (Bid and Complete), and subsequent development and maintenance of the Application for Payments must be given high priority.
    a. No payment will be made without the Architect's review and acceptance of the Schedule of Values.
    b. Progress payments may be withheld in whole or part should the Contractor fail to comply with the requirements of this section.
    c. No separate payment will be made to the Contractor for any of the requirements of this section. All such costs shall be part of the Contractor's planned project overhead costs included in its bid.

B. Performance Requirements:
1. Schedule of Bid Values: The Schedule of Bid Values shall be a breakdown of the Bid(s) submitted in the Bid Proposal and shall include all work that was bid on, regardless the scope of work awarded for construction. The breakdown shall be sufficient for the use by the Owner and Owner's Consultants to evaluate and determine cost of major scopes of work and the value of other owner agreements that are associated with the dollar value of the bid proposal.
    a. Refer to Specification Section – SUMMARY OF WORK.
    b. Refer to Specification Section – ALTERNATES.
2. Complete Schedule of Values: Breakdown of the Contract Sum by specific line-item values, based on the individual activities in the Baseline Project Construction Schedules and to be the basis for the development of the Application for Payment.
    a. Refer to Specification Section – CONSTRUCTION SCHEDULES.
3. Application for Payments: Shall be derived from Baseline Project Construction Schedule utilizing the costs in the Complete Schedule of Values, and from subsequent Project Construction Schedule Updates, reflecting the Work performed as of planned and actual dates.
    a. Refer to Specification Section – CONSTRUCTION SCHEDULES.
4. Unit Prices: If the Scope of Work or estimated quantities of Work by the Contract Documents is increased or decreased, Unit Prices are added to or deducted from the Contract Sum by appropriate modification.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. The Contractor must have the capacity and capability of supporting the project by producing schedule-related data within two (2) days of request by the Architect, or Owner.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Coordination:
1. Coordinate preparation of the Schedule of Bid Values with the submitted Bid Proposal and reflect the major scope of work breakdown described in Specification Section – SUMMARY OF WORK and Specification Section – ALTERNATES.

2. Coordinate preparation of the Complete Schedule of Values with the preparation of the Baseline Project Construction Schedule. Refer to Specification Section – CONSTRUCTION SCHEDULES.
3. Correlate line items in the Complete Schedule of Values with other required administrative forms and schedules, including, but not limited to, the following:
   a. Application for Payment forms with continuation sheets.
   b. Submittals Schedule.
   c. Items required to be indicated as separate activities in the Baseline Project Construction Schedule.

B. Project Information:
1. Identification: Include the following Project Identification on all Schedule of Values and Application for Payment.
   a. Project Name and Location.
   b. Name of Owner and Address.
   c. Name of Architect and Address.
   d. Architect's Project Number.
   e. Contractor's Name and Address.
   f. Submittal Date.

2.2 SCHEDULE OF BID VALUES

A. Format:
1. Arrange the Schedule of Bid Values in tabular form.
   a. Provide and identify separate columns to indicate the following ;
      1) SPECIFICATION SECTION.
      2) DESCRIPTION.
      3) RESPONSIBLE PARTY.
      4) MAJOR SCOPE.
      5) DOLLAR VALUE.
   b. Provide and identify separate line-items to indicate the following;
      1) Activity.
      2) Contract Conditions.
      3) Allowance(s).
      4) Contingency (ies).
      5) Grand Totals.

B. Content:
1. SPECIFICATION SECTION: Use the specification section number in the Project Manual Table of Contents to identify and establish each line-item.
   a. Provide a single line item for each specification section included in the FACILITY CONSTRUCTION SUBGROUP.
   b. Provide a single line item for each division included in the FACILITY SERVICES SUBGROUP.
   c. Provide a single line item for each specification section included in the SITE AND INFRASTRUCTURE SUBGROUP.
2. DESCRIPTION: Provide a description of the work for each line-item associated with the specification section and responsible party.
3. RESPONSIBLE PARTY: Identify the responsible party for performing the work of each line-item associated with the specification section and description.MAJOR SCOPE: Designate Major scope of work as identified and itemized in BID PROPOSAL.
   a. Provide separate columns for each Major Scope of Work identified.

4. DOLLAR VALUE: Sub-Total of the cost for each activity line-item, with the amounts rounded to the nearest dollar.
   a. Assign a dollar value for each line-item to each Major Scope of the project excluding General Conditions, General Requirements and General Contractor's Overhead and Profit.
5. Activity: Provide at least one activity item-line for the work in each Specification Section.
   a. Provide separate activity line items for each Contractor or Subcontractor providing work under the same specification section.
6. Contract Conditions:
   a. Identify and provide separate activity line-item for cost items that are directly related to Division 01 - GENERAL REQUIREMENTS.
   b. Identify and provide separate activity line-item for cost items that are directly related to Division 00 - CONDITIONS OF THE CONTRACT.
7. Allowances: Identify and provide separate activity line- item for each Allowance that is assigned for specific work in any specification section. Dollar value to exclude General Contractor's Overhead and Profit.
8. Contingencies: If required, identify and provide separate activity line-item for each Contingency that is not assigned to specific work in any specification section. Dollar value to exclude General Contractor's Overhead and Profit.
   a. If required, provide separate line items for Owner Contingency and Contractor Contingency.
9. Grand Total: Summation of dollar value for each column equal to the Bids received.

2.3 COMPLETE SCHEDULE OF VALUES

A. Format:
1. Provide a comprehensive, fully developed, detailed Complete Schedule of Values in tabular form.
   a. Provide and identify the following separate columns to indicate the following for each item listed;
      1) SPECIFICATION SECTION.
      2) ACTIVITY CODE.
      3) DESCRIPTION.
      4) RESPONSIBLE PARTY.
      5) MAJOR SCOPE.
      6) SCOPE TYPE.
      7) DOLLAR VALUE.
   b. Provide and identify separate line-items to indicate the following;
      1) Activity.
      2) Sub-Schedules.
      3) Contract Conditions.
      4) Allowance(s).
      5) Purchase Contracts (if applicable).
      6) Contingency (ies).
      7) Grand Totals.

B. Content:
1. SPECIFICATION SECTIONS: As described in the Schedule of Bid Values.
2. ACTIVITY CODE: Provide the Activity Identification Code for each line-item indicated as separate activities in the Baseline Project Construction Schedule.
3. DESCRIPTION: As described in the Schedule of Bid Values
4. RESPONSIBLE PARTIES: As described in the Schedule of Bid Values.

5. MAJOR SCOPE: As described in the Schedule of Bid Values.
6. SCOPE TYPE: Identify each line-item that is associated with a segment of work.
7. DOLLAR VALUE: As described in the Schedule of Bid Values.
8. Activity: As described in the Schedule of Bid Values and the following;
    a. Expand to include entities, which is responsible for performing the work of each activity, identified as, but not limited to, General Contractor, and Sub-Contractor, second and tertiary tier Sub-Contractors, Manufacturers, Fabricators and Vendors.
    b. Expand to include separate activity line-items for cost items that are directly related to Division 01 - GENERAL REQUIREMENTS and are direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
        1) Submittals,
        2) Field Engineering
        3) Operation and Maintenance Manuals.
        4) Demonstration and Training.
9. Sub-Schedules:
    a. Major Scope of Work: Provide Sub-Schedules for line-items that are associated with each designated major scope of work as identified in Bid Proposal, and defined in Specification Section – SUMMARY OF WORK and **Specification Section – ALTERNATES**, that requires itemization of each line-item value.
    b. Scope Type: Provide Sub-Schedules for line-items that are associated with each specific scope type.
        1) Building Costs: Detailed cost breakdown of all cost items that are directly related to the Project per Building.
            a) When the Project Building(s) is of sufficient size to warrant, break the building costs down into areas of work compatible with the Contractor's Means and Methods for construction sequences.
            b) Building areas may consist of floor and roof levels and partial floor and roof levels.
        2) Project Site Costs: Detailed cost breakdown of all cost items that are directly related to the Project Site.
            a) When the Project Site is of sufficient size to warrant, break the site costs down into areas of work compatible with the Contractor's Means and Methods for construction sequences.
10. Contract Conditions: As defined in the Schedule of Bid Values and the following;
    a. Expand to include separate activity line-items for cost items that are directly related to Division 01 - GENERAL REQUIREMENTS and are not direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
        1) Temporary Facilities.
        2) Field Supervision.
        3) Project Identification Sign.
        4) Project Closeout Requirements.
            a) Punch List Activities, and Project Record Documents.
    b. Expand to include separate activity line-item for cost items that are directly related to Division 00 - CONDITIONS OF THE CONTRACT REQUIREMENTS and are not direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
        1) On-Site Facilities and Supervision.
        2) General Contractor's Overhead and Profit.
        3) Performance and Labor and Material Bonds.
11. Allowances: As defined in the Schedule of Bid Values.
12. Purchase Contracts: Provide separate line-item in the Schedule of Values for each Purchase Contract, showing the value of the Purchase Contract.
13. Contingencies: As defined in the Schedule of Bid Values.
14. Grand Total: As defined in the Schedule of Bid Values.

15. Off-Site Costs shall have their own Schedule of Values, and the On-Site costs shall have their Schedule of Values. If a trade contractor is working on Both On-Site and Off-Site work, the trade contractor shall separate these costs.
16. For Off-Site Costs, the schedule of values shall be broken down into units, unit costs, and extensions. The District requires and needs this information for both State and City Funding.
    a. Curb, Gutters, & Paving
    b. Sidewalks
    c. Street Lighting, Landscaping, & Signage
    d. Special District Fees
    e. Utilities, beyond the property lines.
    f. Storm Drain Costs
    g. Water
    h. Sewer
    i. Gas
    j. Electrical
    k. Communications
    l. Concrete Walks and Safety Paths
    m. Permits/fees, testing, inspections, etc.
    n. Soft costs for general requirements and conditions, bonds, insurance, overhead, and profit.
17. For On-Site Costs, the schedule of values shall be broken down by Buildings and Site Development.
    a. The Soft costs for general requirements and conditions, bonds, insurance, overhead, and profit shall be broken out from the buildings and on-site development costs.
    b. Each Building shall be broken out from all other buildings.
    c. Building costs
        1) Foundations, by material
        2) Structure, by material
        3) Exterior Finishes, by material
        4) Roofing systems, by material
        5) Openings, by material, interior and exterior.
        6) Metal Framing, exterior walls and interior walls
        7) Interior Finishes, by material
        8) Plumbing
        9) Mechanical
        10) Mechanical Controls
        11) Electrical Power, Lighting, Controls
        12) Fire Alarm System
        13) Fire Sprinkler System
        14) ERRCS system
    d. General Site Development
        1) Finish Grading
        2) Pavement, Roads, and Driveways
        3) Parking lot pavement
        4) Curbs and gutters
        5) Paved play courts
        6) Play court equipment
        7) Playfield backstops and equipment
        8) Playfield electrical power, communications, and security
        9) Sidewalks
        10) Steps and Ramps
        11) Above-grade valley gutters and drainage systems

12) Grounds, Landscaping and Irrigation
13) Turfed playfields, Landscaping and Irrigation
14) Site Lighting and Pole bases
15) Chain Link Fencing
16) Ornamental Fencing
17) CMU Fencing
18) Temporary Facilities

e. Service Site Development
1) Site Clearing and Grubbing
2) Site Demolition
3) Rerouting any Utility Line
4) Rough Grading
5) Soil Compaction and engineered building pads.
6) Storm Drain Utility Improvements
7) Erosion Control (Storm Water Pollution Prevention Plan, SWPPP)
8) Stairs, Steps, Ramps, & Retaining Walls
9) Work required for site improvements at the Portables
10) Fire Water Utility Service; including hydrants, FDC, PIV and related costs
11) Utility Services
12) Water
13) Sewer
14) Gas
15) Electrical
16) Communication

2.4 UNIT PRICES

A. Unit Prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead and profit.
1. Breakdown prices into:
a. Delivered cost of products(s) including tax.
b. Total installed cost excluding overhead and profit.
c. Add Contractor's and subcontractor’s overhead and profit costs after subtotal and provide a final total.

Paragraph below will suffice for all but the most complex projects. Revise if many unit prices are anticipated and if methods for measuring work-in-place are complex. A special article or additional paragraphs outlining procedures for measurement and payment might be needed to define responsibilities for complex situations.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of Unit Prices. Methods of measurement and payment for Unit Prices are specified in those sections.

The General Conditions protect the Owner in case of dispute. Sometimes they give the authority to ***determine actual quantity of work. Revise to suit Owner’s requirements.***

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established Unit Prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to the Contractor.

Revise to suit Project.

D. List of Unit Prices: A schedule of Unit Prices is included in PART 3. Specification Sections referenced in the schedule contain requirements for materials described under each Unit Price.

2.5 PROPOSITION 39 UNIT COSTS:

A. Unit Costs shall include all necessary labor, material, and other information for energy related mechanical and lighting costs.
   1. Contract shall provide the unit make, model, quantities and additional information regarding HVAC, Boilers, Pumps, EMS and Light Fixtures.

B. List of Unit Costs: A schedule of Unit Costs is included in PART 3 and attached are sample forms.

PART 3 - EXECUTION

3.1 APPLICATION AND CERTIFICATION FOR PAYMENT

A. General Requirements:
   1. Coordination: Coordinate the preparation of the Application for Payment with the preparation of the Complete Schedule of Values and Project Construction Schedule.
      a. Entries shall match data on the Complete Schedule of Values and Project Construction Schedule and Project Schedule Updates, if revisions were made.
   2. Application and Certification for Payment Forms: Use forms accepted by the Architect and Owner for Applications for Payment.
      a. Form shall be based on AIA Document G702 Application and Certification for Payment and AIA Document G703 Continuation Sheets.
      b. Submit form for acceptance with initial submittal of Complete Schedule of Values.
   3. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of the Contractor. Project Inspector or Architect will return incomplete applications without action.
      a. Use signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include Waivers of Lien and similar attachments if required.
   4. Identification: Include the following Project Identification on all Application for Payment:
      a. Project Name and Location.
      b. Owner Name.
      c. Architect's Project Number.
      d. Contractor Name and Address.
      e. Application Number.
      f. Application Date.
      g. Period To:

B. Format.
   1. Provide a comprehensive, fully developed, detailed Application for Payment with Continuation Sheets in tabular form.
      a. Provide and identify the following separate columns to indicate the following for each item listed;
         1) ACTIVITY CODE.

2) DESCRIPTION.
3) SCHEDULED DOLLAR VALUE.
4) WORK COMPLETED.
a) FROM PREVIOUS APPLICATION.
b) THIS PERIOD.
5) TOTAL COMPLETED.
6) PERCENTAGE OF COMPLETION.
7) BALANCE TO FINISH.
8) RETAINAGE.

b. Provide and identify separate line-items to indicate the following the following;
1) Activity.
2) Sub-Schedules.
3) Contract Conditions.
4) Allowance(s).
5) Purchase Contracts (if applicable).
6) Contingency (ies).
7) Grand Totals.
8) Change Orders.

C. Content:
1. ACTIVITY CODE: Provide the Activity Identification Code for each line-item of Work as indicated as separate activities in the Project Construction Schedule
2. DESCRIPTION OF WORK: Provide the same description as indicated in the Schedule of Values for each line item.
3. SCHEDULED DOLLAR VALUE: Provide the same amount as indicated in the Schedule of Values for each line item.
4. WORK COMPLETED: with the following sub-columns.
a. FROM PREVIOUS APPLICATION, include Dollar Value for work completed in previous Application for Payment, whether or not payment has been received.
b. THIS PERIOD, include only the Dollar Value for work completed at the time of Application for Payment.
5. TOTAL COMPLETED: The sum Dollar Value of Work Completed and Materials Presently Stored.
6. PERCENTAGE OF COMPLETION: The percentage value of the total Work Completed and the Stored to Date divided by the Scheduled Value.
7. BALANCE TO FINISH: The dollar value of the Scheduled Value minus the Total Completed.
8. RETAINAGE: The dollar value of the percentage of retention per contract agreement.
9. Activity:
a. Use the Complete Schedule of Values and Baseline Project Schedule as a guide to establish activity line-items for the Application for Payment.
b. Include separate activity line-items when a work activity is separated into stages and requires separate payments for each stage.
c. Provide separate line-items for each part of the Work where separate payments will be requested including, but not limited to, submittals, materials, equipment, fabrication and installation.
d. Provide separate line items for materials stored but not yet installed, where separate payments will be requested.
10. Sub-Schedules: As described in the Complete Schedule of Values.
11. Contract Conditions: As described in the Complete Schedule of Values.
12. Allowances: As described in the Complete Schedule of Values.
13. Purchase Contracts: As described in the Complete Schedule of Values
a. Indicate Owner payments or deposits, if any, and balance to be paid by the Contractor

14. Contingencies: As described in the Complete Schedule of Values.
15. Grand Totals: As described in the Complete Schedule of Values.
16. Change Orders:
    a. Include amounts of approved Change Orders or Construction Change Directives issued before the last day of construction period covered by application.

D. Supplemental Information:
1. Materials Stored: Include in Application for Payment the amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed.
    a. Differentiate between items stored on-site and items stored off-site.
    b. Provide certificate of insurance or Bonded Warehousing, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
    c. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
    d. Provide summary documentation for stored materials indicating the following:
        1) Materials previously stored and included in previous Applications for Payment.
        2) Work completed for this Application utilizing previously stored materials.
        3) Additional materials stored with this Application.
        4) Total materials remaining stored, including materials with this Application.

Insert instructions for preparation and submittal of waivers or releases here if not stated in the General or Supplementary Conditions. Have Owner review and provide their requirements for inclusion.

Lien laws vary widely in the U.S. Owner's legal counsel and financial advisors, not the Architect, should establish requirements for waivers of mechanic's liens.

2. Waivers of Mechanic's Lien: With each Application for Payment, submit Waivers of Mechanic's Liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
    a. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
    b. When an Application shows completion of an item, submit conditional final or full waivers.
    c. Owner reserves the right to designate which entities involved in the Work must submit waivers.
    d. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
    e. Waiver Forms: Submit waivers of lien on forms executed in a manner acceptable to Owner.

E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for payment include the following:

Revise list below to suit Project.

1. List of Subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products List (preliminary if not final).
5. Schedule of Unit Prices.
6. Submittal Schedule (preliminary if not final).
7. List of Contractor's Staff Assignments.
8. List of Contractor's Principal Consultants.

9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
10. Initial Progress Report.
11. Report of Preconstruction Conference.

F. Application for Payment for Progress of Work:
1. Each Application for Payment shall be consistent with previous applications and payments as certified by the Project Inspector, Architect, and paid for by the Owner.
2. Payment Applications shall be submitted to the Architect by the date established by the Owner. The maximum period of time covered by each Application for Payment is for one month.
3. Payments Applications shall be updated to reflect any revised activity in the Project Schedule Updates.

G. Application for Payment at Substantial Completion: After the issuing of the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portions of the Work claimed as substantially complete.
1. Include documentation supporting the claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

H. Final Application for Payment: Submit Final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

Revise list below to suit Project. Consult Owner about the need for additional affidavits and other requirements.
1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement accounting for final changes to the Contract Sum.
4. "Contractor's Affidavit of Payment of Debts and Claims".
5. "Contractor's Affidavit of Release of Liens".
6. "Consent of Surety to Final Payment".
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

3.2 SCHEDULE OF UNIT PRICES

A. Specification Section - CAST-IN-PLACE CONCRETE:
1. Concrete slabs per thickness per square foot.
2. Concrete foundations per cubic yard.
3. Concrete walls per cubic yard.

B. Specification Section - PLUMBING:
1. Utility trenching, pipe placement and backfill per pipe diameter size per linear foot at specific trench depths.

C. Specification Section - ELECTRICAL:

1. Utility trenching, sleeve pipe or conduit pipe placement and backfill per pipe diameter size per linear foot at specific trench depths.

D. Specification Section - COMMUNICATIONS:
1. Utility trenching, sleeve pipe or conduit pipe placement and backfill per pipe diameter size per linear foot at specific trench depths.

E. Specification Section - ELECTRONIC SAFETY AND SECURITY:
1. Utility trenching, sleeve pipe or conduit pipe placement and backfill per pipe diameter size per linear foot at specific trench depths.

F. Specification Section - EARTHWORK:
1. Scarification and compaction of existing soil per cubic yard.
2. Excavation and compacted placement of existing suitable site soil for non-engineered fill per cubic yard.
3. Delivery and compacted placement of import soil per cubic yard.
4. Delivery and compacted placement of import soil for grading per cubic yard.
5. Rough grading per square foot.
6. Finish grading per square foot.

G. Specification Section - STORM DRAINAGE:
1. Delivery and installation of catch basins per individual catch basin size.
2. Trenching, pipe placement and backfill per pipe diameter size per linear foot at specific trench depths.
3. Miscellaneous storm drainage items per item.

END OF SECTION

SECTION 013113 – CONTRACTOR'S PROJECT MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the administrative and procedural provisions for construction operations.

B. Related Sections:
1. DIVISION 00 SPECIFICATION SECTIONS, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
5. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. BIM: Building Information Modeling.

B. CAD: Computer Aided Design and Drafting.

C. RFI: Request for Information. Seeking information required by or clarifications of the Contract Documents.

D. MINUTES: A method of documenting key topics discussed with a focus on decisions made and directions given and by whom during a meeting. A verbatim transcript is not necessary.

1.3 SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.

B. Key Personnel Names: Within fifteen (15) days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities, list telephone numbers, and e-mail addresses. Provide names, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project. Keep list available and current at all times.

1.4 COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in the Contract Documents to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination of Multiple Contracts: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in the Contract Documents that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

D. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

E. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.5 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect, if available, for Contractor's use during construction, as per written request made by the Contractor.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.

2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Digital Drawing Software Program: Contract Drawings are available in Auto CAD.
4. Contractor, and other parties granted access by Contractor to Architect's digital data files, shall execute attached data licensing agreement form "USER AGREEMENT FOR ELECTRONIC FILES."

B. Web-Based Project Management Software Package: Use of Contractor' web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion, is acceptable.
1. Web-based Project management software includes, at a minimum, the following features:
a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
c. Document workflow planning, allowing customization of workflow between project entities.
d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
e. Track status of each Project communication in real time, and log time and date when responses are provided.
f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
g. Processing and tracking of payment applications.
h. Processing and tracking of contract modifications.
i. Creating and distributing meeting minutes.
j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
k. Management of construction progress photographs.
l. Mobile device compatibility, including smartphones and tablets.
2. Provide up to seven (7) Project management software user licenses for use by users as identified by Owner and Architect.
3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.

C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.
4. Do not submit password protected documents or restricted documents.

1.6 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. RFIs submitted to Architect by other parties controlled by Contractor will be returned without response.
2. Coordinate and submit RFIs in a prompt manner to avoid delays in work.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
2. Owner name.
3. Owner's Project number.
4. Name of Architect.
5. Architect's Project number.
6. Date.
7. Name of Contractor.
8. RFI number, numbered sequentially.
9. RFI subject.
10. Specification Section number and title and related paragraphs, as appropriate.
11. Drawing number and detail references, as appropriate.
12. Field dimensions and conditions, as appropriate.
13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
14. Contractor's signature.
15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Use forms accepted by the Architect and Owner. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven (7) days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.
2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.
    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within five (5) days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include not less than the following:
1. Project name.

2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three (3) days if Contractor disagrees with response.

1.7 COORDINATION DRAWINGS

A. Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
   1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
      b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
      c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
      d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
      e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
      f. Indicate required installation sequences.
      g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
   2. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.

B. Coordination Drawing Organization: Organize coordination drawings as follows:
   1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.

2. Above Ceiling: Indicate subframing for support of ceiling**,** and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenums to accommodate layout of light fixtures, fire sprinklers, mechanical ducts, support structures, structural elements (beams, joist, trusses) and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
   a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
   b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
   c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
   a. Runs of vertical and horizontal conduit 1-1/4 inchesin diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
   c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following: Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Site Utility Coordination: Show the following:
   a. Existing and proposed underground and surface utility improvements including gas, domestic water, fire water, chilled water, hot water, irrigation, storm sewer, sanitary sewer, electrical power, and communications. No site improvements shall be installed prior to Architect's and Owner's review of coordination drawing. Architect's and Owner's review is only for general conformance with the Contract Documents. Contractor is responsible to obtain their own GPR Services to locate utilities within the construction site area.

C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
1. Schedule submittal and review of Structural Steel, Wood Framing, Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
4. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
5. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.

6. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.

D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
   1. File Preparation Format:
      a. Same digital data software program, version, and operating system as original Drawings, operating in Microsoft Windows operating system.
   2. File Submittal Format: Submit or post coordination drawing files using PDF format, or in a format as requested by the Architect.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
   2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
   3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
   1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conduct matters relating to the Work.
   2. Agenda: Discuss items of significance that could affect progress, including the following:
      a. Introductions, responsibilities and personnel assignments.
      b. Tentative construction schedule.
      c. Phasing.
      d. Critical work sequencing and long lead items.
      e. Designation of key personnel and their duties.
      f. Lines of communications.
      g. Use of web-based Project software.
      h. Review of General Conditions/Requirements.
      i. Procedures for processing field decisions and Change Orders.
      j. Procedures for RFIs.
      k. Procedures for Submittals.
      l. Procedures for Substitutions.
      m. Procedures for testing and inspecting.
      n. Procedures for processing Applications for Payment.
      o. Distribution of the Contract Documents.
      p. Submittal procedures.
      q. Sustainable design requirements.
      r. Preparation of Record Documents.
      s. Use of the premises.
      t. Work restrictions.
      u. Working hours.

v. Owner's occupancy requirements.
w. Responsibility for temporary facilities and controls.
x. Procedures for moisture and mold control.
y. Procedures for disruptions and shutdowns.
z. Construction waste management and recycling.
aa. Parking availability.
bb. Office, work, and storage areas.
cc. Equipment deliveries and priorities.
dd. Project Safety.
ee. Security.
ff. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Owner and Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   a. Contract Documents.
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Review of mockups.
   i. Possible conflicts.
   j. Compatibility requirements.
   k. Time schedules.
   l. Weather limitations.
   m. Manufacturer's written instructions.
   n. Warranty requirements.
   o. Compatibility of materials.
   p. Acceptability of substrates.
   q. Temporary facilities and controls.
   r. Space and access limitations.
   s. Regulations of authorities having jurisdiction.
   t. Testing and inspecting requirements.
   u. Installation procedures.
   v. Coordination with other work.
   w. Required performance results.
   x. Protection of adjacent work.
   y. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conduct matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
   a. Preparation of Record Documents.
   b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
   c. Procedures for completing and archiving web-based Project software site data files.
   d. Submittal of written warranties.
   e. Requirements for preparing operations and maintenance data.
   f. Requirements for delivery of material samples, attic stock, and spare parts.
   g. Requirements for demonstration and training.
   h. Preparation of Contractor's punch list.
   i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
   j. Submittal procedures.
   k. Coordination of separate contracts.
   l. Owner's partial occupancy requirements.
   m. Installation of Owner's furniture, fixtures, and equipment.
   n. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conduct matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      1) Review schedule for next period.
   b. Review present and future needs of each entity present, including the following:
      1) Interface requirements.
      2) Sequence of operations.

3) Status of submittals.
4) Status of sustainable design documentation.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site use.
9) Temporary facilities and controls.
10) Progress cleaning.
11) Quality and work standards.
12) Status of correction of deficient items.
13) Field observations.
14) Status of RFIs.
15) Status of Proposal Requests.
16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

F. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
   1. Attendees: Each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conduct matters relating to the Work. Advise Owner and Architect of scheduled meeting dates.
   2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
      a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
      c. Review present and future needs of each contractor present, including the following:
         1) Interface requirements.
         2) Sequence of operations.
         3) Status of submittals.
         4) Deliveries.
         5) Off-site fabrication.
         6) Access.
         7) Site use.
         8) Temporary facilities and controls.

9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Status of RFIs.
14) Proposal Requests.
15) Change Orders.
16) Pending changes.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS
NOT APPLICABLE

PART 3 - EXECUTION
NOT APPLICABLE

END OF SECTION

USAGE AGREEMENT FOR ELECTRONIC FILES
Release of Liability

Documents Transmitted By: **Darden Architects, Inc.**
6790 N. West Ave.
Fresno CA 93711

PROJECT NAME: _____

ARCHITECT PROJECT NO.: _____

PROJECT ARCHITECT: _____

I _____, as a duly authorized agent of_____ - (Contractor) have an agreement for construction services on the above named project. The Contractor acknowledges having received at least one (1) complete set of Contract Documents for the project and has posted all Addenda and all other contract documents issued to date.

The Contractor is requesting the electronic CAD files of work prepared by the Architect and/or Architect's Consultants (Design Team) on the subject project, so that the information therein may be utilized in the Contractor's work on the same project. The Contractor understands that these files are being provided as a courtesy and they are strictly intended for the Contractor's sole convenience and they are not recognized Contract Documents. This request is subject to the following conditions, which the Contractor hereby agrees to abide by:

1. It is understood and agreed to that any files and/or documents provided are instruments of professional service by the Design Team and are intended for one-time use solely in the construction of this project. They are and shall remain the property of the Architect or the Architect's Consultants, who is deemed to be the author of the drawings and data, and who shall retain all common law, statutory law, and all other rights, including copyrights.

2. The Contractor shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from contractor's use of these electronic files, or in any way connected with the modification, misinterpretation, misuse, or reuse by the Contractor or by others.

3. The Contractor agrees that by using these electronic files, the Contractor is in no way relieved of the duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm and coordinate all dimensions and other details, take field measurements, verify field conditions and coordinate with all other contractors for the project.

4. It is agreed to that these electronic files are not Contract Documents. Differences may exist between electronic files and corresponding hard-copy Contract documents. The Design Team makes no representation regarding the accuracy or completeness of the electronic files provided to the contractor. In the event that a conflict arises, the signed and sealed hard-copy Contract Documents shall govern. Contractor is responsible for determining if any conflict exists.

5. The Contractor understands that the Design Team makes no representation as to the compatibility of these files with Contractor's computer hardware or software. The Contractor understands that the accuracy of the information is an artifact of the techniques used to generate it and is in no way

intended to imply actual accuracy. It is also understood that the automated conversion of information and data from the system and format used by the Design Team to an alternate system or format cannot be accomplished without the possibility of introduction of inexactitudes, anomalies and errors.

6. Because information presented on the electronic files can be modified, unintentionally or otherwise, the Design Team reserves the right to edit the drawings to remove information deemed not necessary and/or remove all indications of ownership and/or involvement from each electronic display.

7. The Design Team will only furnish those drawings directly applicable to the shop drawings the contractor wishes to create. The Contractor understands that not all electronic files may be available at the Design Team's discretion.

8. The Contractor understands that the Architect's Consultants may have Additional Conditions for release of their electronic files or documents, and the Contractor hereby agree to abide by the Consultants conditions in addition to the stated conditions in this agreement. Additional Conditions (if any) are attached to this agreement.

9. The Contractor understands that the Architect and the Architect's Consultants will incur certain costs in providing the requested electronic files. The Contractor agrees to pay the Design Team a service fee of $120.00 per sheet, per delivery, prior to any delivery of the electronic files to compensate the Design Team for the labor to prepare and transmit the files and for the additional risk that this transfer will occasion.

10. Under no circumstances shall delivery of the electronic files for use by the Contractor be deemed a sale by the Owner, the Design Team, or any member of the Design Team. The Design Team makes no warranties, either expressed or implied, of merchantability or fitness for any particular purpose. In no event shall the Design Team be liable for any loss of profit or any consequential damages as a result of Contractor's use or reuse of the electronic files.

Darden Architects, Inc.

Description of the requested documents and/or CAD files:

___ Civil ___ Structural ___ Mechanical ___ Electrical ___ Other(s)

_____

_____

_____

_____

_____ _____

Printed Name Title

_____ _____

Signed Dated

SECTION 013216 – CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Project Construction Schedules.
   2. Cost Loaded Schedule Data.
   3. Coordination Schedules.
   4. Schedule Modifications.
   5. Time Extensions.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. The following definitions or terms apply to this specification section:
   1. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
      a. Critical Activity is an activity on the critical path that must start and finish on the planned early start and finish times.
      b. Predecessor activity is an activity that precedes another scheduled activity.
      c. Successor Activity: An activity that follows another scheduled activity.
   2. Activity Code: Identifies each activity so as to be organized, group and sorted into Sub-Schedules, Reports and Major Areas of Work.
   3. Construction Schedule: A logical analysis listing the project's milestones, activities, and deliverables with planned dates for performing the scheduled activities and milestones.
   4. Cost Loading: The allocation of the Schedule of Values for the completion of an activity as scheduled. The sum of the costs for all activities must equal the total of the total Contract Sum, unless otherwise approved by the Architect.
   5. Critical Path: The longest continuous chain of activities through the schedule that establishes the minimum overall project duration.
   6. Critical Path Method (CPM): A method of planning and scheduling of a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the project.
   7. Event: The starting or ending point of an activity.
   8. Float: The measure of leeway in starting and completing an activity.

a. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is jointly owned, expiring Project resource available to both parties as needed to meet the schedule milestones and Contract completion date.
b. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
c. Total float is the measure of leeway in starting of or completing an activity without adversely affecting the planned Project completion date.

9. Fragmentary Network (Fragnet): A sequence of new activities that are proposed to be added to the existing schedule, identifying the predecessors to the new activities and demonstrate the impacts to successor activities.
10. Inclement Weather: Temperature, Precipitation, Fog, and Muddy Site conditions that may impede the progress of the Project construction on critical activities for more than fifty percent (50%) of the Contractor's scheduled work day.
11. Milestone: A key or critical point in time for reference or measurement.
12. Mud Days: The amount of excessive muddy site conditions which prohibit access to and around the Project site, access to buildings and impedes the progress of the Project construction on critical activities as a result of Unusually Severe Weather.
13. NOAA: National Oceanic and Atmospheric Administration.
14. Responsibility Code: Designation of the Contractor or Subcontractor or Trade responsible for each identified activity.
15. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity scheduled.
16. Unusually Severe Weather: The amount of excessive Inclement Weather that is greater than the anticipated number of Inclement Weather days for any given month.

1.3 SUBMITTALS

A. General:

B. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.

C. Format for Submittals: A time-scaled Critical Path Method (CPM) network analysis diagram schedule.
1. Provide a working electronic copy of the schedule, utilizing scheduling software specifically designed to manage construction scheduling and approved by the Architect and Owner.
   a. Provide schedule files in a form that can reviewed and used by the Owner, and Architect.
2. Provide PDF electronic copy of schedule file.
3. Provide four (4) paper copies of schedules.
   a. Sheet size shall be of adequate size to clearly show the required information for the entire construction period.
4. All required documentation shall clearly indicate the type of schedule (Initial, Preliminary, Base, Update), date and shall have the Submittal number posted in the upper-right hand corner of the page.

D. Assurance/Control Submittals:
1. Scheduling Qualifications:
   a. Contractor's qualifications;
      1) Submit within seven (7) days after the Award of Contract.
   b. Scheduler qualifications;
      1) Submit within seven (7) days after the Notice to Proceed.
2. Project Construction Schedules:

a. Initial Project Schedule (IPS);
   1) Submit within fourteen (14) days after the Award of Contract.
b. Preliminary Project Schedule (PPS)
   1) Submit within twenty-one (21) days after the Notice to Proceed date.
c. Baseline Project Schedule (BPS);
   1) Submit within sixty (60) days after the Notice to Proceed date.
d. Cost Load Schedule Data;
   1) Submit within seventy (70) days after the Notice to Proceed date.
e. Sub-Schedules;
   1) Submit as requested by Architect or Owner.

3. Coordination Schedules:
   a. Short Interval Schedules (SIS);
      1) Submit at the regularly scheduled meetings.
   b. Monthly Schedule Updates (MSU);
      1) Submit seven (7) days prior to the designated regularly scheduled monthly Progress Meeting for Schedule Review.
      2) Submit the agreed upon MSU one week prior to monthly progress payments.
4. Schedule Modifications:
   a. Change in Sequence;
      1) Submit as needed at a regularly scheduled Progress Meeting.
   b. Recovery Schedule;
      1) Submit as needed at a regularly scheduled Progress Meeting.
   c. Alterations to Schedule;
      1) Submit as needed at a regularly scheduled Progress Meeting
5. Time Extension / Fragnet:
   a. Notice of Delay;
      1) Submit within fourteen (14) days after a delay event, and/or with a Change Order Request (COR) that is in response to a CCD, RFP, or other documents issued by the Architect.
   b. Request for Time Extension;
      1) Submit with seven (7) days after a delay event.
   c. Inclement Weather;
      1) Submit within twenty-four (24) hours after an event.

1.4 SYSTEM DESCRIPTION

A. General:
1. The Architect considers the project schedule requirements to be of significant importance to both the Contractor and the Owner. The development, submittal, acceptance and maintenance of the Initial Project Schedule, Preliminary Project Schedule, Baseline Project Schedule and subsequent Monthly Schedule Updates must be given high priority.
   a. Progress payments may be withheld in whole or part should the Contractor fail to comply with the requirements of this section.
   b. No separate payment will be made to the Contractor for any of the requirements of this section. All such costs shall be part of the Contractor's planned project overhead costs included in its bid.
2. The requirements for the Critical Path Method (CPM) schedule are included to assure adequate planning and execution of the work and to assist the Architect and Owner in appraising the reasonableness of the proposed schedule, evaluating progress of the work and for reviewing the Progress Payment Applications.

B. Performance Requirements:
1. The Baseline Project Schedule shall be the basis for evaluating the job progress and time extension requests. The responsibility for developing the Baseline Project Schedule, accurately updating the schedule, and monitoring the actual progress of the work compared to the planned schedule rests solely with the Contractor.
   a. Failure of the Contractor to include any element of the work or any inaccuracy in the Baseline Project Schedule will not relieve Contractor from the responsibility for accomplishing all the work in accordance with the Contract requirements.
2. Inclement Weather: The Contractor shall have included all impacts to weather dependent activities, resulting from the anticipated Inclement Weather, including muddy site conditions, in the Baseline Project Schedule.
   a. Contractor shall be responsible for all associated time delays and costs.
   b. Contractor shall be responsible for associated mitigating measures which includes, but not limited to, dewatering, mucking, temporary weather protection, gravel roadways, equipment downtime, etc.
   c. Contractor shall be responsible to account for the site's soil conditions, drainage patterns, and other elements that may be affected.
3. Cost Correlation: The Initial Project Schedule, Preliminary Project Schedule and the Baseline Project Schedule shall be the basis for developing the Schedule of Values and the Work performed as of planned and actual dates used for preparation of The Application for Payment.
   a. Refer to Specification Section - SCHEDULE OF VALUES.
4. Early Completion Schedules: Early completion schedules may be prohibited due to certain physical or monetary constraints imposed upon the Owner.
   a. If not prohibited, and is contemplated by the Contractor as part of its bidding strategy, it is hereby expressly understood by the Contractor that early completion schedules will only be acceptable under the condition that the schedule be reasonable and realistic.
   b. The Contractor certifies that it has included general conditions costs in its bid sufficient for the entire contractual time of performance.
   c. No damages for delay will be recoverable if the project is prolonged beyond the early completion date, but still completed within the entire contract duration.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Contractors Qualifications:
   a. The Contractor shall provide evidence to demonstrate the competency in the use of CPM scheduling, including evidence of the use of cost-loaded Critical Path Method scheduling software on projects of similar value and complexity.
   b. The Contractor must have scheduling capabilities (hardware and software, inclusive of plotter) located at the construction site, or readily accessible in a local area office.
2. Schedulers' Qualifications:
   a. The Contractor shall designate, in writing, an authorized representative in its firm or employ a qualified CPM schedule consultant, who shall be responsible for the preparation, revising, and updating the cost-loaded Critical Path Method schedule utilizing scheduling software specifically designed for construction projects.
      1) The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the construction scheduling requirements set forth herein.

2) Contractor's representative authority shall not be interrupted throughout the duration of the project.

b. The Scheduler must have the capacity and capability of supporting the project by producing schedule-related data within two (2) days of request by the Contractor, Architect, or Owner

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

C. Meetings:

1. Prescheduling Conference: Scheduled by the Contractor prior to submitting the Baseline Project Schedule, unless otherwise agreed to by the Architect and Owner, for the proper coordination of the work. Conduct conference at Project site. Review methods and procedures related to the Baseline Project Schedule, including, but not limited to, the following:
   a. Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Owner occupancy.
   b. Review delivery dates for Owner-Furnished products.
   c. Review schedule for work of Owner's separate contracts.
   d. Review submittal requirements and procedures.
   e. Review time required for review of submittals and resubmittals.
   f. Review requirements for test and inspections by independent testing and inspection agencies.
   g. Review time required for Project closeout and Owner startup procedures**,** including commissioning activities.
   h. Review and finalize list of construction activities to be included in schedule.
   i. Review procedures for updating schedule.
2. Progress Meetings: Scheduled by the Contractor for the proper coordination of the work.
   a. Weekly Progress Meeting: Schedule on a weekly basis, unless otherwise agreed to by the Architect and Owner;
      1) Review Short Interval Schedule.
      2) Discuss field observations, problems, and decisions.
   b. Monthly Schedule Update: Designate a regular monthly meeting to address and resolve all schedule issues for the prior month;
      1) Identification of any potential problems which may impede planned progress.
      2) Corrective measures to regain projected schedules.
3. Participants (or designated representative) invited to attend each of the above meetings shall be as follows:
   a. Contractor.
   b. Owner.
   c. Architect.
   d. Project Inspector.
   e. Installer(s), as appropriate.
   f. Material Manufacturer(s), as appropriate.
   g. Subcontractors, as appropriate (including any accessory subcontractors).

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Time Frame: Extend schedules from dates established from the Notice to Proceed to final completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activity Data: Contains activity code, activity description, responsibility code, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, original duration, remaining duration, and percentage completion.
   1. Contractor shall submit a detailed BPS presenting an orderly and realistic plan for the completion of the entire project.
      a. The BPS shall not show more than 10% of the total activities as critical.
      b. The BPS shall not show more than 20% of the activities with total float of 10 working days or less.
      c. The schedule shall not show any activities with negative float.
      d. Start and Finish constraints, unless identified in the contract documents, shall be minimized as much as possible.
   2. Schedule activities that are dependent on submittal approval and/or material delivery. Activities shall not be scheduled to start earlier than the reasonably expected review, and acceptance or delivery dates.
      a. Coordinate Submittal Schedule with the list of subcontractors, and the list of products.
      b. Prepare the schedule in chronological order. Provide information as called for in Specification Section - SUBMITTAL PROCEDURES.
      c. Submittal Review Time: Include review and resubmittal times indicated in Specification Section - SUBMITTAL PROCEEDURES in schedule.

C. Activity Duration: Activity durations shall be the total number of days required to perform that activity.
   1. Define activities so no activity is longer that twenty (20) days, unless specifically allowed by Architect, except for submittal, approval, fabrication and delivery (procurement) activities.
   2. Activities that require three months or longer to complete, indicate an estimated completion percentage in ten (10) percent increments.
   3. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than sixty (60) days, as separate activities in schedule.
      a. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
   4. Startup and Testing Time: Include no fewer that fifteen (15) days for startup and testing.
   5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
   6. Punch List and Final Completion: Include not less than thirty (30) days for completion of punch list items and final completion.

D. Constraints:

1. Constraints: Include constraints and work restriction indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   a. Phasing: Arrange list of activities on schedule by phase as indicated in Specification Section – SUMMARY OF WORK
   b. Include a Separate activity for each of the following
      1) Work under More Than One Contract
      2) Work Performed By Owner
      3) Each Product Ordered In Advance, include delivery dates
      4) Each Owner-Furnished Product, include the delivery dates
   c. Work Restrictions: Show the effect of the following items on the schedule:
      1) Coordination with existing construction.
      2) Limitations of continued occupancies.
      3) Uninterruptible service.
      4) Partial occupancy before Substantial Completion.
      5) Use of premises restrictions.
      6) Provisions for future construction.
      7) Seasonal variations.
      8) Environmental control.
   d. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
      1) Submittals
      2) Purchases
      3) Mockups
      4) Fabrication
      5) Sample Testing.
      6) Deliveries
      7) Installation
      8) Test and inspections
   e. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities.

E. Inclement Weather: The schedules shall include delays due to the effect of the anticipated Inclement Weather, including resultant muddy conditions, in all-weather dependent activities.
   1. The Contractor shall submit with the Baseline Project Schedule, a National Oceanic and Atmospheric Administration [NOAA] Meteorological Data Chart showing the "Normals", "Means" and "Extremes" of monthly Temperature, Precipitation, and Fog for the area where the project is located.
      a. The Owner reserves the right to update Meteorological Data, so that it reflects the most accurate data for the project site, site conditions and locality.
   2. Upon review and acceptance, the Meteorological Data Chart shall be the baseline for evaluating anticipated weather related delays. Refer to the sample "Meteorological Data Chart" provided herein.
      a. Provide the number of delay days of anticipated Inclement Weather in the schedule per month.
      b. Provide the number of delay days of anticipated Mud Days in the schedule per month.
         1) Not all Mud Days are eligible for delays, only a portion of the actual Mud Days will be considered.
         2) Mud Days shall be based on a percentage of actual precipitation days. Upon review and found acceptable, the percentage shall be applied to actual precipitation that are above and beyond the anticipated Inclement Weather.

3) It is the Contractors obligation to become aware of the site soil conditions, drainage patterns, and other elements that may affect the resulting impacts due to Mud.

F. Project Information:
1. Identification: Include the following Project Identification on all Project Construction Schedules, Coordination Schedules, Schedule Modifications and Time Extension Requests.
a. Project Name and Location.
b. Name of Owner and Address.
c. Name of Architect and Address.
d. Architect's Project Number.
e. Contractor's Name and Address.
f. Submittal Date.

2.2 INITIAL PROJECT SCHEDULE (IPS)

A. Format:
1. Prepare in form of a summary level horizontal-box-column Bar-Chart Schedule:
a. Provide and identify separate columns to indicate the following;
1) SPECIFICATION SECTION.
2) DESCRIPTION.
3) RESPONSIBILITY CODE.
4) HORIZONTAL TIME SCALE.
b. Provide and identify separate activity line-item horizontal bars to indicate the following;
1) Activity.
2) Milestones.
3) Contract Conditions.
4) Designation of Contractor or Subcontractor.

B. Content:
1. SPECIFICATION SECTION: Use the specification section number in the Project Manual Table of Contents to identify and establish each line-item.
2. DESCRIPTION: Provide a description of the work for each line-item associated with the specification section and responsible party.
3. RESPONSIBILITY CODE: Provide responsibility code that identifies the responsible party for performing the work of each activity line-item associated with the specification section and description.
4. HORIZONTAL TIME SCALE: Identify the week, month and year. Indicate the first work day of each week with a continuous vertical line.
a. Extend from the date established from the Notice to Proceed to the date of Final Completion.
5. Activity: Provide a summary level bar chart with distinct graphic delineation for each activity line-item.
a. Provide at least one activity line-item for the work in each Specification Section.
1) Provide separate activity line items for each Contractor or Subcontractor providing work under the same specification section.
b. Organize activities in chronological order by the beginning of each Activity.
6. Milestones: Include initial milestones with dates for the Notice to Proceed, Project Start, Substantial Completion, and Final Completion.
7. Contract Conditions:

a. Identify and provide separate activity line-items that are directly related to Division 01 - GENERAL REQUIREMENTS.
b. Identify and provide separate activity line-items that are directly related to Division 00 - CONDITIONS OF THE CONTRACT.

2.3 PRELIMINARY PROJECT SCHEDULE (PPS)

A. Format:
1. Provide a preliminary computerized, time-scaled, cost loaded Critical Path Method (CPM) Contract Schedule using Precedence Diagram Methodology (PDM) showing in detail how the Contractor plans to execute, coordinate and generate progress billings for the work.
   a. Prepare a time-scaled logic diagram presenting an orderly and realistic detailed plan for the work to be completed in the first **ninety (90)** days of the contract.
      1) Work beyond the first **ninety (90)** shall be shown in a skeleton diagram for the remainder of the Work.
2. A tabular report containing Activity Data, Activity Durations, Constraints and Inclement Weather:
   a. Include Activity Code, Specification Sections, Responsible Code,
   b. Include Activity, Sub-Schedules, Milestones, Contract Conditions.
   c. Include Cost Loading of activities.
3. Provide a cash requirement prediction base on indicated activities.

B. Content:
1. Activity Data:
   a. Activity Code: Assign Activity Codes that identifies each separate activity to allow the following, but not limited to, to be appropriately sort and grouped in Sub-Schedules, Major Areas of Work, and Reports:
      1) “Construction Area,” “Trade or “Submittal Procurement”.
   b. Specification Sections: As describe in the Initial Project Schedule.
   c. Responsible Code: As describe in the Initial Project Schedule.
   d. Activity: As describe in the Initial Project Schedule and expand to provide detail data for each activity.
      1) Expand to include entities, which are responsible for preforming the work of each activity, identified as, but not limited to General Contractor, and Sub-Contractor, second and tertiary tier Sub-Contractors, manufactures, fabricators and vendors.
      2) Include planned mobilization and equipment; sequence of early operations; and procurement of materials and equipment.
      3) Include duration, early start date, early finish date, late start date, late finish date.
      4) Cost and Resource Loading.
         a) Assign cost to construction activities on the CPM schedule.
         b) Do not assign costs to submittal activities.
         c) Prior to assigning costs to fabrication and delivery activities, obtain Architect’s approval.
2. Submit a Cash Flow Projection Diagram with the cost-loaded Preliminary Project Schedule.
   a. Report and diagram shall be based on the planned monthly progress billings expressed as a percentage of the total project cost.
3. The PPS will be temporarily used to record and monitor the progress of the work until the Baseline Project Schedule has been completely developed and accepted.

4. Recorded data on the Preliminary Project Schedule shall be incorporated into the Baseline Project Schedule during the first monthly update.

2.4 BASELINE PROJECT SCHEDULE (BPS)

A. Format:
1. Provide a comprehensive, fully developed, detailed computerized, time-scaled, resource and cost loaded Critical Path Method (CPM) Project Schedule using Precedence Diagram Methodology (PDM) showing in detail how the Contractor plans to execute, coordinate and generate progress billings for the work.
   a. Baseline Project Schedule shall be based on the Preliminary Project Schedule and expand to include additional required information of the Project for the complete duration of the Project.
2. A tabular report containing Activity Data, Activity Durations, Constraints and Inclement Weather.
   a. Include Activity Code, Specification Sections, Responsible Code.
   b. Include Activity, Sub-Schedules, Milestones, Contract Conditions.
   c. Include Cost and Resource Loading of activities.
3. A Cash Flow Envelope Report and Cash Flow Projection Diagram (S-curves) with the finalized, cost-loaded baseline project schedule.

B. Content:
1. Activity Code: As describe in the Preliminary Project Schedule.
   a. “Construction Area,” “Trade or “Submittal Procurement”.
2. Specification Sections: As describe in the Initial Project Schedule.
3. Responsible Code: As describe in the Initial Project Schedule.
   a. Expand to include Other codes for "area," "trade" or "submittal/procurement" shall be similarly utilized to allow schedule data to be sorted and organized into separate, coherent reports or plots.
4. Activity: As describe in the Preliminary Project Schedule and expand to provide detail data for each activity thru the completion of the Project.
   a. Include but not limited to procurement Activities, Startup and testing, Substantial Completion, Punch List and Final Completion
   b. Expand to include original duration, remaining duration, early start date, early finish date, late start date, late finish date, original duration, remaining duration, total float and percentage completion.
   c. Appropriately grouped and sorted into Sub-Schedules, and Major Areas of Work. Organize activities in chronological order by the beginning of each Activity
   d. Cost and Resource Loading.
      1) Assign cost to construction activities on the CPM schedule.
      2) Do not assign costs to submittal activities
      3) Prior to assigning costs to fabrication and delivery activities, obtain Architect’s approval.
      4) Assign costs under the main subcontracts for testing and commissioning activities, operations and maintenance manuals, punch list activities, Project record documents, demonstration and training, in the amount of five (5) percent of the Contract Sum.
      5) Total cost assigned to activities shall equal the total Contract Sum.
5. Sub-Schedules: Sub-Schedules shall include, but not limited to, the following:
   a. Major Scope of Work: Identify each major area of construction for each major portion of the Work.
      1) Include, but not limited to, the following: Phasing, Alternates, Construction Phases and funding Criteria.

b. Scope Type: Arrange and identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
   1) Site Utilities.
   2) Site Development Zones.
   3) Buildings.
      a) If necessary, separate each floor or separate areas of each main elements of the work.

c. Submittals: Include a separate sub-schedule for all submittal, approval and procurement activities, including owner-furnished items.
   1) Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
   2) Coordinate Submittal Schedule with the list of subcontractors, Schedule of Values and the list of products as well as the Contract Construction Schedule

d. Testing and Inspection: Include a separate sub-schedule for all required on-site testing, off-site testing, mock-ups, and inspections.

6. Milestones: As describe in the Initial Project Schedule, Preliminary Project Schedule and include other milestones indicated in the Contract Documents and the following interim milestones.
   a. Earthwork.
   b. Building Foundations and slab on grade.
   c. Structural completions.
   d. Partial Occupancy before Substantial Completion.
   e. Temporary Enclosure and Space Conditioning.
   f. Permanent Space enclosure.
   g. Completion of Mechanical.
   h. Completion of Electrical Installation.
   i. Completion of Communication Installation.
   j. Substantial Completion
   k. Finial Completion

7. Contract Conditions: As describe in the Initial Project Schedule, Preliminary Project Schedule and expand to include separate activity line-items that are directly related to Division 01 - General Requirements and are not of actual work-in-place. Such items shall be, but not limited to the following.
   a. Temporary Facilities.
   b. Field Engineering.
   c. Project Closeout Requirements:
      1) Startup and Testing Time:
      2) Operation and Maintenance.
      3) Demonstration and Training.
      4) Punch List.
         a) Cost-Load Schedule:

   d. Submit a Cash Flow Envelope Report and Cash Flow Projection Diagram (S-curves) with the finalized, cost-loaded baseline project schedule.
      1) Report and diagram shall be based on the planned monthly progress billings expressed as a percentage of the total project cost.
      2) Report and diagram shall calculate and show two projections. One based on early starts/early finishes, and another based on late starts/late finishes.

PART 3 - EXECUTION

3.1 SCHEDULES AND PROCEDURES FOR CONSTRUCTION SCHEDULES

A. General Requirements:
1. The Architect may request the Contractor to provide (at no cost) the following additional reports or schedule plots:
   a. Total or Free Float Report from least to most float.
   b. Subcontractor Certifications, indicating approval of the subcontractors scheduled work, acknowledging outside factors such as manpower resources, stacking of trades, multiple mobilizations, and coordination of space with other trades and the stacking of trades.
   c. Narrative Reports: May include, but not limited to, the following descrtiptions:
      1) Last month's progress achieved, and anticipated next month's progress.
      2) Problems or delays experienced and an explanation of mitigating actions taken.
      3) Current or anticipated delays and proposed mitigation action to be taken.
      4) Listing of all submittals, RFIs, Change Directives, Owner-supplied equipment or other Owner-controlled and critical constraints affecting the Contractor's progress.

B. Coordination Schedules:
1. Short Interval Schedules (SIS): A look-ahead schedule.
   a. Provide a three-week snapshot of the work generated from the most recent monthly Schedule Update.
   b. Include the current week, and two week thereafter.
   c. The schedule shall contain sufficient detail to evaluate inspection requirements, and for the Contractor t anticipate manpower and equipment needs.
2. Monthly Schedule Updates (MSU): Accurately indicate the actual progress of the work during the prior month.
   a. Indicate the ate through which progress is reported shall be identified on all update chedule.
      1) Provide the actual start and finish dates of activities commenced or completed during the prior month.
      2) Once the actual start and finish dates are updated and accepted as accurate, this data shall not be changed. This portion shall be considered an "As-Built".
      3) If the schedule data is changed due to a routine updating only, no identification or discussion of such changes is required.
   b. The Monthly Schedule Updates shall include the Schedule Modifications and Time Extensions that have been mutual agreed to by the Architect and Contractor.
      1) In the event of multiple Schedule Modifications and Time Extensions, events shall be updated into the current Monthly Schedule Update in the actual order of occurrence.
   c. The Architect's review comments shall be incorporated into the next update for the Architect's verification.
   d. Provide a Cost Report listing each activity and its associated cost, percentage of work accomplished, earned value to date, previous payments and amount earned for the update period.

1) Also provide a cost report listing each new or refined activity and its associated cost that were created through updates, change orders, or fragnet delay analyses for time extension requests.

e. Provide Cash Flow Projections Diagram showing actual billings plotted against early and late curves based on the Monthly Schedule Updates.

C. Schedule Modifications:

1. Changes in Sequence:

a. If the Architect determines that the sequence of the construction differs significantly from the Contract schedule, the Contractor shall submit a revised schedule for approval within fourteen (14) days of the Architect's request.

b. If the work is re-sequenced, or if activities are added or deleted, these schedule data changes must be specifically identified, discussed and submitted.

1) The submittal shall be separate and apart from the routine monthly update submittals.

c. If the changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.

1) The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.

2. Recovery Schedule:

a. When periodic update indicates, the Work is fourteen (14) or more calendar days behind the current approved schedule, submit a separate recovery schedule indication means by which Contractor intends to regain compliance with the schedule.

b. Submittal shall indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

1) The submittal shall be separate and apart from routine monthly update submittals.

c. The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.

3. Alterations to Schedule:

a. If the Contractor intends to alter its planned sequence or approach to the work, the Contractor shall submit a request of the schedule revisions or sequence changes to the Architect for review and comment.

b. Submittal shall include a description of the reason(s) for the schedule changes, a description of the changes being made, a list of all added and deleted activities, changed logic relationships, changed activity durations or descriptions, etc.

c. The submittal shall be separate and apart from routine monthly update submittals.

d. If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.

1) The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.

D. Time Extension:

1. Notice of Delay:

a. Provide a "Notice of Delay submittal for all time extension requests, showing the impact of the delay event on the Project Schedule. Refer to the sample "Notice of Delay Form" provided herein.

1) In cases where the Contractor does not provide "Notice of Delay" submittal for a delay event within the specified time limits, then it is mutually agreed that the delay event has no time impact on the contract completion date (or interim milestones) and no time extension is required.

2. Time Extension Request:
   a. Submit with a Change Order Request (COR) in response to an event, SI, RFI, RFP, or other documents issued by the Architect.
   b. Provide a “Fragnet with the COR, demonstrating the time impact based on the date(s) and durations of the delay event, the status of construction at that point in time, and the affect on the scheduled sequence, progress of the Critical Path Activities and Project Completion
      1) The Submittal shall be based on the latest Monthly Schedule Update.
      2) The Submittal shall include all supporting project documentation or delay calculations that establish entitlement and quantify the delay.
      3) The Submittal shall demonstrate the activity or activities effects on the total float along the activity path at the time the event occurred.
      4) The Contractor must propose possible mitigation plans (sequence changes and any costs) for otherwise critical path delays.
         a) The Contractor shall provide an evaluation of the cost of mitigation versus the cost of extended project performance.
   c. If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.
      1) Extensions of time for performance will be granted only to the extent that the equitable time adjustment for the activity or activities affected exceeds the total float.
      2) The Contractor acknowledges and agrees that mitigation of delays due to delay events may require a change to preferential sequences of work.
         a) The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.
   d. The Owner (or District) shall not be liable for any acceleration costs due to the Contractor’s failure to comply with the contract requirements for requesting, documenting and demonstrating that a time extension is required for a delay event.
      1) The Contractor’s obligation to timely perform per the schedule will not be excused until time extension requests are reviewed and accepted by the Architect.
3. Inclement Weather:
   a. General:
      1) The Contractor shall record on the Contractor Daily Reports, each occurrence of Inclement Weather and Mud impacts to the progress of scheduled work through the Contract duration. Refer to the sample of “Inclement Weather Form" provided herein
         a) Inclement Weather days will be counted chronologically from the first to the last day of each month, with each daily incidence of "Inclement Weather" being counted as a whole day.
         b) Each occurrence of Inclement Weather and Mud, must be verified and approved by the Inspector of Record.
   b. Unusually Severe Weather:
      1) Submit with a Change Order Request (COR) for all time extension requests in response to "Unusually Severe Weather”.
      2) Provide a “Fragnet with the COR, demonstrating the time impact based on the date(s) and durations of the delay event, the status of construction at that point in time, and the effect on the scheduled sequence, progress of the Critical Path Activities and Project Completion.

a) The submittal shall be based on the latest Monthly Schedule Update.
b) The submittal shall include all supporting project documentation or delay calculations that establish entitlement and quantify the number of days of anticipated "Inclement Weather" are exceeded in a given month.
c) The submittal shall demonstrate the effects on the total float of the Project at the time the event occurred
d) The submittal shall demonstrate that the delay must be beyond the control and without the fault of negligence of the Contractor

3) If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.
a) The Contractor will become eligible for an excusable, non-compensable time extension for "Unusually Severe Weather".

c. Mud Days:
1) Provide "Mud Days" Submittal to the Architect for all claimed time extension requests, showing the impact of the delay event on the contract schedule.
2) Submit as a Change Order Request (COR).
3) The Submittal shall demonstrate the time impact based on the date(s) and durations of the delay event, the status of construction at that point in time, and the effect on the scheduled sequence and progress of the Critical Path Activities.
a) The Submittal shall be based on the latest Monthly Schedule Update.
b) The Submittal shall include all supporting project documentation or delay calculations that establish entitlement and quantify the number of days of anticipated "Mud Days" are exceeded in a given month.
c) The Submittal shall demonstrate the effects on the total float of the Project at the time the event occurred.
d) The Submittal shall demonstrate that the delay must be beyond the control and without the fault of negligence of the Contractor.
4) If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update Submittal.
a) The Contractor will become eligible for an excusable, non-compensable time extension for "Mud Days".

3.2 SCHEDULES

A. List of attached Forms and Reports.
1. Meteorological Data Chart.
2. Notice of Delay Form.
3. Inclement Weather Form.
4. Fragnet Submittal Form.

- THE REST OF THIS PAGE IS INTENTIONAL BLANK -

"SAMPLE" Meteorological Data for Fresno, California

Normals, Means and Extremes

TEMPERATURE (degrees F)					PRECIPITATION***		FOG	
	Normal	Extremes						
Month	Daily Max.	Daily Min.	Record Highest	Record Lowest	Mean* Calendar/Work	Number Calendar/Work	Normal (in)	Mean**Number
	Days per month		Days per month					
Jan	54.1	37.4	78	19	7.5/5.4	1.96	11.8/8.4	
Feb	61.7	40.5	80	24	7.1/5.1	1.8	6.0/4.3	
Mar	66.6	43.4	90	26	7.1/5.1	1.89	1.7/1.2	
Apr	75.1	47.3	100	32	4.1/2.9	0.97	0.3/0.2	
May	84.2	53.7	107	36	1.9/1.4	0.3	0.1/0.1	
Jun	92.7	60.4	110	44	0.7/0.5	0.08	0.0/0.0	
Jul	98.6	65.1	112	50	0.2/0.1	0.01	0.0/0.0	
Aug	96.7	63.8	111	49	0.3/0.2	0.03	0.1/0.1	
Sep	90.1	58.8	111	37	1.0/0.7	0.24	0.1/0.1	
Oct	79.7	50.7	102	27	2.2/1.6	0.53	0.9/0.6	
Nov	64.7	42.5	89	26	5.2/3.7	1.37	5.8/4.1	
Dec	53.7	37.1	76	18	6.7/4.8	1.42	12.1/8.6	
Year	44.1/31.5		10.6	38.8/27.7				

Source: NOAA, National Oceanic and Atmospheric Administration

* Precipitation of .01 inches or more

** Heavy Fog visibility ¼ mile or less

*** Refer to the term Mud, for mud impacts.

2 Above data is subject to change, based upon the locality of the project. Contractor shall assemble the data and submit to The Architect for confirmation, review and modifications: Obtain data from NOAA (828) 271-4800, or the Local Weather Office. http://www.ncdc.noaa.gov.

- THE REST OF THIS PAGE IS INTENTIONAL BLANK -

NOTICE OF DELAY FORM

Date: _____ Submittal No.: _____

From: Name of Contractor Sheet _____ of _____

To: Darden Architects, 6790 N. West Avenue, Fresno, CA 93711 (559) 448-8051

Description of Delay: By reference to attached schedule, the following delay occurred:

_____

_____

_____

_____ Continued on Sheets ____ of ____

Time Extension Requested:_____ work days x 1.4 = _____ calendar days.

Time Requested for Activity:_____ Time Requested for Project:_____

Related Documents: The following construction documents provide evidence of the delay event:

RFI Nos.: _____ SI Nos.: _____

CCD Nos.: _____ RFP Nos.: _____

Daily Reports Dated:_____ and attached.

Project Correspondence Dated:_____ and attached.

Other Documentation:_____

Schedule-Related Information: By reference to the attached Schedule, provide the following:

Predecessor Activity: _____

Successor Activity: _____

Affected CPM Schedule Activities (list IDs and descriptions):

_____

_____

_____

- THE REST OF THIS PAGE IS INTENTIONAL BLANK –

INCLEMENT WEATHER FORM

Date: _____

From: Name of Contractor Sheet _____ of _____

To: Darden Architects, 6790 N. West Avenue, Fresno, CA 93711 (559) 448-8051

Description of Delay: the following delay occurred:

_____

_____

_____

_____ Continued on Sheets ____ of ____

Time Extension Requested:_____ work days x 1.4 = _____ calendar days.

Time Requested for Activity:_____ Time Requested for Project:_____

Related Documents: The following construction documents provide evidence of the delay event:

Daily Reports Dated:_____ and attached.

Project Correspondence Dated:_____ and attached.

Other Documentation:_____

Affected CPM Schedule Activities (list IDs and descriptions):

_____

_____

_____

FRAGNET SUBMITTAL FORM

Date: _____ Fragnet No.: _____

From: Name of Contractor Sheet _____ of _____

To: Darden Architects, 6790 N. West Avenue, Fresno, CA 93711 (559) 448-8051

Description of Delay: By reference to attached schedule Fragnet, the following delay occurred:

_____

_____

_____

_____ Continued on Sheets ____ of ____

Time Extension Requested:_____ work days x 1.4 = _____ calendar days.

Time Requested for Activity:_____ Time Requested for Project:_____

Related Documents: The following construction documents provide evidence of the delay event:

RFI Nos.: _____ SI Nos.: _____

CCD Nos.: _____ RFP Nos.: _____

Daily Reports Dated:_____ and attached.

Project Correspondence Dated:_____ and attached.

Other Documentation:_____

Schedule-Related Information: By reference to the attached Fragnet, provide the following:

Predecessor Activity to Fragnet: _____

Successor Activity to Fragnet: _____

Affected CPM Schedule Activities (list IDs and descriptions):

_____

_____

_____

END OF SECTION

SECTION 013226 – FORMS AND REPORTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Contractor to provide all Forms and Reports as required by the Architect for Administrative Procedures and other related items necessary to document the Project as required by the Contract Documents, including but not limited to those forms provided under this specification section.
   2. CalGREEN Forms:
      a. Contractor shall provide all California Green Building Standards Code Certification Worksheets and other related items necessary to document the Project as required by the AHJ, including, but not limited to, those forms provided under this specification section.
         1) Obtain the latest documents from the California Building Standards Commission; revisions may have been made since the publication of this Project Manual.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Forms and Reports as attached to this section when required by the Architect.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

A. Listing of Architect required Forms and Reports No. of Pages:
1. 01 32 26.01-DAILY SUPERINTENDENT'S REPORT 2
2. 01 32 26.02-SUBCONTRACTOR'S DAILY REPORT 1
3. 01 32 26.03-SHOP DRAWING AND SUBMITTAL TRANSMITTAL 1
4. 01 32 26.04-REQUEST FOR INFORMATION (RFI) 1
5. 01 32 26.05-SUPPLEMENTAL INSTRUCTIONS (SI) 1
6. 01 32 26.06-REQUEST FOR PROPOSAL (RFP) 1
7. 01 32 26.07-CONSTRUCTION CHANGE DIRECTIVE (CCD) 1
8. 01 32 26.08-CHANGE ORDER REQUEST REVIEW (COR) 2
   a. (Review form provided by the Contractor is subject to review and comments by the Owner and Architect).
9. 01 32 26.09-CHANGE ORDER (CO) 1
10. 01 32 26.10- FRAGNET SUBMITTAL FORM (NOT USED)
11. 01 32 26.11-APPLICATION FOR PAYMENT (AP) 1
12. 01 32 26.12-CONTRACTOR'S TESTING / INSPECTION REQUEST FORM 1
13. 01 32 26.13-CONTRACTOR'S "DEVIATION NOTICE" INSPECTION REPORT FORM 1
14. 01 32 26.14-CONTRACTOR'S FINAL INSPECTION REQUEST FORM 1
15. 01 32 26.15-CONTRACTOR'S PUNCHLIST INSPECTION REQUEST FORM 1
16. 01 32 26.16-CONTRACTOR'S PUNCHLIST 1
17. Periodic field reports issued by the Architect and Engineers.
18. Contractor's Punch List Response and Correction form is required for each Punch List Review report, citing the issuing Punch List Review format number(s).
19. Completed Contractor's Punch List and Final Inspection Reports issued by the Architect, Engineers and the Owner.
20. See the attached Forms and Reports suitable for reproduction by the Contractor or Subcontractor.

B. Listing of California Green Building Standards Code Certification Worksheets:
1. CONSTRUCTION WASTE MANAGEMENT (CWM) PLAN WORKSHEET (Sample).
2. CONSTRUCTION WASTE MANAGEMENT (CWM) WORKSHEET (Sample).
3. CONSTRUCTION WASTE MANAGEMENT (CWM) ACKNOWLEDGMENT (Sample).

END OF SECTION

(Attachments)

GENERAL CONTRACTOR'S
DAILY SUPERINTENDENT'S REPORT

(JOB NO./REPORT NO.) (DATE/DAY)

(JOB NAME) WEATHER DESCRIPTION

(WORK SHIFT) / FROM / TO (PROJECT MANAGER/SUPERINTENDENT)

PM/	ENGR/	CARPENTERS			LABORERS		CEM FINISHERS			OPER ENGR			
SUPT	TK	FMAN	JRMAN	APP	FMAN	LAB	FMAN	JRMAN	APP	JRMAN	APP	OTHER	TOTAL

CONCRETE: CY TODAY:_____ LOCATION: _____ CY TO DATE: _____

WORK SUMMARY:

DELAYS / WORK RELEASED BY OWNER:

CHANGE ORDERS / EXTRA WORK ORDERS:

INSTRUCTIONS FROM ARCHITECT / OWNER:

MATERIALS / EQUIP. DELIVERED TO JOB:

INSPECTIONS / TESTS PERFORMED

SAFETY / ACCIDENTS:

MAJOR EQUIP. ON SITE:

BACKSIDE OF GENERAL CONTRACTOR'S REPORT

SUBCONTRACTORS ON JOB	NO. OF MEN	FOREMAN'S NAME	WORK DESCRIPTION / LOCATION

MAJOR EQUIPMENT ON SITE:

BACK CHARGES:

REMARKS:

SUBCONTRACTOR'S
DAILY REPORT

PROJECT: DATE:

SHIFT TIME FOREMAN: WEATHER:

WORK DESCRIPTION AND LOCATION:

SUB-SUBCONTRACTOR	CREW SIZE	CRAFT	WORK DESCRIPTION / LOCATION

DELAYS:

CHANGE ORDERS / EXTRA WORK ORDERS:

INSTRUCTIONS RECEIVED FROM GC:	TESTS / INSPECTIONS PERFORMED:
MATERAL / EQUIPMENT DELIVERIES:	MAJOR EQUIPMENT ON SITE:

SAFETY / ACCIDENTS:

INTENTIONALLY LEFT BLANK

SHOP DRAWING AND SUBMITTAL TRANSMITTAL

DESCRIPTION:

SUBMITTAL NO.:

SPEC SECTION:

ARCHITECT:
Darden Architects
6790 N. West Ave
Fresno, California 93711

PROJECT:

CONTRACTOR:

SUPPLIER:

Substitution: **Yes:** ☐ **DSA Approval Req'd**

DATE RECEIVED: _____ **NO. RECEIVED:** _____ **DATE RETURNED:** _____

Contractor Remarks:

Other Required Information:

CPM Activity / Submittal Task No.: _____
Early Start (ES) Date: _____ Late Finish (LF) Date: _____
Early Finish (EF) Date: _____ Scheduled Float Time: 0

WARRANTY: ☐ **O and M MANUALS** ☐

DESIGN CONSULTANT'S REVIEW:

TRANSMITTED BY ARCHITECT TO: _____ DATE RETURNED: _____
DATE SENT: _____
NO. SENT: _____

Consultants Remarks:

ACTION:

- ☐ NO EXCEPTION TAKEN RELATIVE TO DESIGN
- ☐ NO EXCEPTION TAKEN WITH MODIFICATION NOTED
- ☐ AMEND AS NOTED AND RESUBMIT
- ☐ REJECTED AND RESUBMIT
- ☐ SEE ATTACHED LETTER

ARCHITECT'S REVIEW:

Architects Remarks:

ACTION:

- ☐ NO EXCEPTION TAKEN RELATIVE TO DESIGN
- ☐ NO EXCEPTION TAKEN WITH MODIFICATION NOTED
- ☐ AMEND AS NOTED AND RESUBMIT
- ☐ REJECTED AND RESUBMIT

Approved Substitution ☐

COPIES TO:

DATE RETURNED: _____

Contractor: **Owner:** **Inspector:** **File:** **Other:**

INTENTIONALLY LEFT BLANK

darden
architects

6790 N. West Avenue
Fresno, California 93711
Tel: 559.448.8051
Fax: 559.446.1765
www.dardenarchitects.com

REQUEST FOR INFORMATION

RFI No.:

To: **Darden Architects**
6790 N. West Ave
Fresno, California 93711

Date:

Respond By:

Attn:

Architect Project No.

DSA/OSHPD Review Required Yes ☐ No ☐ Apprd ☐

Project:

INFORMATION REQUESTED:

Cost Impact: _____ Signature: _____

Schedule Impact: _____ Days Pages Attached: _____

Trade/Contractor: Schedule Task No/Item:

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in the Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time.

If the Contractor considers that this supplemental instruction requires a change in the Contract Sum or Contract Time, the Contractor shall not proceed with this Work and shall promptly submit an itemized proposal to the Architect for doing this work. If your proposal is found to be satisfactory and in order, this supplemental instruction will be superseded by a Construction Change Directive.

Refered To: Refered Date: Return Date:

SUPPLEMENTAL INSTRUCTIONS:

Consultant :_____ Architect _____

Date:_____ Date _____

Copy: ☐ Owner ☐ Inspector ☐ Testing Lab ☐ Structural ☐ Mech. ☐ Elec ☐ File ☐ Other Pages Attached: _____

INTENTIONALLY LEFT BLANK

darden architects

6790 N. West Avenue
Fresno, California 93711
Tel: 559.448.8051
Fax: 559.446.1765
www.dardenarchitects.com

SUPPLEMENTAL INSTRUCTIONS

PROJECT:

SUPPL. INST. NO.:

DATE OF ISSUANCE:

OWNER:

CONTRACT DATE:

NOTICE TO PROCEED:

CONTRACTOR:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
OSHPD No.:

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in the Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time.

If the Contractor considers that this supplemental instruction requires a change in the Contract Sum or Contract Time, the Contractor shall not proceed with this Work and shall promptly submit an itemized proposal to the Architect for doing this work. If your proposal is found to be satisfactory and in order, this supplemental instruction will be superceded by a Construction Change Directive.

Description:

Trade/Contractor:

Schedule Task No/Item:

Attachments:

Darden Architects, Inc.

Issued By:

Architect

☐ **OWNER** ☐ **CONTRACTOR** ☐ **INSPECTOR** ☐ **TESTING LAB** ☐ **STRUCTURAL** ☐ **MECHANICAL** ☐ **ELECTRICAL** ☐ **OTHER**

INTENTIONALLY LEFT BLANK

darden architects

6790 N. West Avenue
Fresno, California 93711

Tel: 559.448.8051
Fax: 559.446.1765

www.dardenarchitects.com

REQUEST FOR PROPOSAL

PROJECT:

REQUEST FOR PROPOSAL NO.:

DATE OF ISSUANCE:

OWNER:

CONTRACT DATE:

NOTICE TO PROCEED:

CONTRACTOR:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
OSHPD No.:

Please submit an itemized proposal for change in the Contract Sum and Contract Time for proposed modifications to the Contract Documents described herein. Submit proposal promptly or notify the Architect in writing of the date on which you anticipate submitting your proposal.

This is not a Change Order, Construction Change Directive, or a direction to proceed with the Work described in the proposed modifications.

Description:

Attachments

Darden Architects, Inc.

ISSUED BY:

_____

Architect

☐ **OWNER** ☐ **CONTRACTOR** ☐ **ARCHITECT** ☐ **CONSULTANT** ☐ **INSPECTOR** ☐ **OTHER**

INTENTIONALLY LEFT BLANK

darden architects

6790 N. West Avenue
Fresno, California 93711

Tel: 559.448.8051
Fax: 559.446.1765

www.dardenarchitects.com

CONSTRUCTION CHANGE DIRECTIVE

PROJECT:

DIRECTIVE NO.:

DATE OF ISSUANCE:

OWNER:

CONTRACT DATE:

NOTICE TO PROCEED:

CONTRACTOR:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
OSHPD No.:

You are hereby directed to make the following change(s) in this Contract:

CONTRACT ADJUSTMENT

1. The proposed basis of adjustment to the Contract Sum or Guaranteed Maximum Price is:

   - ☐ Lump Sum
   - ☐ Unit Price of
   - ☐ As provided for in General Conditions and the Supplemental Conditions of the contract.
   - ☐ As Follows:

2. The Contract Time is proposed to (be adjusted) . The proposed adjustment, if any, is increase of _____ days)

When signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change(s) described above.

Signature by the Contractor indicates the Contractor's agreement with the proposed adjustments in Contract Sum and Contract Time set forth in this Construction Change Directive.

ARCHITECT	OWNER	CONTRACTOR
Darden Architects		
6790 N. West Ave		
Fresno, California 93711		
By:	By:	By:
Date:	Date:	Date:

☐ **OWNER** ☐ **CONTRACTOR** ☐ **ARCHITECT** ☐ **CONSULTANT** ☐ **INSPECTOR** ☐ **OTHER**

INTENTIONALLY LEFT BLANK

darden architects

6790 N. West Ave
Fresno, California 93711
Tel: 559.448.8051
Fax: 559.446.1765
www.dardenarchitects.com

CHANGE ORDER REQUEST REVIEW

PROJECT:

CHANGE ORDER REQUEST NO.:

DATE OF ISSUANCE:

OWNER:

CONTRACTOR:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
OSHPD No.:

DESCRIPTION OF PROPOSED CHANGE:

Requested By:

Scope:

Necessary for:

DESIGN CONSULTANT'S REVIEW:

Date Sent:
Referred To:
Date Returned:

ACTION:

- ☐ NO EXCEPTION TAKEN RELATIVE TO COST
- ☐ NO EXCEPTION TAKEN RELATIVE TO TIME
- ☐ AMEND AS NOTED AND RESUBMIT
- ☐ REJECTED

Consultants Remarks

ARCHITECT'S REVIEW:

Date Returned:

ACTION:

- ☐ NO EXCEPTION TAKEN RELATIVE TO COST
- ☐ NO EXCEPTION TAKEN RELATIVE TO TIME
- ☐ AMEND AS NOTED AND RESUBMIT
- ☐ REJECTED

Architects Remarks:

Attachments:

REVIEWED:

Darden Architects
6790 N. West Ave
Fresno, California 93711

APPROVED:

Darden Architects : **Date :**

Owner : **Date :**

The Architect is hereby directed to instruct the Contractor to make the above changes in the Project and to include these changes in a subsequent Change Order:

☐ **OWNER** ☐ **CONTRACTOR** ☐ **INSPECTOR** ☐ **STRUCTURAL** ☐ **MECHANICAL** ☐ **ELECTRICAL** ☐ **OTHER**

CHANGE ORDER REQUEST NO.

Project Architect's Project No.:

CHANGE ORDER REQUEST- BREAKDOWN WORKSHEET

WORK DELETED:

Contractor				
Materials	$0.00			
Equipment	$0.00			
Labor	$0.00			
Material, Equipment, & Labor		$0.00		
TOTAL:				**$0.00**

ADDITIONAL WORK PERFORMED BY SUB-CONTRACTOR

Sub-Contractor				
Materials	$0.00			
Equipment	$0.00			
Labor	$0.00			
Material, Equipment, & Labor		$0.00		
Overhead		$0.00		
Profit		$0.00		
Sub Total:			$0.00	
Contractor				
Overhead			$0.00	
Profit			$0.00	
TOTAL:				**$0.00**

ADDITIONAL WORK PERFORMED BY CONTRACTOR

Contractor				
Materials	$0.00			
Equipment	$0.00			
Labor	$0.00			
Material, Equipment, & Labor		$0.00		
Overhead		$0.00		
Profit		$0.00		
TOTAL:				**$0.00**

TOTAL COST: $0.00

TOTAL COST:	$0.00
TOTAL DAYS:	0

ARCHITECTURAL ADMINISTRATIVE FEES:

Proposal Request Administration	$0.00
Construction Administration	$0.00
TOTAL:	$0.00
DSA Fees:	$0.00

darden
architects

6790 N. West Avenue
Fresno, California 93711
Tel: 559.448.8051
Fax: 559.446.1765
www.dardenarchitects.com

CHANGE ORDER

PROJECT:

CHANGE ORDER NO.:

DATE OF ISSUANCE:

OWNER:

CONTRACT DATE:

NOTICE TO PROCEED:

CONTRACTOR:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
OSHPD No.:

The Contract is changed as follows:

Description:

It is mutually agreed that the affixed signature to this Change Order is evidence that all compensation with respects to the changes defined herein have been satisfied with the execution of this document. Furthermore, no additional compensation either monetarily or via time extension to this contract will be sought in respect to this Change Order.

The Original Contract Sum and Contract Completion Date:		
Net change (Contract Sum and Contract Time) by previous Change Orders:		days
Contract Sum and Contract Completion Date prior to this Change Order:		
Contract Sum and Contract Time (increased or decreased) by this Change Order:		days
New Contract Sum and Contract Completion Date including this Change Order:		

CONTRACTOR	ARCHITECT	OWNER
	Darden Architects	
	6790 N. West Ave	
	Fresno, California 93711	
By:	By:	By:
Date:	Date:	Date:

☐ OWNER ☐ CONTRACTOR ☐ ARCHITECT ☐ CONSULTANT ☐ INSPECTOR ☐ OTHER

INTENTIONALLY LEFT BLANK

FRAGNET SUBMITTAL FORM

Date: _____ Sheet _____ of _____

From: _____ Fragnet No.: _____

To: Darden Architects, Inc.

Description of Delay: By reference to attached schedule fragnet, the following delay occurred:

_____

_____

_____

Continued on Sheets _____ of _____

Time Extension Requested: _____ wds, _____ cds.

Time Requested for Activity: Time Requested for Project:

Related Documents: The following construction documents provide evidence of the delay event:

RFI Nos.: _____ SI Nos.: _____

CCD Nos: _____ RFP Nos.: _____

Daily Reports Dated: _____ and attached.

Project Correspondence Dated: _____ and attached.

Other Documentation: _____

Schedule-Related Information: By reference to the attached fragnet, provide the following:

Predecessor Activity to Fragnet:

Successor Activity to Fragnet:

Affected CPM Schedule Activities (list IDs and descriptions):

_____

_____

New CPM Schedule Activities (list IDs and descriptions):

_____

_____

END OF FORM

INTENTIONALLY LEFT BLANK

APPLICATION FOR PAYMENT

To:
DARDEN ARCHITECTS, INC.
6790 N. West Avenue
Fresno, CA 93711

Project: _____

Bid Package No. _____

Pay Application No.: _____

Application Date: _____

Period Ending: _____

Distribution to:
Owner: _____
Architect: _____
Contractor: _____
Const Mgr.: _____
Inspector: _____

FROM _____
Prime Contractor

Address: _____ Phone: _____

CONTRACTOR'S APPLICATION FOR PAYMENT

CHANGE ORDER SUMMARY		
APPROVED CHANGE ORDERS:		
Change Order No.:	Approved Date:	Amount:
		$
		$
		$
		$
		$
		$
		$
		$
TOTALS		
Net change by Change Order		$

The present status of the account for this Contract is as follows:

ORIGINAL CONTRACT SUM	$
Net Change by Change Orders	$
CONTRACT SUM TO DATE:	$
TOTAL COMPLETE & STORED TO DATE:	$
RETAINAGE:_____%:	$
TOTAL EARNED LESS RETAINAGE:	$
LESS STOP NOTICE(S):	$
LESS PREVIOUS PAYMENT:	$
CURRENT PAYMENT DUE:	$

The undersigned Contractor certifies that in the best of his knowledge, information, and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the contractor for work for which previous Certificates for Payment were issued and payment received from the Owner and that current payment show herein is now due.

Contractor:

_____ **DATE:** _____

This Certificate is not negotiable. This AMOUNT CERTIFIED is payable only to the Contractor named herein, issuance, payment and acceptance of payment, are without prejudice to any rights of the Owner or Contractor under this contract.

CONTRACTOR: _____ DATE: _____

CONSTRUCTION MANAGER: _____ DATE: _____

INSPECTOR: _____ DATE: _____

ARCHITECT: _____ DATE: _____

INTENTIONALLY LEFT BLANK

CONTRACTOR'S TESTING / INSPECTION REQUEST FORM

PROJECT: _____

DATE RECEIVED: _____ (by Inspector)

TIME RECEIVED: _____ (by Inspector)

BUILDING: _____

SITE/OFFSITE: _____

CONSTRUCTION PHASE (1, 2, 3, etc.): _____

SPECIFICATION SECTION (No.): _____

PLAN SHEET AND DETAIL: _____

SCOPE OF WORK: _____

(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____

(contractor name)

LOCATION (bldg., room, floor, wall, ceiling, etc.) _____

_____

_____

TYPE OF INSPECTION (concrete, framing, welding, masonry, electrical, etc.) _____

_____

_____

INSPECTION REQUESTED ON: _____ at _____ am/pm

(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the Testing / Inspection is Requested to Begin.

_____

PRINT NAME AND TITLE OF PERSON REQUESTING INSPECTION

_____

SIGNATURE OF PERSON REQUESTING INSPECTION

Note 2: Contractor Must Accompany Inspector on Inspection, if Requested.

PASSED: _____ FAILED: _____

Note 3: See Attached Sheet for Explanation if Inspection Failed. Re-inspection Required.

INSPECTOR SIGNATURE: _____ Date: _____

INTENTIONALLY LEFT BLANK

CONTRACTOR'S "DEVIATION NOTICE" INSPECTION REQUEST FORM

PROJECT: _____

DATE RECEIVED: _____ (by Inspector)

TIME RECEIVED: _____ (by Inspector)

DEVIATION NOTICE(S) (No.): _____

BUILDING: _____

SITE/OFFSITE: _____

CONSTRUCTION PHASE (1, 2, 3, etc.): _____

SPECIFICATION SECTION (No.): _____

SCOPE OF WORK: _____

(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____

(contractor company name)

LOCATION(S) OF WORK FOR INSPECTION (be specific- bldg.(s), room(s), etc.)

_____

_____

INSPECTION REQUESTED ON: _____ at _____ am/pm

(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the "Deviation Notice" Inspection is Requested to Begin.

_____

PRINT NAME OF PERSON REQUESTING DEVIATION NOTICE INSPECTION

_____

SIGNATURE OF PERSON REQUESTING DEVIATION NOTICE INSPECTION

Note 2: Contractor Must Accompany Project Inspector on "Deviation Notice" Inspection, if Requested.

Note 3: See Attached "Deviation Notice" for Inspector's Comments and/or Date Completed.

PASSED: _____ FAILED: _____

PROJECT INSPECTOR SIGNATURE: _____

DATE: _____

INTENTIONALLY LEFT BLANK

CONTRACTOR'S FINAL INSPECTION REQUEST FORM

PROJECT: _____

DATE RECEIVED: _____ (by Inspector)

TIME RECEIVED: _____ (by Inspector)

BUILDING: _____

SITE/OFFSITE: _____

CONSTRUCTION PHASE (1, 2, 3, etc.): _____

SPECIFICATION SECTION (No.): _____

SCOPE OF WORK: _____

(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____

(contractor company name)

INSPECTION REQUESTED ON: _____ at _____ am/pm

(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the Final Inspection is Requested to Begin. Contractor to be Notified by the Construction Manager in Regards to the Actual Date and Time of the Final Inspection.

_____

PRINT NAME AND TITLE OF PERSON REQUESTING FINAL INSPECTION

_____

SIGNATURE OF PERSON REQUESTING FINAL INSPECTION

Note 2: Contractor Must Accompany Project Inspector, Architect and/or Engineer(s) on Final Inspection, if Requested.

PASSED: _____ FAILED: _____

Note 3: If the Final Inspection Fails Re-Inspection is Required. See Attached Sheet for Comment(s).

PROJECT INSPECTOR SIGNATURE: _____

DATE: _____

PROJECT ARCHITECT SIGNATURE: _____

DATE: _____

INTENTIONALLY LEFT BLANK

CONTRACTOR'S PUNCHLIST INSPECTION REQUEST FORM

PROJECT: _____

DATE RECEIVED: _____ (by Inspector)

TIME RECEIVED: _____ (by Inspector)

BUILDING: _____

SITE/OFFSITE: _____

CONSTRUCTION PHASE (1, 2, 3, etc.): _____

SPECIFICATION SECTION (No.): _____

SCOPE OF WORK: _____

(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____

(contractor company name)

LOCATION(S) OF WORK FOR INSPECTION: (be specific- bldg.(s), room(s), etc.)

_____

_____

DESCRIPTION OF WORK TO BE INSPECTED: (item number(s) from punchlist)

_____

_____

INSPECTION REQUESTED ON: _____ at _____ am/pm

(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the Punchlist Inspection is Requested to Begin.

_____

PRINT NAME OF PERSON REQUESTING PUNCHLIST INSPECTION

_____

SIGNATURE OF PERSON REQUESTING PUNCHLIST INSPECTION

Note 2: Contractor Must Accompany Project Inspector on Punchlist Inspection, if Requested. Items Must Have Already Been Signed Off by Contractor.

Note 3: Attached Sheet for Contractor's Signoff and/or Inspector's Comments and/or Date Completed for the Specific Punchlist Items Noted Above.

Note 4: This Inspection is NOT A FINAL INSPECTION but Only an Acknowledgement That a Particular Item(s) is/are completed.

INTENTIONALLY LEFT BLANK

PROJECT: _____ - CONTRACTOR'S PUNCHLIST

CONTRACTOR NAME: _____ Page _____ of _____

ITEM NO.	DESCRIPTION	BUILDING & ROOM NO.	FLOOR	CEILING	WALLS N. S. E. W.	DATE OBSERVED	SIGNOFF/ COMMENTS

INTENTIONALLY LEFT BLANK

SECTION 013300 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely provide all required submittals and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Contractor's responsibilities:
   1. The Contractor shall check, verify, and be responsible for all field measurements.
   2. The Contractor shall submit a schedule indicating when the required shop drawings and submittals will be submitted to the Architect.
      a. Submit schedule within the amount of days as indicated in Specification Section - CONSTRUCTION SCHEDULES.
   3. Submit copies as scheduled below, checked and approved by the Contractor for all submittals required for the work of the various trades. Deliver submittals promptly to avoid delays in delivery of materials or execution of the work.
      a. The Contractor (or Subcontractor) shall mark-up the submittals as to project specifics. If the specifications contains a schedule prepared by the Architect (i.e. paint symbols such as DW-1, M-1, CB-1, etc., or tile symbols such as CT-1,CT-2, or IWA, IWB, IWC, etc.), then the submittal will also contain those designations. Submittals without project specifics will be returned to the Contractor as not being properly prepared.
      b. The Contractor shall stamp the Submittals utilizing any language requested by the Owner in the General Conditions and the following minimum language:

"This submittal has been reviewed by (Name of Contractor) and approved with respect to the means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incidental thereto. The Contractor has reviewed and approved not only the field dimensions, but the construction criteria, and has also made written notation regarding any information in the Shop Drawings that does not conform to the Contract Documents. The Contractor has reviewed this submittal and coordinated with all other Shop Drawings received to date by the Contractor and this duty of coordination has not been delegated to subcontractors, material suppliers, the Architect, or the design consultants on this project. The Contractor shall also have indicated that it has not relied upon the dimensions shown on the drawings, specifications and schedules, and that the Contractor has double-checked all dimensions for accuracy and fit. (Name of Contractor) also warrants that this

submittal complies with the Contract Documents and comprises no variation thereto."

By: _____ Contractor's Signature

_____ Contractor's Typed Name

Date: _____

c. Substitutions on shop drawings or in product submittals will not be considered without prior approval in accordance with Specification Section - SUBSTITUTION PROCEDURES. Submittals containing unacceptable items will be rejected.

d. The Contractor shall make any corrections required by the Architect during the Architect's initial review, and re-submit the required corrected copies for final review and distribution.

B. Architect's responsibilities:

1. The Architect will make any desired corrections with reasonable promptness, and return the submittal to the Contractor.
2. The Architect's review of such drawings or schedules shall not relieve the Contractor of responsibility for deviations from the drawings or specifications, unless he has, in writing, called the Architect's attention to such deviations at the time of submission, and secured written acceptance.
   a. The Architect's review shall be for general conformance with the design concept for the project and general compliance with the information given in the Contract Documents.
   b. The Architect's review shall not be construed as an "approval," or to relieve the Contractor(s) and material suppliers of responsibility for errors or omissions in the submitted documents.
   c. Modifications or comments made on the submittals or shop drawings during this review do not relieve the Contractor from compliance with the requirements of the drawings and specifications.
   d. Acceptance of a specific item does not include acceptance of the assembly of which the item is a component.

C. The following list of items, definitions and required quantities is a minimum required for this project. Verify with FACILITY SERVICES SUBGROUP sections for additional quantities required within those divisions.

1. Product Data: Illustrations, standard schedules, performance charts, instructions, brochures, diagrams, other product information, color choices and/or manufacturer's catalog sheets shall be specially prepared for the Project (marked-up with project specifics) and shall be submitted in sequential sets for each category of work:
   a. Quantity:
      1) Unless otherwise indicated in the Contract Documents, provide Six (6) sets.
   b. Material Safety Data Sheets (MSDS): MSDS are not required, but it is recognized that applicable federal and state laws require the submission of these data sheets to an Owner. MSDS shall be turned over to the Owner (without review by the Architect or it's consultants) in compliance with federal and state laws.
2. Shop Drawings: Newly prepared information, drawn to accurate scale, consisting of drawings, diagrams, schedules, and other data specifically prepared for the Project by the Contractor, a Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Project. Do not reproduce Contract Documents or copy Standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

a. Quantity: Provide One (1) reproducible original (vellum, sepia or mylar) and Three (3) opaque (blue-line or black-line xerographic) prints for each sheet or detail.
   1) The contractor shall receive the marked-up reproducibles and copy the required number of sets to the subcontractor, manufacturer's and/or material suppliers.

b. Contractor's use of Architect's Electronic CAD Files.
   1) Upon written request by Contractor, copies of the Architect's electronic CAD files may be available for Contractor's use in connection with this Project.
      a) Contractor's written request shall be on the Architect's "Contractor's Document Usage Agreement for Requested Documents" and may include an additional Architect's Consultant's Agreements, outlining conditions for providing files.
      b) Contractor's request shall be limited to drawings directly applicable to the Shop Drawings the Contractor wishes to create for submittal.
      c) Contractor shall pay the Architect for work incurred for providing the requested files. Payment shall be submitted with the request.
   2) The Architect's electronic CAD files are limited to files that already exist and that not all files may be available at the Architect's and Architect's Consultant's discretion.
   3) The Architect's electronic CAD files are not part of the Contract Documents and have limitations to the accuracy, incorporating modifications, CAD system formats, CAD entity attributes and layering.
   4) The Architect's electronic CAD files have restrictions on Contractor's use, transmittal and delivery of files.

3. Samples: Physical examples specially prepared for the Project (marked-up with project specifics) which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.
   a. Quantity:
      1) Unless otherwise indicated in the Contract Documents, provide Four (4) sets.
   b. Color samples shall be submitted on 8-1/2" x 11" cards for all colors scheduling paint types specified utilizing the paint symbols designated by the Architect in the drawings and specifications.
   c. Manufactured devices or equipment items:
      1) Quantity: One (1) sample, returned to supplier and which, when approved, may be incorporated into the Project.
4. Quality Assurance/Control submittals: Consists of design data, test reports, certificates, manufacturers instructions, and /or manufacturer's field reports.
   a. Quantity:
      1) Unless otherwise indicated in the Contract Documents, provide Six (6) sets.
5. Closeout submittals: Maintenance data, operating manuals, project documents, engineering calculations, and/or warranties shall be submitted when required in the various specification sections:
   a. Quantity:
      1) Unless otherwise indicated in the Contract Documents, provide Two (2) sets.
6. Field Samples: Sample panels of in place construction, or selected area of completed substrates or work showing the anticipated compliance with specified characteristics in order to establish a standard of quality.
   a. Quantity:
      1) See specific specification section requirements.

7. Mockups: Full-sized erected assemblies, used for coordination purposes or for testing in a laboratory, or required for approval in a finish form before the actual Project construction begins.
    a. Quantity:
        1) See specific specification section requirements.

D. Substitution, Dispute or Claim Submittals:
1. Any substitution, dispute or claim submittals relating to this contract, or any Contract breach, which are not disposed of by agreement shall be promptly submitted in accordance with the GENERAL CONDITIONS, as a claim to and decided by the Architect who shall issue a written decision on the dispute.
2. Adequate supporting data shall include, but is not limited; a statement of the reasons for the asserted entitlement, the certified payroll, invoice for material and equipment rental, and an itemized breakdown of any adjustment sought.
3. If no "SUBMISSION UNDER PENALTY OF PERJURY" clause is provided within the GENERAL CONDITIONS, then the Contractor shall certify, at the time of submission of a substitution, dispute or claim, as follows:

(The rest of this page is left intentionally blank)

SUBMISSION UNDER PENALTY OF PERJURY

I _____, being the _____(Must be an officer), declare under penalty of perjury under the laws of the State of California, and do personally certify and attest that: I have thoroughly reviewed the attached substitution, dispute or claim for additional compensation and/or extension of time, and know its contents, and said claim is made in good faith; the supporting data is truthful and accurate; that the amount required accurately reflects the contract adjustment for which the Contractor believes the Owner is liable; and further, that I am familiar with California Government Code Section 12650, et seq, pertaining to false claims, and further know and understand that submission of certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.

By: _____ Contractor's Signature

_____ Contractor's Typed Name

Date: _____

Submission of a substitution, dispute or claim, properly certified, with all required supporting documentation, and written rejection or denial or all or part of the claim by Owner, is a condition precedent to any action, proceeding, litigation, suit or demand for arbitration by Contractor.

(This page is left intentionally blank)

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

A. The following schedule was prepared to assist the Contractor in knowing the required submittals for this project, but may not be complete. Specific submittal information as to what is required is contained within the individual specification sections and those individual sections shall govern in the event of a question.

B. SUBMITTAL SCHEDULE
1. 01 11 13 - SUMMARY OF WORK
   a. QUALITY ASSURANCE/ CONTROL SUBMITTALS
2. 01 25 00 - SUBSTITUTION PROCEDURES
   a. SUBSTITUTION REQUEST FORMS
3. 01 29 73 - SCHEDULE OF VALUES
   a. SCHEDULE OF VALUES
4. 01 32 16 - CONSTRUCTION SCHEDULES
   a. CONSTRUCTION SCHEDULE, SHOP DRAWING SUBMITTAL SCHEDULE, CRITICAL PATH SCHEDULES, FRAGNETS.
5. 01 32 26 - FORMS AND REPORTS
   a. AS REQUIRED BY THIS SPECIFICATION SECTION AND OTHER SPECIFICATION SECTIONS.
6. 01 33 00 - SUBMITTAL PROCEDURES
   a. SHOP DRAWING AND SUBMITTAL SCHEDULE, COLOR SAMPLES OF ALL FINISH MATERIALS FOR COLOR BOARD SELECTION.
7. 01 45 29 - TESTING LABORATORY SERVICES
   a. TESTING SCHEDULE, TEST REPORTS
8. 01 71 23 - FIELD ENGINEERING
   a. COORDINATION DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
9. 01 77 20 - PROJECT CLOSEOUT
   a. ANOTATED CONTRACTOR’S AND ARCHITECT’S PUNCH LIST. ALL OPERATIONAL DATA, ALL MAINTENANCE MANUALS, ALL EXTRA MATERIALS.
10. 01 78 36 - WARRANTIES
    a. ALL GUARANTEES AND WARRANTIES
11. 01 78 39 - PROJECT DOCUMENTS
    a. PROJECT "AS-BUILT" DOCUMENTS, PROJECT "RECORD" DOCUMENTS AND PROJECT "CERTIFICATION" DOCUMENTS.
12. 03 11 01 - CONCRETE FORMWORK
    a. PRODUCT DATA, SAMPLES, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
13. 03 15 14 - DRILLED ANCHORS
    a. PRODUCT DATA, ICC EVALUATION SERVICE REPORTS, DSA APPROVAL LETTERS.
14. 03 20 00 - REINFORCEMENT

a. SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.

15. 03 30 00 - CAST-IN-PLACE CONCRETE
    a. PRODUCT DATA, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
16. 03 35 10 - POLISHED CONCRETE FINISHING
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/ CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
17. 03 37 13 - SHOTCRETE
    a. PRODUCT DATA, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
18. 04 23 00 - GLASS MASONRY UNITS
    a. SAMPLES, COLOR SAMPLES, PRODUCT DATA CERTIFICATION.
19. 05 30 00 - METAL DECK
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
20. 05 52 00 - RAILING SYSTEMS
    a. MATERIALS LIST, SHOP DRAWINGS, AND WARRANTIES.
21. 06 10 00 - ROUGH CARPENTRY
    a. PRODUCT DATA, CERTIFIACTES OF COMPLIANCE, AND WARRANTIES.
22. 06 18 00 - GLUE-LAMINATED CONSTRUCTION
    a. SHOP DRAWINGS, VERIFIED REPORTS, AND WARRANTIES.
23. 06 41 23 - MODULAR CASEWORK
    a. SHOP DRAWINGS, MANUFACTURER'S SPECIFICATIONS, COLOR SAMPLES, MOCK-UP, WI CERTIFICATION.
24. 06 61 16 - SOLID SURFACING
    a. SHOP DRAWINGS, MANUFACTURER'S SPECIFICATIONS, COLOR SAMPLES, MOCK-UP, WI CERTIFICATION.
25. 07 26 13 - VAPOR-ALKALINITY CONTROL
    a. PRODUCT DATA, INSTALLATION INSTRUCTIONS, CLOSEOUT SUBMITTALS.
26. 07 21 00 - INSULATION
    a. PRODUCT DATA, INSTALLATION INSTRUCTIONS, CLOSEOUT SUBMITTALS.
27. 07 31 13 - SHINGLES
    a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES, CLOSOUT SUBMITTALS.
28. 07 40 12 - MCM PANELS
    a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES, CLOSEOUT SUBMITTALS.
29. 07 40 10 - ACM PANELS
    a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES, CLOSEOUT SUBMITTALS.
30. 07 51 13 - BUILT-UP ROOFING
    a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
31. 07 53 16 - ELASTOMERIC MEMBRANE ROOFING
    a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
32. 07 72 00 - ROOF ACCESSORIES
    a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES AND WARRANTIES.
33. 07 81 16 - FIREPROOFING
    a. MATERIALS LIST, COLORS, MANUFACTURER'S DATA, TEST DATA AND SAMPLES.
34. 07 84 00 - FIRESTOPPING

a. PRODUCT DATA, CERTIFICATIONS, SHOP DRAWINGS QUALIFICATION DATA ON INSTALLERS.

35. 07 92 00 - SEALANTS
    a. PRODUCT DATA, COLORS AND WARRANTIES.
36. 07 95 00 - EXPANSION JOINTS
    a. MATERIALS LIST, SHOP DRAWINGS, AND WARRANTIES.
37. 08 14 16 - WOOD DOORS
    a. PRODUCT DATA AND SHOP DRAWINGS.
38. 08 15 13 - LAMINATE-FACED WOOD DOORS
    a. PRODUCT DATA AND SHOP DRAWINGS.
39. 08 33 00 - COILING DOORS
    a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
40. 08 34 73 - ACOUSTICAL DOORS AND FRAMES
    a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
41. 08 41 00 - STOREFRONTS
    a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
42. 08 44 00 - CURTAINWALL
    a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
43. 08 63 00 - SKYLIGHTS
    a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
44. 08 80 00 - GLASS
    a. PRODUCT DATA, MATERIALS LIST, SAMPLES AND CERTIFICATES.
45. 08 91 00 - LOUVERS
    a. PRODUCT DATA, SHOP DRAWINGS, CERTIFICATES AND COLORS.
46. 09 22 16 - METAL FRAMING
    a. PRODUCT DATA (INCLUDING INSTALLATION METHODS) AND MATERIALS LIST.
47. 09 24 00 - CEMENT PLASTER
    a. PRODUCT DATA (INCLUDING INSTALLATION METHODS) AND MATERIALS LIST.
48. 09 26 13 - VENEER PLASTER
    a. PRODUCT DATA (INCLUDING INSTALLATION METHODS) AND MATERIALS LIST.
49. 09 30 13 - TILE
    a. PRODUCT DATA, COLORS, SAMPLES, CERTIFICATES, MAINTENANCE MATERIAL AND WARRANTIES.
50. 09 51 00 - ACOUSTICAL CEILINGS
    a. ACOUSTICAL TILE SAMPLES, SUSPENSION SYSTEM SAMPLES AND DSA APPROVED CEILING BRACING DRAWINGS.
51. 09 64 29 - HARDWOOD FLOOR
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
52. 09 65 13 - RESILIENT BASE AND ACCESSORIES
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
53. 09 65 16 - RESILIENT SHEET
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
54. 09 65 19 - RESILIENT TILE
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
55. 09 67 23 - RESINOUS FLOORING

a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.

56. 09 68 40 - CARPET
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
57. 09 69 00 - ACCESS FLOORING
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
58. 09 91 00 - PAINTING
    a. PRODUCT DATA, MATERIALS LIST, COLORS, MAINTENANCE INFORMATION AND WARRANTIES.
59. 10 05 00 - MISCELLANEOUS SPECIALTIES
    a. PRODUCT DATA, COLORS AND SAMPLES (WHERE APPLICABLE) FOR ALL ITEMS.
60. 10 11 00 - VISUAL DISPLAY BOARDS
    a. PRODUCT DATA AND SAMPLE COLORS.
61. 10 13 00 - DIRECTORIES
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
62. 10 14 53 - ROAD AND PARKING SIGNAGE
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
63. 10 21 00 - TOILET PARTITIONS
    a. PRODUCT DATA, SHOP DRAWINGS, CERTIFICATES AND COLORS.
64. 10 26 00 - WALL AND CORNER GUARDS
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
65. 10 28 13 - TOILET ACCESSORIES
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
66. 10 44 00 - FIRE PROTECTION SPECIALTIES
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
67. 10 51 13 - METAL LOCKERS
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
68. 10 56 13 - METAL STORAGE SHELVING
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
69. 10 75 00 - FLAGPOLES
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
70. 11 66 43 - SCOREBOARDS
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
71. 11 66 53 - GYMNASIUM DIVIDERS
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
72. 12 66 23 - TELESCOPING CHAIR PLATFORMS
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
73. 14 42 00 - WHEELCHAIR LIFTS

a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.

74. DIV. 22 - PLUMBING SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
75. DIV. 23 -HEATING, VENTILATING AND AIR CONDITIONING SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
76. DIV. 25- INTEGRATED AUTOMATION SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
77. DIV. 26- ELECTRICAL SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
78. DIV. 27 -COMMUNICATIONS SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
79. DIV. 28- ELECTRONIC SAFETY AND SECURITY SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
80. 31 20 00 - EARTHWORK
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES, AND DRAWINGS SHOWING KNOWLEDGE OF THE EXTENT OF ENGINEERED PADS.
81. 31 31 00- SOIL TREATMENT
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES.
82. 32 12 00- PAVEMENT
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES.
83. 32 80 00- LANDSCAPE IRRIGATION
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES.
84. 33 40 00- STORM DRAINAGE
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES.

END OF SECTION

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Commissioning Authority, Inspector or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Requirements:
   1. 01 41 00 REGULATORY REQUIREMENTS
   2. 01 42 00 REFERENCES
   3. 01 45 23 TESTING AND INSPECTION SERVICES for qualifications of inspector.
   4. 01 45 29 TESTING LABORATORY SERVICES for qualifications of testing laboratory.

1.2 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
   1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
   1. Mockups are used for one or more of the following:
      a. Verify selections made under Sample submittals.
      b. Demonstrate aesthetic effects.
      c. Demonstrate the qualities of products and workmanship.

d. Demonstrate successful installation of interfaces between components and systems.
e. Perform preconstruction testing to determine system performance.

2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) in accordance with 29 CFR 1910.7, by a testing agency accredited in accordance with NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."

I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.3 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.4 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 SUBMITTALS

A. Mockup Shop Drawings:
1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
2. Indicate manufacturer and model number of individual components.
3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

B. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

C. Qualification Data: For Contractor's quality-control personnel.

D. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

E. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

F. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

G. Reports: Prepare and submit certified written reports and documents as specified.

H. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.

B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
   1. Project quality-control manager may have other Project responsibilities.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
   1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
   2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
   3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by Commissioning Authority.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
   1. Date of issue.

2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement of whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
   1. Requirements of authorities having jurisdiction supersede requirements for specialists.

G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Contractor's Responsibilities:
      a. Provide test specimens representative of proposed products and construction.
      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
      c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
      d. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.

e. When testing is complete, remove test specimens and test assemblies; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.
3. Notify Architectseven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
   a. Allow seven days for initial review and each re-review of each mockup.
7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed unless otherwise indicated.

1.9 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Engage a qualified testing agency to perform quality-control services.
   a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.
3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
   1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
   2. Distribution: Distribute schedule to Owner, Architect, Commissioning Authority, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections attached to this Section, and as follows:
   1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
   2. Notifying Architect, Commissioning Authority, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
   3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Commissioning Authoritywith copy to Contractor and to authorities having jurisdiction.
   4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
   5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
   6. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
   1. Date test or inspection was conducted.
   2. Description of the Work tested or inspected.
   3. Date test or inspection results were transmitted to Architect.
   4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority's, reference during normal working hours.
   1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section CUTTING AND PATCHING.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014100 – REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
   2. Section 4-317 (c), Part 1, Title 24, CCR, requires the following:
      a. "The intent of these drawings and specifications is that the work of the alteration, rehabilitation or reconstruction is to be in accordance with Title 24, California Code of Regulations. Should any existing conditions such as deterioration of non-complying construction be discovered which is not covered by DSA approved documents wherein the finished work will not comply with Title 24, California Code of Regulations, a construction change document, or a separate set of plans and specifications, detailing and specifying the required repair work shall be submitted to and approved by DSA before proceeding with the repair work."

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. References to standards, codes, specifications, recommendations and regulations, refer to the latest edition or printing in effect at the date of issue shown in the Documents unless another date is implied by the suffix number of the Standards.

B. Applicable portions of the Standards listed that are not in conflict with the Contract Documents shall be construed as specification for this work.

C. General Standards:
   1. AFPA American Forest and Paper Association
   2. ANSI American National Standards Institute
   3. ASTM American Society for Testing and Materials
   4. CAL/OSHA California Occupational Safety and Health Administration
      a. State of California Construction Safety Orders
   5. CS Commercial Standards of the US Department of Commerce
   6. EPA Environmental Protection Agency
   7. FMG Factory Mutual Group
   8. NIBS National Institute of Building Sciences
   9. NIST National Institute of Standards and Technology

10. NFPA National Fire Protection Association
11. OSHA Occupational Safety and Health Administration
    a. Federal Construction Safety Orders
12. PS Product Standards of the US Department of Commerce
13. SS-CDOT "Standard Specification":
    a. State of California Department of Transportation (CalTrans)
14. UL Underwriters Laboratory Incorporated
15. WH Warnock Hersey

1.3 SUBMITTALS

1. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
2. Quality Assurance/Control Submittals:
    a. Certificates:
        1) Submit three (3) copies of certificates written on the Contractor's Letterhead indicating that the required codes shall be present at the Job Site.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. All codes, laws, ordinances, rules, regulations, orders and other legal requirements of City, County, State, Federal and other public authorities which bear on performances of Work shall be applicable to Project. Latest editions shall be applicable unless specified otherwise.
2. Relationship between Applicable Codes and Contract Documents. The Contract Documents have been developed with the intent to conform to the applicable codes. Nothing within the Contract Documents shall be construed to permit Work not conforming to the applicable codes.

B. Major Governing Codes And Regulations:

1. General: All work shall comply with the requirements of the following codes and regulations. Special reference in other Sections of the Specifications to a specific code will be by use of the abbreviation given in front of the Code.
    a. Freestanding equipment (if applicable) shall be provided and installed in accordance with the seismic requirements where the Project is located.
2. NOTE: * -Indicates that a copy of these codes shall be at the job site at all times.
3. FEDERAL LAW:
    a. ADA: Americans with Disabilities Act
4. CALIFORNIA CODE OF REGULATIONS (Previously known as the California Administrative Codes)
    a. CCR-T5: California Code of Regulations, Title 5-Education.
    b. CCR-T8: California Code of Regulations, Title 8-Industrial Safety
        1) Contains the California Elevator Safety Code.
    c. CCR-T19: California Code of Regulations, Title 19-Public Safety.
    d. CCR-T21: California Code of Regulations, Title 21-Public Works.
    e. *CCR-T24: California Code of Regulations, Title 24, Part 1-Administrative Regulations DSA.
5. CALIFORNIA BUILDING, ELECTRICAL, MECHANICAL, PLUMBING, ENERGY, FIRE, and REFERENCED CODES
    a. *CBC: California Building Code 2019 California Code of Regulations, Title 24-Part 2, Volumes 1 and 2, CCR-T24, based on the 2018 edition of the IBC (International Building Code), with the latest California State Amendments.

b. *CEC: California Electrical Code 2019, California Code of Regulations, Title 24-Part 3, CCR-T24, based on the 2017 edition of the NEC (National Electrical Code), with the latest California State Amendments.

c. *CMC: California Mechanical Code 2019, California Code of Regulations, Title 24, Part 4, CCR-T24, based on the 2018 edition of the UMC (Uniform Mechanical Code), with the latest California State Amendments.

d. *CPC: California Plumbing Code 2019, California Code of Regulations, Title 24, Part 5, CCR-T24, based on the 2018 edition of the UPC (Uniform Plumbing Code) by IAPMO, with the latest California State Amendments.

e. *CEnC: California Energy Code 2019, California Code of Regulations, Title 24, Part 6, CCR-T24, and the latest California State Amendments.

f. *CFC: California Fire Code 2019, California Code of Regulations, Title 24, Part 9, CCR-T24, based on the 2018 edition of the IFC (International Fire Code), with the latest California State Amendments.

1) In addition to all other Chapters in the CFC to be followed, attention is specifically called out to comply with Chapter 33 - "Fire Safety During Construction and Demolition".

g. CBSC: California Building Standards Commission, California Code of Regulations, Title 24, Part 10, CCR-T24.

h. CGBSC: California Green Building Standards Code 2019, California Code of Regulations, Title 24-Part 11, CCR-T24 (CALGreen).

i. CRSC: California Referenced Standard Code 2019, Title 24, Part 12, CCR-T24, with the latest California State Amendments.

6. DIVISION OF THE STATE ARCHITECT:

a. DSA: Regulations of the Division of the State Architect of the State of California:

1) ACS: Access Compliance Section
2) SSS: Structural Safety Section
3) FLS: Fire and Life Safety Section
4) IR: Interpretation of Regulations.

7. OTHER STATE AGENCIES:

a. AQMCD: Air Quality Management Control District in the area where the project is located.

b. RWQCB: Regional Water Quality Control Board in the area where the project is located.

C. Governing Authority:

1. The provisions of the State of California, Statutes of 1933, Chapter 59, Safety of Construction of Public School Buildings Act, and the latest regulation based thereon, of the Division of the State Architect of the State of California, shall be the governing authority and shall take precedence over other applicable codes.

2. The following shall be stamped and signed by the A/E on Record or Delegated Design Professional per CBC, Part 1, Section 4-317 (h), and the following:

a. Addenda or Bulletins per Sec. 4-338(b): All addenda or bulletins shall be signed and approved by the Division of State Architect.

b. Construction Changes per Sec. 4-338(c): All Construction Changes related to structural items, fire safety issues, life safety issues and accessibility compliance issues shall be reviewed and approved by the appropriate Division of the State Architect.

c. Substitutions (per DSA) shall be treated like Addenda, or Construction Changes per Sec. 4-338(c), and IR A-6: All substitution requests and substitutions related to structural items, fire safety issues, life safety issues and accessibility compliance issues shall be reviewed and approved by the appropriate Division of the State Architect prior to fabrication and installation.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 014200 – REFERENCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. The abbreviations, symbols and work meanings not defined in the Contract Documents are in accordance with building industry usage and convention. Questions which arise as to "meaning," or intent shall be referred to the Architect prior to bidding for interpretation.
      b. Refer to drawings for additional abbreviations and symbols.
      c. Refer to GENERAL and SPECIAL or SUPPLEMENTAL CONDITIONS and specific specification Sections for additional definitions.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. EXECUTE Perform what is required to install, apply, erect and otherwise incorporate products in to this Project.

B. FURNISH Supply products required, deliver to Project, unload, store and install as required in location as directed by Contractor, Owner or Architect.

C. GUARANTEE An assurance by the seller or installer that products or Work are as represented or will be as promised in compliance with Specifications. Synonymous and interchangeable with WARRANTY.

D. INSTALL Incorporate into this Project.

E. PRODUCTS The material, equipment, fixtures and other physical substances required to execute the Project.

F. PROVIDE Furnish and Install into this Project.

G. WARRANTY An assurance by the seller or installer that products or Work are as represented or will be as promised in compliance with Specifications. Synonymous and interchangeable with GUARANTEE.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 014523 – TESTING AND INSPECTION SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. One Project Inspector (Owner's Inspector), including Special and/or Assistant Inspector(s) (minimum Class 1 Rating), as required, will be employed by the Owner in accordance with the requirements of CCR-Title 24, Part 1, CALIFORNIA ADMINISTRATIVE CODE, and the latest amendments, and will be assigned to the Project.
      a. Duties of a Project Inspector are specifically defined in CCR-Title 24, Part 1, and the latest amendments.
      b. Special Inspections (not within the Project Inspector's abilities) shall be performed by the Testing Laboratory or other Special Inspector as approved by the Owner and DSA.
         1) All Special Inspections shall be approved by DSA in accordance with CCR-T24, Part 1, Chapter 4, Group 1, Article 5, Section 4-335.1.
   2. The Project Inspector shall be employed by the Owner and approved by the Architect, Structural Engineer, and DSA.
      a. See the Title Page of this Project Manual for the name of this Project.
      b. Payment of the Project Inspector will be by the Owner.
   3. Provide all access, facilities and information required by the Project Inspector for the Project.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Responsibilities of the Project Inspector:
   1. The Project Inspector will be required to provide inspection of the Work (including "Continuous Inspection") as required in CCR-T24, Part 1:
      a. Educational Work: Chapter 4, Group 1, Article 6, 4-342 (b).
   2. The Project Inspector will report to the Owner, the Architect and DSA as required during the progress of the Work.
   3. The Project Inspector shall review all Pay Requests prior to submittal to the Architect.

B. Responsibilities of the Contractor:
   1. Written Statement of Responsibility to the Owner and the Authority Having Jurisdiction (DSA) per CBC Chapter 17A:

a. Provide a written Statement of Responsibility regarding the Contractor's understanding of the special inspection requirements and identifying individuals in their firm responsible for exercising control over the conformance to the construction documents.

2. Provide the Project Inspector free access to any and all parts of the Project at all times.
3. Provide the Project Inspector information necessary to keep him fully informed with respect to the progress, manner and character of Work.
4. Perform no Work in absence of the Project Inspector unless alternate arrangements have been made in advance and agreed to by the Owner, the Architect and DSA.
5. The Owner's "Inspection of Work" by the Project Inspector shall not relieve the Contractor from any conditions of this Contract.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Quality Assurance/Control Submittals:
a. Written Statement of Responsibility to the Owner and the Authority Having Jurisdiction per CBC Chapter 17A.
b. Project Inspector's Field Reports:
1) Submit four (4) copies of reports.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 014529 – TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. The Owner's Testing Laboratory shall be employed by the Owner and approved by the Architect, Structural Engineer, and DSA.
      a. Payment of the Owner's Testing Laboratory will be by the Owner.
      b. The Owner shall pay for all initial testing indicated as paid for by Owner except as specified otherwise or in the schedule at the end of this section.
         1) Cost of re-testing (due to initial failures) shall be back-charged to the Contractor, and those excess costs will be deducted from the Contract Price.
         2) Cost of testing (due to shop fabrication or in-plant testing out of state and beyond a 75 mile radius of the Project Site) shall be back-charged to the Contractor, and those excess costs will be deducted from the Contract Price.
   2. Provide all access, facilities and information required for the testing of the various portions of the Work as required by Regulatory Agencies, Planning, Agencies, Building Agencies, and other Governmental Inspectors, the Contract Documents and the Owner.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Responsibility of the Testing Laboratory:
   1. Taking all specimens.
   2. Performing Tests.
      a. The Testing Laboratory's duties shall include all tests required by the DSA 103 Form prepared at the time of DSA Approvals, and any other testing as determined by authorities or the Project Inspector during the course of the work.
      b. Special Inspections (not within the Project Inspector's abilities) shall be performed by the Testing Laboratory or other Special Inspector as approved by the Owner and DSA.
         1) All Special Inspections shall be approved by DSA in accordance with CCR-T24, Part 1, Chapter 4, Group 1, Article 5, Section 4-335.
   3. Review of "Continuous Inspection" reports by the Project Inspector.
      a. Portions of the Work requiring "Continuous Inspection" shall be performed by the Project Inspector (if qualified) and all reports will be reviewed by the Testing Laboratory.
   4. Distribute Test Reports to the Owner, Architect, applicable Engineer, Contractor and to DSA.

B. Responsibilities of the Contractor:
1. Contractor shall provide a Testing Schedule that is in accordance with the following:
a. Format of the Testing Schedule shall be in accordance with Specification Section – CONSTRUCTION SCHEDULES.
b. Cooperates with the Testing Laboratory's schedule of required testing.
c. Contractor shall coordinate Construction Schedule and Testing Schedule.
1) Format of testing schedule in accordance with Specification Section – CONSTRUCTION SCHEDULES.
2. Cooperation with testing laboratory:
a. Provide access to Work being tested.
b. Provide test samples as selected by testing laboratory.
c. Schedule Work so that there shall be no excessive inspection time.
1) At times that an inspector is required, sufficient work shall be laid out and adequate personnel supplied so that the inspector's time shall be used to full advantage.
2) If inspection costs become excessive because of poor shop or construction procedure, such excess costs will be paid for by the Owner, but deducted from the Contract Price.
d. Inspections and tests required by regulatory agencies shall be the responsibility of and shall be paid for by the Owner unless specified otherwise.
e. Inspections and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.
f. Test Reports:
1) Distribute test reports and related instruction to insure all required re-testing and/or replacement of materials.
g. Payment of Testing:
1) All testing shall be paid for by the Owner.
3. Contractor shall be backcharged for re-testing, excessive distance from the Project Site, or extra testing required because of initial failures.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Quality Assurance/Control Submittals:
a. Test Reports:
1) Submit four (4) copies of testing laboratory's report.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Testing Laboratory Qualifications:
a. In accordance with the latest Edition of ASTM E-329.

B. Regulatory Requirements and Reference Standards:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. In accordance with regulatory agencies and appropriate ASTM Standards.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 TESTING SCHEDULE

A. Testing Schedule should be used as a guide. Refer to regulatory agency requirements and specific specification section for complete testing requirements.

B. DRILLED ANCHORS
1. Tension Tests. Paid by Owner.

C. REINFORCEMENT
1. Rebar Material per ACI 318, CBC TABLE 1705A.2.1, CBC Sections 1903A.1, 1905A, and 1910A. Paid by Owner.
2. Continuous Inspection of Welds per ACI 318, CBC TABLE 1705A.2.1, CBC Sections 1903A.8, 1905A, and 1910A.Paid by Owner.

D. CAST-IN-PLACE CONCRETE
1. Cement Material per ACI 318, and CBC Sections 1903A, 1905A, and 1910A. Paid by Owner.
2. Aggregate Material per ACI 318. Paid by Owner.
3. Concrete Mix per ACI 318. CBC Sections 1903A and 1910A. Paid by Owner.
4. Concrete Strength Tests per ACI 318. Paid by Owner.
5. Concrete Compression Tests per ACI 318. Paid by Owner.

E. CONCRETE MASONRY UNITS
1. Grout Tests/Mortar Tests per CBC Section 2105A.3. Paid by Owner.
2. Continuous Inspection of Laying Block and Block Cores per THE MASONRY SOCIETY - TMS 402 and TMS 602, as set forth in Tables 3 and 4, Level 3 requirements and Chapter 21A. Testing shall be in accordance of CBC Section 2105A. Paid by Owner.
3. Concrete Masonry Unit Tests per CBC Section 2105A.6. Paid by Owner.

F. STEEL AND FABRICATIONS
1. Steel Material per CBC Section 1705A.2. Paid by Owner.
2. High Strength Bolts and installation per CBC Section 1705A, and CBC Section 1705A.2.6. Paid by Owner.
3. Inspection of Shop and Field Welding per CBC Section 1705A, and CBC Section 1705A.2.5. Paid by Owner.

G. METAL DECK
1. Steel Material per CBC Section 1705A, and CBC Section 1705A.2.2. Paid by Owner.
2. Inspection of Shop and Field Welds per CBC Section 1705A, and Table 1705A.2.1. Paid by Owner.

H. METAL FRAMING
1. Metal Stud Material. Paid by Owner.

2. Metal Stud Welding. Paid by Owner.

I. ACOUSTICAL CEILINGS
1. Main and cross runners, intersection connectors and expansion devices. Paid by Contractor.

J. PLUMBING
1. Non-Leaking System. Paid by Contractor.
2. Bacteriological Purity. Paid by Contractor.

K. HEATING, VENTILATING AND AIR CONDITIONING
1. Equipment Operation. Paid by Contractor.
2. System Energy Balance. Paid by Contractor.
3. Non-Leaking Hydronic System. Paid by Contractor.

L. SERVICE AND DISTRIBUTION
1. Equipment Operation. Paid by Contractor.
2. Protective Systems. Paid by Contractor.

M. LIGHTING
1. Equipment Operation. Paid by Contractor.

N. MASTER CLOCK AND PUBLIC ADDRESS SYSTEM
1. Equipment Operation. Paid by Contractor.

O. FIRE SPRINKLER SYSTEM
1. All tests required by NFPA #13. Paid by Contractor.

P. WET CHEMICAL FIRE SUPPRESSION SYSTEM
1. All tests required by NFPA #17A. Paid by Contractor.

Q. EARTHWORK
1. Compaction Test. Paid by Owner.
2. Inspection of Excavations and Fills per CBC Table 1705A.6. Paid by Owner.

R. Division of the State Architect "Statement of Structural Tests and Special "Inspections":
1. In addition to the TESTING SCHEDULE cited above, and elsewhere within the documents, DSA requires the Contractor to schedule and manage the following tests to be performed and reported as required for this Project.
2. Failure to schedule these tests is grounds for reduction in Monthly Payment Request authorization, and may delay distribution of the Final Payment.
3. Refer to the approved DSA 103-Listing of Structural Tests and Special Inspections Form.

END OF SECTION

SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Temporary Utilities, Support Facilities, and Protection Facilities materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Shop Drawings:
      a. Project Sign.
   2. Quality Assurance/Control Submittal:
      a. Copy of Application to APCD for Dust Prevention and Control Plan.
      b. Copy of approved Application to APCD for Dust Prevention and Control Plan.
      c. Copy of Application to local City or County Engineer for Traffic Control.
      d. Copy of approved Application to local City or County Engineer for Traffic Control.
      e. Temporary Project Enclosure Plan.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
      b. CAL/OSHA California Division of Occupational Safety and Health Administration
      c. CF County of Fresno, Codes and Ordinances
      d. EPA Environmental Protection Agency

B. Dust Prevention and Control Plan:

1. Prior to commencing the Work, prepare a Dust Prevention and Control Plan and obtain review and approval of the Air Pollution Control District (APCD) in the area where the project is located.
    a. Prepare application and file with appropriate fees to APCD upon completion of Dust Prevention and Control Plan.
2. The Dust Prevention and Control Plan shall specify the methods of control that will be utilized, demonstrate the availability of needed equipment and personnel, and identify a responsible individual who, if needed, can authorize implementation of additional measures.
3. All construction shall comply with applicable elements of the APCD's regulations.
4. The Dust Prevention and Control Plan shall include, but not be limited to, the following:
    a. Contractor's name and project identification information.
    b. Procedures and measures to be implemented, but not be limited to:
        1) All material excavated or graded shall be sufficiently watered to prevent excessive amounts of dust.
        2) During periods of high winds, all clearing, grading, earth moving, or excavation shall cease when dust control measures are unable to avoid visible plumes.
        3) All dust producing material transported off site shall be either sufficiently watered or securely covered to prevent excessive amounts of dust.
        4) The area disturbed by clearing, earth moving, or excavation activities shall be minimized at all times.
        5) All watering of areas shall be only to the extent required to keep the soil particles in a moist condition and not to the extent that erosion of surface soil occurs.
        6) To control general fugitive dust, on-site vehicle speed shall be limited to 15 mph.
        7) All areas with vehicle traffic shall be watered periodically for stabilization of dust emissions.
        8) Periodically streets adjacent to the project site shall be cleaned as required to remove silts which may have accumulated from construction activities.

C. Traffic Control Plan:
1. Prior to commencing the Work, prepare a Traffic Control Plan and obtain approval of the local City or County Engineer in the area where the project is located.
    a. Prepare application and file with appropriate fees to the local City or County Engineer upon completion of Traffic Control Plan.
2. The Traffic Control Plan shall include information on construction timing and phasing and proposed methods of alleviating potential hazardous and/or inconvenient conditions. Such methods can include, but are not limited to, the use of flagmen, barricades, signs, warning lights, detours, phased lane closures, coordination with adjacent property owners, and coordination with law enforcement, fire protection and other emergency service agencies.

D. Temporary Project Enclosure Plan:
1. In accordance with CBC Chapter 33 Safeguards During Construction.
    a. Refer to Table 3306.1 Protection of Pedestrians for type of protection required.
2. Prior to commencing the Work, prepare a Temporary Project Enclosure Plan indicating the protection of people, animals, and partial and fully completed work until occupancy by the Owner.
3. Identify temporary egress from existing occupied facilities and as required by authorities having jurisdiction.
4. The Temporary Project Enclosure Plan shall include, but not be limited to, the following:
    a. Contractor's name and project identification information.

b. Indicate the duration of the proposed measures based on the completion of the work as a whole and if any phases of work are identified.
c. Indicate proposed temporary fencing and potential exit and entry paths.
   1) Show gate and door locations and indicate who has access.
d. Indicate proposed temporary wall location(s) and potential exit and entry paths.
   1) Show door location(s) and indicate who has access.
e. Indicate type of material used for temporary fencing, walls, gates, and doors.
f. Indicate proposed temporary roads and paved areas.
g. Indicate proposed temporary offices and storage areas.

E. Copy of approved Fire Protection Program:
1. Contractor shall be responsible for the development, implementation, and maintenance of a written plan establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, alteration, or demolition work in accordance with CFC Chapter 33, Section 3308 and sub-sections.
2. It is the Contractor's responsibility to contact local Fire Authority to discuss the plan.
   a. A copy of the report should be made available to the Project Inspector and local Fire Authority.
3. Approval Required: Prior to commencing the Work, prepare a Fire Protection Program and obtain review and approval from the local Fire Authority in the area where the project is located.
4. Plan shall address at a minimum:
   a. Each phase of the construction, repair, alteration, or demolition work.
   b. Designate responsible program superintendent in accordance with CFC 3308.2.
   c. Duties of staff.
   d. Staff training requirements.
   e. Prefire plans.
   f. Fire protection devices.
   g. Hot work operations.
   h. Impairment of fire protection systems.
   i. Temporary covering of fire protection devices.

1.4 PROJECT CONDITIONS

A. Environmental Requirements:
1. Heating and Cooling:
   a. Provide temporary heating and cooling required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed, and is maintained prior, during and after the installation in accordance with the exterior or interior building materials temperature and humidity guidelines.
      1) Do not use heating units that contribute moisture to the enclosed spaces under construction.
2. Ventilation and Humidity Control:
   a. Provide temporary ventilation required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1) Exterior Moisture Control:
   a) Perform the installation of all exterior building cladding only after the substrate to which they are being applied is dry and ready to receive them. Do not apply any cladding if it will trap moisture inside a wall or roof cavity (i.e. insulation that has become wet for whatever reasons).
2) Interior Moisture Control:
   a) Perform the installation of all interior moisture sensitive building materials only after the building or space is acclimated to the final environmental conditions under which the building is to be operated in accordance within the Owner's humidity control guidelines.

b. Maintain a consistent humidity in accordance with the guidelines for those materials in the space at least seven (7) days prior to installation of any moisture sensitive materials (i.e. Veneer Plaster, Gypsum Board, Ceiling Tiles, Wood Sensitive Floors, other Flooring sensitive to moisture levels, Interior Painting, etc.).

c. Maintain the same levels or temperature and humidity during the installation of those materials, and after the installation of those materials until the building's own mechanical systems can be turned on to maintain the facility within the Owner's temperature and humidity control guidelines.

d. Replace any materials that have become wet and damaged due to the Contractor not properly protecting installed building materials at no additional cost to the Owner.

3. Dust control:
   a. Perform work in a manner as to minimize the spread of dust and flying particles.
   b. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
4. Burning: No burning will be allowed on-site.
5. Noise Control:
   a. Stationary noise sources shall be of a low-noise emission design, consistent with the best available noise reduction technology.
   b. The hours of operation of noise-generating equipment shall be restricted to 6:00 a.m. to 7:00 p.m. Monday through Friday, and to 8:00 a.m. to 6:00 p.m. on Saturday and Sunday.
   c. Mufflers shall be required on all gas and diesel-powered equipment.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

D. Wood Barrier Fence: Plywood, 8 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.

E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

F. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.

G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Field Offices:
1. General Note: Provide one (1) 2A:10B:C Wall Surface Mounted Fire Extinguisher in each field office as a minimum per the CSFM.
2. Contractor's Field Office:
   a. Size: Nominal 10 feet wide minimum, approximately 400 square feet minimum (half of this office is to be reserved for a conference room for job site meetings).
   b. Equipment:
      1) Table for review of Drawings.
      2) Files, rack and shelves as required to store Contract Drawings and Project Record Drawings in a neat, orderly manner.
      3) One copy of each code listed in Specification Section - REGULATORY REQUIREMENTS.
      4) Telephone.
      5) Internet Connection.
      6) Plain Paper Copier / FAX Machine.
      7) Conference room table and chairs for at least 10 people.
   c. Facilities:
      1) Adequate light and power.
      2) Adequate heating, ventilation and air conditioning.
   d. Control and Access:
      1) Door shall be lockable and key shall be supplied to Architect and access shall be limited to Owner, Architect, Inspector and Contractor.
   e. All of the above items shall be subject to Architect's approval.
3. Project Inspector's Field Office:
   a. Size: Nominal 10 feet wide minimum, approximately 400 square feet minimum (sized for two (2) Owner's Inspectors, and a desk for the Architects use).
   b. Equipment:
      1) Three (3) 48" x 96" layout tables for review of the drawings by each Inspector.

2) Three (3) 30" x 60" standard desks with two drawers on one side of each desk (the third desk will be used by the Architect when visiting the site).
3) Three (3) secretarial task chairs with five point rolling bases.
4) Three (3) 4-drawer legal size, full suspension, lockable file cabinets.
5) Three (3) 60" high x 36" wide x 12" deep free standing bookcases with four (4) adjustable shelves for each bookcase.
6) Three (3) 12-capacity rolling, vertical "Plan Holds" with adjustable brackets for 30" x 42" wide drawings.
7) Three (3) 36" x 48" tackboards mounted to walls as directed by the Owner's Inspector.
8) Three (3) drafting stools.
9) Space for one copy of each code listed in Specification Section - REGULATORY REQUIREMENTS.
10) Two telephones.
11) Internet Connection.
12) One Plain Paper Copier / FAX Machine.

c. Facilities:
1) Adequate light and power.
2) Adequate heating, ventilation and air conditioning (ducted central HVAC).
3) Electric water cooler with both hot and cold water.

d. Control and Access:
1) Door shall be lockable and key shall be supplied to Architect and access shall be limited to Owner, Architect, Inspectors and Contractor.

e. All of the above items shall be subject to Architect's approval.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

D. Project Sign:
1. The Contractor shall furnish and erect at location as directed by the Architect one sign board approximately 4 feet x 8 feet, fabricated of 3/4 inch exterior grade plywood with a sturdy frame attached to 4 inch x 4 inch x 14 foot redwood posts set 4 feet in the ground minimum, and substantially braced.
2. The sign to be painted on signboard shall be of design in 4 colors as directed by the Architect.
3. Lettering shall be of style shown, neatly executed by a skilled sign painter.
4. The information to be lettered on sign shall be as furnished by the Architect.
5. Sign will include the names of the [Prime] Contractor[s], Owner, Architect, and the project designation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   2. Execution of work under this specification section shall constitute acceptance of existing conditions.
   3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the work under this section.

3.2 PREPARATION

A. Coordination:
   1. Before proceeding, verify plans match existing conditions.
   2. Coordinate work under this specification with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. The Contractor shall verify and protect existing landscaping, asphalt area, concrete walkways, and other site improvmeents to remain on the site before proceeding with the Work.
   2. Prior to starting Work, hose bibbs, utility lines, etc., to be abandoned and removed within the construction area shall be stubbed off outside the limits of construction.
   3. Verify and protect utilities to remain within the construction area and provide special construction for their protection.

3.3 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
   1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.4 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
   1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
   1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with coordination drawings.
      a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
      b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
   2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
   3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.5 IMPLEMENTATION

A. General:
   1. Perform Work and provide and maintain Temporary Utilities and Temporary Facilities in accordance with the requirements of all regulatory authorities having jurisdiction.
   2. Contractors shall cooperate with other contractors and the Owner in the use of the site, Temporary Utilities, Temporary Facilities and shall adjust their operations to maintain harmonious relations and uninterrupted progress of the Work.
   3. The Contractor shall assume all responsibility for the provision and maintenance of these Temporary Utilities and Temporary Facilities and for the provisions of public safety where the operations under this Contract interface with public areas.
   4. Relocate and modify Temporary Utilities and Temporary Facilities, as required by progress of the Work.
   5. Remove Temporary Utilities and Temporary Facilities upon completion of the Project.
   6. Temporary Utilities and Temporary Facilities are to be provided and maintained from commencement of Work until final acceptance.
      a. The Contractor shall pay all charges required of him for the duration of the project, including a 3 month period following the date of the Notice of Substantial Completion.

3.6 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

B. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
   1. Install temporary service or connect to existing service.

C. Sewers: Provide temporary service to remove effluent lawfully.

D. Storm Drainage:Provide temporary service as necessary to remove storm water. Work shall be performed in accordance with the requirements of the Storm Water Pollution Prevention Plan (SWPPP), if any. If no SWPPP is required, then follow local authorities having jurisdiction requirements.

E. Water:

1. The Contractor will arrange and pay for all water supply for all purposes of construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.
2. The Owner will pay for all water supply for all purposes of construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.

F. Electrical:
1. The Contractor shall provide and pay for all electrical facilities and services for all purposes of power and lighting for construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.
   a. The Contractor shall pay for cost of electrical energy required in connection with the testing of such equipment as generators, transformers, power machinery, and similar equipment installed in the work.
2. The Owner will pay and the Contractor shall provide for all electrical facilities and services for all purposes of power and lighting for construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.
   a. The Contractor shall pay for cost of electrical energy required in connection with the testing of such equipment as generators, transformers, power machinery, and similar equipment installed in the work.
3. The Contractor will provide electrical energy to all subcontractors as required on or about the premises.
4. The Contractor will provide power outlets having adequate electrical characteristics and lighting of adequate intensity for the use of other contractors within reasonable distances from their needs and within a reasonable period of time after the other contractors have requested them.

G. Telephone:
1. The Contractor shall provide and pay for all telephone service and telephone equipment in the Field Offices until completion of the Work.
   a. Provide an additional dedicated phone line for modem/network connection in the Project Inspector's Field Office for use by the Architect's representative.

H. Heating:
1. Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity.
2. Select UL or FM approved equipment that will not have a harmful effect on completed installations or elements being installed.
   a. Except where use of the permanent heating system is authorized, provide temporary units that do not introduce moisture into the newly constructed building spaces.
   b. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.
3. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

3.7 SUPPORT FACILITIES INSTALLATION

A. Offices and Storage:

1. Provide temporary offices and storage facilities located within the construction area.
2. Protect materials, construction work and their operations from weather, vandalism, and theft.

B. Sanitary Facilities:
1. Provide adequate, self-contained toilets as required for all persons employed on the Project.
2. In no case shall the permanent plumbing fixtures of the Project be used for this purpose.

C. Temporary Roads and Paved Areas:
1. Construct and maintain temporary roads and paved areas adequate for construction operations and fire protection during construction.

D. Traffic Controls:
1. Implement procedures and measures outlined in the local jurisdiction's approved Traffic Control Plan.
2. Maintain access for fire-fighting equipment and access to fire hydrants.
3. Conduct work and comply with applicable building codes and regulations regarding the use of public streets and sidewalks and the proper barricading and lighting of public thoroughfares surrounding the construction activities.
4. Provide and maintain access as required to perform work.
5. Repair all damage as a result of work performed on the project to adjacent roads, streets, drives and walks. Restore to condition as good as existed at commencement of the Work.

E. Project Sign:
1. Install project sign as submitted and approved.
2. No other signs will be allowed on the project.

F. Existing Elevator Use:
1. Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to the Owner.
2. Do not load elevators beyond their rated weight capacity.

G. Existing Stair Use:
1. Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to the Owner.

3.8 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Existing Facilities:
1. Protect existing vegetation, equipment, structures, utilities, and other improvements at project site and on adjacent properties, except those indicated to be removed or altered. Damage occurring during the course of construction shall be repaired to condition at the start of the Work.

B. Environmental:
1. Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Project Enclosure:
1. Implement procedures and measures outlined in Temporary Project Enclosure Plan.

2. Project enclosure shall protect materials, construction work, and operations from vandalism, theft, and to exclude the intrusion of the public into the construction area.
3. Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by the Owner from fumes and noise.
4. Maintain security by limiting number of keys and restricting distribution to authorized personnel.

D. Barriers: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades.

E. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
2. Paint and maintain appearance of walkway for duration of the Work.

3.9 CLEANING

A. Clean in accordance with Specification Section – PROJECT CLOSEOUT.
1. At all times, keep the premises free from accumulations of waste materials or rubbish caused by employees or the Work.
2. Clean all soiled surfaces to remain immediately.
3. At the completion of the Work, remove all rubbish from and about the building and all tools, scaffolding, and surplus materials and shall leave the Work "broom clean" or its equivalent.

END OF SECTION

SECTION 016400 – OWNER-FURNISHED ITEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all materials, labor, equipment, and services necessary to prepare for installation for those items, noted or scheduled within the Contract Documents, indicated as follows:
      a. CFCI - Contractor Furnished, Contractor Installed
      b. OFCI - Owner Furnished, Contractor Installed
      c. OFOI - Owner Furnished, Owner Installed

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Unless otherwise defined in the GENERAL CONDITIONS, the following definitions apply for this project:
   1. CFCI: CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
      a. When and if the indication "CFCI" is noted on the drawings or listed in the specifications, such items are shown or listed for information and will be furnished by and installed by the Contractor. Such a designation is listed only for clarity, in order to set the item(s) apart from the OFCI, OFOI, and OFVI related item(s).
      b. All item(s) shown or listed in the drawings and specifications without any indication are in the Contract and are part of the Work unless specifically noted otherwise.
   2. OFCI: OWNER FURNISHED, CONTRACTOR INSTALLED
      a. When and if the indication "OFCI" is noted on the drawings or listed in the specifications, such item(s) are shown or listed for information and will be furnished by Owner and installed by the Contractor. The Contractor shall coordinate and verify all dimensions and details necessary for the proper installation.
   3. OFOI: OWNER FURNISHED, OWNER INSTALLED
      a. When and if the indication "OFOI" is noted on the drawings or listed in the specifications, such item(s) are shown or listed for the purpose of general information and will be furnished and installed by Owner. The Contractor shall coordinate and verify all dimensions and details necessary for proper installation.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Coordination Drawings:
   a. Submit installer's coordination drawings or other documents indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
   b. The Owner will provide Product Data, Shop Drawings, Piping and Wiring Diagrams, Catalog Data Sheets for any items provided under this Specification Section.
2. Closeout Submittals in accordance with Specification Sections in Division One:
   a. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA). Regulatory changes may affect the formulation, availability, or use of the specified coatings. Confirm availability of coatings to be used prior to use, and notify the Architect of any recent changes in the Local California Air District Standards where the Project is located, that may have occurred after the preparation of this specification section.

B. Meetings:
   1. Progress Meetings: Scheduled by the Contractor for the proper performance of the work.
      a. Minimum agenda shall be to review the work progress; discuss field observations, problems, and decisions; identification of any potential problems which may impede planned progress; corrective measures to regain projected schedules; and maintenance of quality and work standards in accordance with manufacturer's warranty requirements.
   2. Final Inspection: Scheduled by the Contractor upon proper completion of the work.
      a. Minimum agenda shall be a walkover inspection to identify problems which may impede the issuance of any warranties or guarantees, and discussion of maintaining the work until substantial completion notice for the project is filed.
   3. Participants (or designated representative of) invited to attend each of the above meetings shall be as follows:
      a. Contractor.
      b. Owner.
      c. Architect.
      d. Installer.
      e. Material Manufacturer(s).
      f. Subcontractors, as appropriate (including any accessory subcontractors).

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted. Contractor shall inspect prior to unloading, for any damaged goods, and if OK, will allow unloading and be responsible for the goods.

B. Acceptance at Site:
1. The Contractor shall accept delivery of any items and the responsibility for all items to be furnished to him by the Owner.

C. Storage and protection:
1. Owner Furnished Equipment: The Owner will coordinate and inform the Contractor as to delivery dates for Owner Furnished Equipment to the Project Site. The Contractor shall be responsible for unloading, uncrating, and protecting such equipment.
2. When only a supporting device, or sub-assembly is to be installed by the Contractor the Owner shall provide only that portion and shall store and safeguard those portions to be installed later by others.
3. All products shall be protected, handled, and stored in complete compliance with the manufacturer's printed instructions to protect the Owner from warranty infringements or loss of the full function of the item specified.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Examine all preparatory work to determine its suitability and completeness. Notify the responsible Contractor of any deficiencies which must be corrected prior to installation.
3. Be satisfied that all conditions affecting installation, operation or function are suitable for installation of the items scheduled.
4. After installation, and acceptance by the inspector and the Architect, the Contractor shall provide protective guards, covers or barricades as required by the manufacturer.
5. The Contractor shall promptly repair, refurbish, or replace items damaged by his operations to a condition satisfactory to the Owners representatives and at no cost to the Owner.

1.7 WARRANTY
1. The Contractor shall provide access to the installed items or prepared substrates for the inspection of the manufacturers representatives, for the purpose of affirming the warranties scheduled.
2. All work shall be performed in full accordance with the manufacturers warranty requirements and all governing codes.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
   a. Prepare all substrate blocking as required by the items Furnished By Owner.
   b. Prepare all wiring and piping connections as required by the items Furnished By Owner.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond or installation of materials specified within the Contract Documents.

3.2 INSTALLATION

A. General:
1. In accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.

C. Material and Equipment to be installed:
1. All items so noted or scheduled to be OFCI shall be unloaded, completely installed and placed in operable condition under this Contract.

3.3 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces at the end of each day, minimum.
2. In accordance with manufacturer's instructions and recommendations.

AD1-SP01 Refer to Specification Section 01 64 00 OWNER-FURNISHED ITEMS

1. Refer to Article 3.4 SCHEDULES. Omit the Schedule and replace it with the following.

1.	*ITEM*	*STATUS*
a.	***Clock PA System**: Wall Mounted.*	***OFOI***
	1) Meeting Rooms.	
	2) Lobbies.	
	3) Offices, when indicated.	
	4) Refer to the Architectural and electrical drawings for locations.	
b.	***Teaching Wall** / AV System:*	***OFOI***
	Wall Mounted Monitor, Monitor Bracket, and Apple TV mounted behind the monitor.	
	1) Lobbies, when indicated.	
	2) Conference Rooms, when indicated.	
	3) Break Rooms, when indicated.	
	4) Offices, when indicated.	
	5) Refer to the Architectural and electrical drawings for locations.	
c.	***Toilet Accessories***	***OFCI***
	1) Seat Cover Dispensers.	
	2) Toilet Paper Dispensers (Non-Accessible Stalls).	
	3) Soap Dispensers.	
	4) Paper towel dispensers.	
	5) Refer to the Enlarged Toilet Room Plans and the Interior Elevations.	
d.	***Vape Sensor***	***OFOI***
	1) Boys, Typical of (2) per room.	
	2) Girls, Typical of (2) per room.	
	3) Boys Locker, Typical of (2) per room.	
	4) Girls Locker, Typical of (2) per room.	
	5) Refer to Reflected Ceiling Plans and Electrical and Technology Plans.	
e.	***Wireless Access Point** (WAP) equipment.*	***OFOI***
	1) Refer to the electrical drawings for locations.	
f.	***Security Cameras**.*	***OFOI***
	1) Refer to the electrical drawings for locations.	
g.	***Surface Mounted IP speakers**, 14x14x4.*	***OFOI***
	1) Refer to the electrical drawings for locations.	
h.	***Wall Mounted IP Speakers**.*	***OFOI***
	1) Refer to the electrical drawings for locations.	
i.	***Ceiling Mounted Projectors**.*	***OFOI***
	1) Verify the distance from the projection screen before installing the pathway.	
	2. Building Q, Library Q202	
a.	***Food Service Point of Sale equipment**.*	***OFOI***
	3. Building Q, Food Service items #2-83,#2-86, and #2-92 and item #3-27	

lans.

SECTION 017123 – FIELD ENGINEERING

PART 1 - GENERAL

1.1 SUMMARY

1. This section includes the following:Section includes requirements governing execution of the work including, but not limited to, the following:
    a. Construction layout
    b. Field engineering and surveying

B. Related Sections: The following Project Manuel Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS
2. ALL DIVISION 01 SPECIFICATION SECTIONS
3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP
5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with specification section – SUBMITTAL PROCEDURES:
1. Coordination Drawings:
    a. Utility Coordination Drawing(s)
2. Quality Assurance/Control Submittal:
    a. Qualification Data for Civil Engineer/Surveyor
    b. Intermediate Certificate of Survey Compliance
    c. Final Certificate of Survey Compliance
3. Closeout Submittals in accordance with the following:
    a. As-built Survey Drawing(s)
    b. Project "Record" Survey Drawing

1.3 QUALITY ASSURANCE

A. Qualifications:
1. Civil Engineer/Surveyor Qualifications:
    a. A professional Civil Engineer or Land Surveyor who is licensed to practice in the State of California.
    b. Has successfully completed three (3) projects of similar scope and size to that indicated for this project.

B. Regulatory Requirements:
1. In accordance with Specification Section – REGULATORY REQUIREMENTS and the following:
    a. CARB Materials and equipment used for this project shall comply with the current applicable regulations of the California Air Resources Board and the Environmental Protection Agency (EPA), in the area where the project is located.
    b. CF County of Fresno, codes and ordinances

C. Certificates:
1. Intermediate Certificate of Survey Compliance:
   a. Provide certification letter on contractor's letterhead stating the project complies with the requirements of the contract documents at the completion of building pad construction and installation of underground utilities outside of building pads is complete. Certification letter must be stamped and signed by the qualified Civil Engineer/Surveyor.
2. Final Certificate of Survey Compliance:
   a. Provide certification letter on contractor's letterhead stating the project complies with the requirement of the contract documents at the completion of all above ground improvements and finish grading.

D. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with all other related work.
   b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems, which may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been filed.

1.4 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. The High School is an extension of the Junior High, forming the Sanger Educational Complex. The survey for locating the new work point / hub / starting point for the new High School buildings shall be verified with the existing buildings locations.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions:
1. The existence and location of underground utilities indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence, location, and elevation of all underground utilities and other construction affecting the Work.

a. Call a local utility locator service (such as USA – "Underground Service Alert") for the task of locating any project related utilities.
b. Verify the location and invert elevation at points of connection of sanitary sewer system and storm drainage system.
c. Accurately document vertical and horizontal measurements and elevations uncovered or verified.

B. Coordination:
1. Before proceeding to lay out the Work, verify layout information shown on the drawings in relation to the property survey, topographic survey, and existing benchmarks.
2. Drawings have been provided showing improvements and underground systems for foundations, storm drainage, sewer, water, gas, mechanical lines, electrical lines, and site improvements. Coordinate and verify the accuracy of the drawing locations and elevations as they relate to each other, with existing utility lines, and building pad earthwork zones of influence.
   a. Provide 1"=20' scaled and dimensioned Utility Coordination Drawing.
   b. No improvements shall be executed until the Utility Coordination Drawing is reviewed by the Architect for general conformance with the Contract Documents.
3. Coordinate Layout of Work performed under other sections of the Specifications.
4. If layout conflicts are encountered, report to Architect and then prepare recommendation(s) for correction.
5. Close and careful coordination is required between work of the Contract and that of any future work to follow.
6. Work under this Contract shall accommodate the installation of future work.

3.2 PREPARATION

A. Existing Utility Information:
1. Furnish information to public utilities that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

3.3 CONSTRUCTION

A. Layout of Work:
1. Engage a Civil Engineer/Surveyor to Layout the Work using accepted surveying practices and be responsible for all reference points, benchmarks, lines, elevations, and measurements required for Work under this Contract.
2. Reference points:
   a. Locate existing permanent benchmarks, control points, and similar reference points before beginning the work.
   b. Do not change or relocate existing benchmarks or control points without approval of the Architect.
   c. Replace lost or destroyed permanent benchmarks and control points. Base replacements on the original survey control points.
3. Benchmarks:
   a. Establish and maintain a minimum of two (2) permanent benchmarks on the project site, referenced to data established by survey control points.
   b. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
   c. Use established benchmarks and control points to set lines and levels at each floor of construction and elsewhere as needed to locate each element of the Project.

4. Locate construction access to site parking, storage areas, and temporary facilities and controls.
5. Locate and layout control lines and levels for structures, foundations, column and wall grids, and floor levels including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels.
   a. Level foundations and piers from two or more locations.
6. Locate and layout site improvements, including pavement, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
7. Inform installers of lines and levels to which they must comply.
8. Check the location, level, and plumb of every major element as the Work progresses.
9. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.4 FIELD QUALITY CONTROL

A. Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by the Inspector and Architect.

B. Maintain As-built Survey Drawing(s) of all underground, surface, and above ground improvements and grades with measurements for both vertical and horizontals dimensions.
   1. Record all addendum and issued change documents.
   2. Upon project completion stamp and sign As-built Survey Drawing(s).

C. Check documented measurements and elevations at completion of building pads and underground utilities against contract documents. The Contractor shall correct out of compliance Work before proceeding with the next element of Work. As-built Survey Drawing(s) shall be current. When all Work at this stage is in compliance with the contract documents, issue the Intermediate Certificate of Survey Compliance.

D. Check documented measurements and elevations at completion of finish grading and site improvements, except for landscape and irrigation work, against contract documents. The Contractor shall correct out of compliance Work before proceeding with the next element of Work. As-built Survey Drawing(s) shall be complete. When all Work at this stage is in compliance with the contract documents, issue the Final Certificate of Survey Compliance.

E. The Civil Engineer/Surveyor shall prepare Project "Record" Survey Drawing in accordance with Specification Section - PROJECT DOCUMENTS.
   1. The Project "Record" Survey Drawing shall contain all of the vertical and horizontal measurements and elevations of reference points, benchmarks, utility lines, grade contours, grade breaks, building floors, major vegetation, and sitework improvements.
   2. The Project "Record" Survey Drawing shall be stamped and signed by the qualified Civil Engineer/Surveyor.
   3. The As-built Survey Drawing(s) shall used in preparation of the Project "Record" Survey Drawing.

3.5 PROTECTION

A. Preserve and protect permanent benchmarks, control points, reference points, and staking during construction operations.

END OF SECTION

SECTION 017329 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary for cutting and patching existing materials, accessories and other related items necessary to remodel the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of Work.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Coordination Drawings:
      a. Submit any installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.

1.4 QUALITY ASSURANCE

A. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades.
   1. Review areas of potential interference and conflict.
   2. Coordinate procedures and resolve potential conflicts before proceeding.

B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

C. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. The Contractor shall do all cutting, fitting or patching of existing construction and his work as may be required to make the several parts come together properly and ready to receive or be received by work of other contractors as shown, or reasonably implied by the drawings and specifications for the completed structure. All work shall be as directed by the Architect to achieve the intended work and degree of finish shown.

F. Any cost caused by defective or ill-timed work shall be borne by the party responsible therefor.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections of these Specifications.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
   1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 FIELD QUALITY CONTROL

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill. *Do not overcut concrete corners* – hand chip all corners to prevent over-cutting lines. Cut any masonry pavers at grout lines, and *don't overcut* into adjacent brick that is to remain.
   4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   6. Proceed with patching after construction operations requiring cutting are complete.

C. Grinding and Sandblasting: Where grinding and sandblasting is required of existing construction, perform in accordance with industry standards for proper preparation of new construction or finishes.

D. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

a. All hard paving and walk replacement shall be flush with adjacent existing construction. Compact existing subgrade so that there is no settling of adjacent horizontal surfaces greater than 1/4", and that all surfaces are ADA compliant.

b. When altering surfaces in brick paving, match nearby adjacent horizontal concrete surfaces in color and texture. Take care to protect adjacent brick surfaces from concrete slurry and finishing operations. Clean exposed surfaces of brick immediately so that no signs of adjacent concrete work is seen.

c. Match existing adjacent exposed aggregate concrete paving (color and texture) when construction is proposed for areas paved with exposed aggregate concrete.

d. Match existing adjacent colored concrete paving (color and texture) when construction is proposed for areas paved with colored concrete.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

   a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION

SECTION 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:
   1. Requirements governing execution of the work including, but not limited to, the following:
      a. Salvaging non-hazardous demolition waste.
      b. Recycling non-hazardous construction and demolition waste.
      c. Disposing of non-hazardous construction and demolition waste.

B. Related Sections: The following Project Manuel Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS
   2. ALL DIVISION 01 SPECIFICATION SECTIONS
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, modernization, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition and site clearing operations.

C. Disposal: Removal off-site of construction and demolition waste and subsequent sale, recycling, reuse, or deposit in landfill acceptable to authorities having jurisdiction.

D. Recycle: Recovery of construction or demolition waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of construction or demolition waste and subsequent sale or reuse in another facility.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements
   1. General:
      a. Achieve end-of-project rate for salvage/recycling of minimum [65][75][90] percent by weight of total non-hazardous construction and demolition waste generated by the Work.

b. Practice efficient waste management in the use of materials in the course of the Work.
c. Use all reasonable means to divert construction demolition waste from landfills and incinerators.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section – SUBMITTAL PROCEDURES:
1. Quality Assurance/Control Submittal:
a. Waste Management Plan
b. Waste Management Progress Reports

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:
a. CARB Materials and equipment used for this project shall comply with the current applicable regulations of the California Air Resources Board and the Environmental Protection Agency (EPA), in the area where the project is located.
b. CAL/OSHA California Division of Occupational Safety and Health Administration.
c. CF County of Fresno, codes and ordinances
d. EPA Environmental Protection Agency

B. Waste Management Plan:
1. Prior to commencing the Work, submit Waste Management Plan. The Plan must include, but not limited to, the following:
a. Contractor's name and project identification information.
b. Procedures to be implemented.
c. Materials to be salvaged, recycled, or disposed.
d. Estimated quantities of material broken down by material categories.
e. Names and locations of entities who receive salvaged and recycled materials.
f. Tonnage calculations that demonstrate that the Contractor will salvage, re-use, or recycle the minimum percentage by weight of the construction and demolition waste materials generated by the Work.

C. Waste Management Progress Reports:
1. Submit the Report with each application for progress payment.
a. Failure to submit the Report and it supporting documentation can render the application for progress payment incomplete and delay the progress payment.
2. Each Report must include, but not limited to, the following:
a. List of material categories.
b. Weight quantity of waste by material category.
c. Weight quantity of waste salvaged.
d. Weight quantity of waste recycled.
e. Total weight quantity of salvaged and recycled waste by material category.
f. Weight percentage of waste salvaged and recycled by material category.
g. Include manifests, weight tickets, receipts, and invoices specifically identifying the salvaged, reused, and recycled materials.
h. Signature line for Contractor.

D. Meetings:
1. Pre- Demolition……Schedule prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems, which may impede the proper disposal of materials.
   c. Review areas where waste and recycle bins will be located.
   d. Review where salvaged materials will be stored.
   e. Review demolition waste disposal and material recycling procedures and environmental goals per Waste Management Plan with all subcontractors and waste haulers.
2. Progress:……Scheduled by the Contactor during the performance of the work.
   a. Review for maintaining proper procedures.
   b. Inspect and identify any problems and acceptable corrective measures.
3. Completion:……Scheduled by the Contactor upon proper completion of the work.
   a. Inspect and identify any problems.
   b. Submit final Progress Report summarizing total construction and demolition waste weights, percentages salvaged, recycled, and disposed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Cleaning, handling, and packing:
1. Salvaged Items shall be handled in such a manner as to assure that they are free from damage.
2. Salvaged Items shall be cleaned and packed or cleaned and palleted before off-site transport.

B. Storage and protection
1. Salvaged Items shall be stored in a dry, protected area prior to transport.
2. Cover with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental requirements;
1. Comply with federal, state, and local regulations pertaining to solid waste, recycling, chemical waste, sanitary waste, and noise pollution.
2. Perform work in a manner as to minimize the spread of dust and flying particles.
3. No burning will be allowed on-site.

B. Existing conditions:
1. Examine project site and building(s) and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent buildings, roads, streets, drives, and walks.
   a. Do not close or obstruct streets, alleys, walks, or passageways without permission from authorities having jurisdiction and coordinating same with immediate neighbors whose business operation may be affected.

b. Safety measures shall be taken to insure an uninterrupted flow of traffic around the site as required by local Police and Fire Departments

3. Storage or sale of removed items on-site is not permitted.
4. It is not expected that hazardous materials will be encountered in the Work.
   a. Hazardous materials will be removed and disposed of by Owner prior to start of the Work.
   b. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.
5. Hazardous materials are present in buildings and structures to be selectively demolished. The Owner has prepared a report for the Contractor to review and use.
   a. Hazardous material remediation is specified in Specification Section - HAZARDOUS MATERIAL PROCEDURES.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Furnish all materials, tools, equipment, facilities, and services as required for performing the construction and demolition waste disposal work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions:
   1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   2. Execution of work under this specification section shall constitute acceptance of existing conditions.
   3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the Work under this Section.

3.2 PREPARATION

A. Coordination:
   1. Before proceeding, verify plans match existing conditions.
   2. Review documents of existing construction provided by Owner against existing conditions.
   3. If conflicts are encountered, report it to the Architect. Then prepare recommendation(s) for correction and submit to Architect for review.
   4. Coordinate work under this specification section with work specified under other sections.

B. Protection:
   1. Property:
      a. Provide temporary weather protection to prevent damage to salvage and recycled items.

b. All damage inflicted on public and private property and the property of the Owner shall be repaired or restored to the original condition prior to the start of this Work. All repair or replacement work shall be done at no additional cost to the owner.

3.3 IMPLEMENTATION

A. General:
1. Implement waste management plan as submitted.
2. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the contract.
3. Designate and label specific areas on project site necessary for separating materials that are to be salvaged, recycled, reused, and donated.

B. Demolition Waste:
1. Salvaged items for delivery to Owner or other entity:
   a. Clean salvaged items.
   b. Pack or crate items after cleaning. Identify contents of containers.
   c. Store items in a secure area until pick-up or delivery to Owner.
   d. Transport item to Owner's storage area [on-site][off-site][list address].
   e. Protect items from damage during transport and storage.
2. Salvaged items for reuse in the work:
   a. Clean salvaged items.
   b. Store items in a secure and dry area until ready for installation.
3. Recyclable materials:
   a. Prepare and maintain recyclable waste materials according to recycling facility requirements.
   b. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
   c. Separate recyclable demolition waste from other waste materials. Separate recyclable waste by material type at project site to the maximum extent practical according to approved waste management plan.
   d. Separate recyclable demolition waste from other waste materials. All recyclables may be co-mingled into one bin and separated off-site at the appropriate recycling facility.
      1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from the project site.
      2) Include a list of acceptable and unacceptable materials at each container or bin.
      3) Inspect containers and bins for contamination and remove contaminated materials if found.
      4) Processed materials stockpiled on site shall not be mixed with other materials. Shape stockpiles to drain surface water. Cover stockpiles to prevent windblown dust.
      5) Processed material shall be stockpiled away from construction. Do not stockpile within drip line of remaining trees.
   e. Remove recyclable demolition waste off project property and transport to recycling receiver or processor.
   f. The following list is of common material types which can be recycled. The list of material types is in no way complete but is representative of materials that can be sorted and recycled as per the intent of this specification section.
      1) Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

2) Wood: Sort and stack members according to size, type, and length of member.
3) Metals: Separate metal by type. Stack structural steel members according to size and length. Remove bolts, nuts, washers, and other hardware from members.
4) Gypsum Board: Stack large clean pieces on wood pallets in a dry location. Remove edge trim and sort with other metals.
5) Acoustical Ceiling Tile: Stack large clean pieces on wood pallets in a dry location.
6) Metal Suspension System: Separate metal members including trim and other metals from acoustical ceiling tile and sort with other metals.
7) Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and any tack strips. Store carpet in a dry location.
8) Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
9) Conduit: Reduce conduit to straight lengths and store by type and size.

4. Site clearing waste:
   a. Excavated top soil and land clearing debris not recycled and reused on-site shall be removed to an off-site recycling location or disposed of at a landfill that accepts inert material.

C. Construction Waste:
1. Recyclable materials:
   a. Prepare and maintain recyclable waste materials according to recycling facility requirements.
   b. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
   c. Recycle paper and beverage containers used by on-site workers.
   d. Separate recyclable construction waste from other waste materials. Separate recyclable waste by material type at project site to the maximum extent practical according to approved waste management plan.
   e. Separate recyclable construction waste from other waste materials. All recyclables may be co-mingled into one bin and separated off-site at the appropriate recycling facility.
      1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from the project site.
      2) Include a list of acceptable and unacceptable materials at each container or bin.
      3) Inspect containers and bins for contamination and remove contaminated materials if found.
   f. Remove recyclable construction waste off project property and transport to recycling receiver or processor.
   g. Remove recyclable construction waste off project property and transport to recycling receiver or processor.
   h. The following list is of common material types which can be recycled. The list of material types is in no way complete but is representative of materials that can be sorted and recycled as per the intent of this specification section.
      1) Cardboard Packaging: Breakdown into flat sheets. Bundle and store in a dry place.
      2) Polystyrene Packaging: Separate and bag materials.

3) Pallets: As much as possible, require deliveries using pallets to remove pallets from the project site. For pallets that remain on-site, breakdown pallets into component wood pieces and comply with requirements for recycling wood.
4) Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
5) Wood: Clean cut-Offs of lumber and grind or chip into small pieces.
6) Gypsum Board: Stack large clean pieces on wood pallets in a dry location.

D. Disposal of Waste:
1. Except for items or materials to be salvaged, recycled, or otherwise reused remove and transport waste materials from project site and legally dispose of them in a manner acceptable to authorities having jurisdiction.
2. Do not allow waste material to accumulate on site.
3. Transport waste in a manner that will prevent spillage on adjacent surfaces and areas.

3.4 CLEANING
1. Clean in accordance with Specification Section – PROJECT CLOSEOUT:
a. Immediately clean any soiled surfaces to remain.

END OF SECTION

SECTION 017720 – PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

C. Work Included:
   1. Project cleanup and coordination of all cleaning work required under all sections of this specification.
   2. Collection of and processing for delivery to the Architect of all Project Record Drawings required under this and other various Sections of the Specifications.
   3. Compile and assemble all required documents, operation data, maintenance manuals, and parts lists for all equipment items provided for this project.
   4. Start-up of all mechanical, electrical, and miscellaneous equipment items; and adjustment required for the performance specified.
   5. Compile and assemble all guarantees, warranties, or other written documentation to establish the requirements outlined under all sections of this specification.
   6. Repair and touch-up on all items damaged during the construction and handling processes.
   7. Furnish maintenance material and spare parts as specified within DIVISIONS 02 through 49 of these specifications.
   8. Deliver to the Architect all assembled copies of those items required in Articles 1 through 6 above for presentation to the Owner.

D. It shall be the responsibility of the Contractor to provide all labor and materials necessary to achieve completion of the items listed under Paragraph A, B and C above, although certain items may be specified under the work of other trades. Periodic removal of debris, cleaning, repair, and testing of times in various areas of the construction site shall be carried out under the direction of the Contractor.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Quality Assurance/Control Submittals:
      a. Design Data.
         1) All design data as required by the Contract Documents.

b. Test Reports:
   1) Submit one (1) digital copy of reports.
   2) Submit one (1) digital copy of reports required by regulatory requirements.
   3) Submit one (1) digital copy of ICC Evaluation Service Report.
   4) Submit one (1) digital copy of Testing Laboratory's report.
   5) All other Test Reports as required by the Contract Documents.

c. Certificates:
   1) Submit one (1) digital copy of certificates.

d. Manufacturer's Instructions:
   1) Submit one (1) digital copy of manufacturer's instructions.

e. Manufacturer's Field Reports:
   1) Submit one (1) digital copy of manufacturer's field reports.

f. Engineering Calculations:
   1) Submit one (1) digital copy of engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.

2. Closeout Submittals in accordance with Specification Sections in Division One:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
   c. Warranty in accordance with Specification Section - WARRANTIES.

3. Project Record Documents:
   a. Various Sections of the detailed specifications require Project Record Drawings to be prepared by the Contractor(s). These drawings shall be collected by the Contractor, checked for conformance to the specific requirements, and when completed, delivered to the Architect. The Contractor shall also be responsible for collecting bound operating and maintenance manuals required of all trades supplying equipment, and for delivering them to the Architect.

1.3 QUALITY ASSURANCE:

A. Safety, Fire and Environmental Protection, and Insurance standards shall be strictly adhered to in all phases of the construction work. It shall be the responsibility of the Contractor to determine the standards applicable to this project as set forth in all codes, regulations, and ordinances having jurisdiction, and as set forth elsewhere in the Specifications.

B. All specific requirements stipulated in, or required by code references included under all sections of DIVISIONS 02 through 49 inclusive of this specification, and as detailed under Article 3.4 of this Section, shall be required under this Contract.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Materials:
   1. Use only those specified materials or types of materials recommended and approved by the manufacturer of the item to be cleaned.

B. Touch-Up Materials:

1. Use only those materials furnished by or as recommended and approved by the manufacturer of the item to be touched up. Colors and finish characteristics shall exactly match the base material and extra materials, labor, and services required to achieve this result shall be provided by the Contractor(s).

C. Replacement Materials:
1. Materials that are damaged and not repairable, or materials that are destroyed shall be replaced with equal and identical materials of the same manufacture and shall function in conjunction with the remaining portions of that material. Items no longer manufactured or available shall be replaced with comparable materials as approved by the Architect and at no additional cost to the Owner.
2. Materials that are required for maintenance replacement by the owner after the guarantee period has expired, or by the contractor during the guarantee period shall exactly match those materials installed as to make, style, color lot, etc., under this contract, and shall be delivered to the owner in marked, identified containers.

D. Extra Materials:
1. Carefully examine the requirements of the applicable Sections of all DIVISIONS and specifically of DIVISION 09 and deliver the materials required to the Owner.

PART 3 - EXECUTION

3.1 REPAIR AND RESTORATION

A. All damaged items shall be repaired and replaced as directed using proper materials and craftsmen skilled in that particular trade. Materials shall be as follows:
1. All repair or replacement parts shall be of the same equality and manufacturer as the item being repaired.
2. All touch-up paint shall be as provided by the item manufacturer for that purpose and shall exactly match the original color and finish.

3.2 FIELD QUALITY CONTROL

A. Final Reviews:
1. In addition to all items covered under those Sections of Divisions 02 through 49 inclusive, the Contractor shall comply with the requirements stated herein.
   a. The Contractor shall request in writing a final review (see Contractor's Request for Final Review form at the end of this Specification Section).
      1) The Contractor shall allow a forty-eight (48) hour time period of advance notification prior to the requested date and time indicated on the Review Request form.
      2) The Contractor represents that the work has been carefully inspected by the Contractor to determine that the work is complete and in compliance with all requirements set forth.
   b. The Contractor shall prepare and shall submit the initial Contractor's Punch List identifying the items that remain uncompleted forty-eight (48) hours prior to the scheduled final review by the Architect.
   c. Under no circumstances shall the Contractor ask the Architect or his representative to make these determinations for him.

2. The Architect shall review the initial Contractor's Punch List along with the Owner's Project Inspector, and determine together whether or not the Project is ready for final review. If approved, the Architect or its representative will make the final review on the date and time requested in the Contractor's Request for Final Review form, except under the following conditions:
   a. Upon reviewing a portion of the Project and finding quantities of work incomplete or not in compliance, the review shall cease, and the Architect will notify the Contractor.
   b. If the Contractor has assured the Architect of the completeness and/or accuracy of the work, and the review does not bear this contention out.
3. The above conditions will be adhered to rigidly to prevent the Architect from being required to act as a supervisory agent of the Contractor by being asked to determine the degree of completion.
   a. When the Contractor requests additional reviews, he shall reimburse the Architect for all time and expense incurred as indicated on the Contractor's Request for Final Review form at the end of this Specification Section.
   b. The Architect is herein defined as any of those firms or individuals listed by references on the drawings, including all consultants identified herein.
   c. All requests for Project Final Review (and re-review) shall be made in writing on the form provided at the end of this Specification Section.
4. When the Architect does approve of the degree of readiness for the Project based on the initial Contractor's Punch List and the readiness of the Project, the Architect will make his final review, adding to the Contractor's Punch List any other items that require further completion.
5. The Contractor shall take the initial Contractor's Punch List, together with the Architect's Punch List, and initial and date each item on each list as to when it was completed.
6. Once both lists are completed and signed by the Project Inspector, the Contractor shall submit to the Architect the completed lists for final review and approval prior to filing for Substantial Completion.

3.3 CLEANING

A. During Construction:
   1. Oversee cleaning and ensure that building and grounds are maintained free from accumulations of waste materials and rubbish.
   2. Sprinkle dusty debris with water.
   3. At reasonable intervals during progress of work, clean up site and access and dispose of waste materials, rubbish, and debris.
   4. Provide suitable containers and locate on site for collection of waste materials, rubbish, and debris.
   5. Do not allow waste materials, rubbish and debris to accumulate and become an unsightly or hazardous condition.
   6. Remove waste materials, rubbish and debris form the site and legally dispose of at public or private dumping areas off the Owner's property.
   7. Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for acceptance or occupancy.
   8. Lower waste materials in a controlled manner with as few handling as possible; do not drop or throw materials from heights.
   9. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

B. Final Cleaning:

1. Use experienced professional cleaners for final cleaning.
2. At completion of construction and just prior to acceptance or occupancy, conduct a final review of exposed interior and exterior surfaces.
3. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from interior and exterior surfaces.
4. Repair, patch, and touch-up marred surfaces to match adjacent finishes.
5. Broom clean paved surfaces; rake clean other surfaces of grounds.
6. Replace air conditioning filters if units were operated during construction.
7. Clean ducts, blowers, and coils if air conditioning units were operated during construction
8. Maintain cleaning until the building, or portion thereof, is accepted by the Owner.

3.4 DEMONSTRATION

A. During Construction and as each piece of equipment is installed, provide the following tests:
   1. Verify that all external service connections have been properly completed, and that piping and/or wiring is properly sized, and contain all necessary safety devices.
   2. Verify that the equipment is free of shipping materials, tie downs, or other internal obstructions.
   3. Conduct tests employing the manufacturer's operating instructions as a sequential guide.
   4. Verify that all portions of the equipment function properly and that the total performance criteria is satisfied.
   5. Make adjustments, replacements, or repairs necessary to achieve full operational capability and repeat tests until performance is achieved and approval obtained.

B. Prior to acceptance, verify that all conditions specified in the Article titled FIELD QUALITY CONTROL, Final Review, have been satisfied and that equipment is ready for continuous use. Provide the following services preparatory to acceptance:
   1. Clean or replace all filters and/or strainers.
   2. Adjust all belts and drive mechanisms.
   3. Lubricate all moving parts as required by manufacturer's operating instructions.
   4. Demonstrate to the Owner's representative and the Architect or Engineer the method and sequence of operation, and provide testing devices and/or data to verify that performance equals that specified.
   5. Provide operating instructions in bound form along with manufacturer's parts list and written warranties.

3.5 SCHEDULES

A. See next page for Request for Final Review from the Contractor(s):

(The rest of this page is left intentionally blank)

CONTRACTOR'S REQUEST
FOR
FINAL REVIEW FORM

PROJECT:_____
(Name of Project and DA Project Number)

TO: **DARDEN ARCHITECTS, INC.**
6790 N. West Avenue
FRESNO, CA 93711

FROM:_____
(Contractor)
_____
(Address)
_____

WE HEREBY request Final Review on _____ and _____.
(Date) (Time)

WE HEREBY, request and certify:

1. The project is ready for Final Review.
2. The undersigned will compensate the Architect at a rate of $176.00 an hour for further review, investigation and comments if it is determined that the Project is not ready for final review as indicated earlier within this Specification Section. The Architect is herein defined as any of those firms or individuals listed by reference on the Drawings, including all Consultants identified herein.

Submitted By (Contractor)

Signature_____
Firm_____
Address_____
Date_____
Telephone_____

Below is
for Use by Design Consultant only
___ Conditions for Final Review Accepted
___ Final Review Accepted as Noted
___ Final Review Not Accepted
By_____
Date_____
Remarks_____
_____
_____
_____

END OF SECTION

SECTION 017836 – WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

A. In addition to providing all other warranties specified in the Project Manual and without affecting any rights of Owner under State or Federal law, Contractor shall warrant that the Work done under this Project Manual will be free from faulty materials or workmanship and hereby agrees, upon receiving notification from the Owner or his Agent, to immediately remedy, repair or replace, without cost to the Owners and to his entire satisfaction, all defects, damages or imperfections appearing in said work within a period of one (1) year unless specified otherwise, after date of final acceptance by the Owner of all work done under this Project Manual, regardless of whether or not the Owner or persons operating under contract with the Owner partially or wholly occupies any portion of the work prior to acceptance. For work performed after completion, the one (1) year period shall be extended by the period of time between the date of final acceptance by Owner and actual performance of the work. This obligation shall survive acceptance of the work and termination of the Contract.

1. Warranties shall be in the form outlined below and shall be submitted in duplicate to the Contractor and submitted on his own letterhead.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:

1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Warranty Form: *(following page.)*

(Contractor's Letterhead)
Project Number: _____
Project Name: _____

WARRANTY FOR

_____

We hereby warrant and the General Contractor warranties that

_____

_____

_____

has been done in accordance with the Drawings and the Specifications and that the Work as installed will fulfill the requirements of the warranty included in the Project Manual. We agree to repair, replace any or all of our work together with any other adjacent work which may be displaced or damaged by so doing that may prove to be defective in its workmanship or materials within a period of _____ years from date of acceptance of the above-named without any expense to the Owner, ordinary wear and tear and unusual abuse or neglect excepted. In the event of our failure to comply with above-mentioned conditions within ten (10) days after being notified in writing by the Owner or his agent, we collectively or separately, do hereby authorize the Owner to proceed to have said defects repaired and made good at our expense and we will honor and pay the costs and charges therefor upon demand.

_____
(Signature of Subcontractor)

_____
(Signature of Contractor)

Date: _____

B. Submit 2 copies of all manufacturer's or installer/applicator's warranties and bonds as specified within Division 02 –49.

C. Submit to Architect together with Project Record Documents.

D. Accompany submittals with transmittal letter in duplicate.

E. When Product Submittals are required, submit copy of warranty with product submittal.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 017839 – PROJECT DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the administrative and procedural requirements for Project Record Documents, including the following:
   1. Project As-Built Drawings.
   2. Project Record Drawings.
   3. Record Specifications.
   4. Record Product Data.

B. Related Requirements: The following Project Manual Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

C. CONTRACT DOCUMENTS: Contract Documents include Contract Forms, Project Manual (Contract Requirements and Specifications), Drawings, Addenda, Change Orders and Modification Documents (Supplemental Instructions, Request for Information, Construction Change Directives).

D. PROJECT "AS-BUILT" DOCUMENTS: A set of Contract Documents used during construction for recording of actual construction information during construction. The recording of construction information shall be maintained on the Contract Drawings and in the Project Manual.

E. PROJECT "RECORD" DOCUMENTS: A set of Contract Documents used at the completion of construction for transferring and documenting the actual construction information recorded on the PROJECT "AS-BUILT" DOCUMENTS.

F. RECORD PRODUCT DATA: A set of Submittals and Shop Drawings that have documentation of field changes made after review.

G. AGENCY DOCUMENTATION: Documents required by the Agency Having Jurisdiction to be prepared and submitted by the contractor.

1.3 SUBMITTALS:

H. Submit the following in accordance with specification Section SUBMITTAL PROCEDURES.

I. Format for Submittals:

1. Accompany each submittal with a SHOP DRAWING AND SUBMITTAL TRANSMITTAL:
2. PDF electronic file names shall match the Sheet Numbers of the Contract Documents.
3. Provide labels on DVD's and DVD Cases and include the following:
4. First Line: CLOSE-OUT DOCUMENTS
5. If submittal contains multiple disks append to first line Disk, i.e. (1 of 2)
6. Second Line: Project Name and Year
7. Third Line: Architect Firm Name and Architect's Project Number
8. Fourth Line: DSA Number (if applicable)
9. Fifth Line: Contractor Company Name
10. PDF files for Project "Record" Documents and Record Product Data shall be combined with PROJECT CLOSEOUT, Maintenance Data and Operations Data, and WARRANTIES on a single set of DVD's.

J. PROJECT "AS-BUILT" DOCUMENTS: Comply with the following:
1. Number of Copies: Submit one paper-copy set of marked-up as-built drawings and one paper-copy of marked-up as-built specifications.
2. Clearly Label each copy "PROJECT 'AS BUILT' DOCUMENTS" in two-inch-high printed letters.

K. PROJECT "RECORD" DOCUMENTS: Comply with the following:
1. Number of copies: Submit copies of the Record Documents as follows:
   a. Initial Submittal:
      1) Submit one paper-copy of marked-up record drawings and one paper copy of marked-up record specifications,
      2) Alternatively, submit PDF electronic files of scanned marked-up record drawings and marked-up record specifications on one set of DVD's
      3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
2. Final Submittal:
3. Submit one paper-copy of marked-up record drawings, one paper copy of marked-up record specifications, and PDF electronic files of scanned marked-up record drawings and marked-up record specifications on three sets of DVD's.
4. Each record drawing sheet shall be labeled, "PROJECT "RECORD" DOCUMENT.•
5. Print each drawing, whether or not changes and additional information were recorded.
6. Clearly Label each copy "PROJECT "RECORD" DOCUMENTS in two-inch-high printed letters in a prominent location.

L. RECORD PRODUCT DATA: Comply with the following:
1. Number of Copies:
   a. Submit one paper-copy set of marked-up shop drawings.
   b. Submit three DVD's of PDF electronic files of scanned marked-up shop drawings.

M. AGENCY DOCUMENTATION: Comply with the following:
1. Submit Documentation Required by the Agency Having Jurisdiction utilizing the format and system established by the Agency.

1.4 SYSTEM DESCRIPTION

N. The Architect considers the Project Record Documents to be of significant importance to the Owner.

O. Project Record Documents provide important information for the Owner's records, they form an invaluable record for future reference for concealed conditions, facilities management processes, and future additions and renovations.

PART 2 - PRODUCTS

2.1 General:

P. All costs (including the time) required for recording, transferring, and copying all documentation shall be part of the Contractor's Overhead Expense.

Q. Provide red pencil or ink (contrasting color) for all marking of the PROJECT "AS-BUILT DOCUMENTS, PROJECT "RECORD" DOCUMENTS, and RECORD PROJECT DATA.

R. Do not permanently conceal any work until required information has been recorded.

2.2 RECORD DRAWINGS

S. PROJECT "AS-BUILT" DOCUMENTS: Maintain one set of marked-up paper copies of the Contract Drawings: and Specifications, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an acceptable drawing technique.
   c. Record data as soon as possible after obtaining it.
   d. Record and check the markup before enclosing concealed installations.
2. Content: Types of items requiring marking include, but are not limited to, the following:
   a. Elevation for finish grade for all points indicated on Site Grading Plan.
   b. Depths of various elements of foundation in relation to first floor finish elevation.
   c. Horizontal and vertical location of underground utilities and appurtenances referenced to visible and accessible features of structure.
   d. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.
   i. Locations of concealed internal utilities Field changes of dimensions and details.
   j. Changes made by Addenda, Change Orders and other Modification Documents.
   k. Details not on original Contract Documents.
   l. Changes made on Shop Drawings.
3. Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
   a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   b. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

c. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
d. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
e. Note related Changes Orders, record Product Data, and record Drawings where applicable.

4. Mark the Contract Drawings and Specifications completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
5. Note Request for Information numbers, Supplemental Instruction numbers, Construction Change Directive numbers, Change Order numbers, and similar identification, where applicable.

2.3 PROJECT "RECORD" DOCUMENTS:

T. General: Transfer all changes, notations, etc. from the "AS-BUILT" PROJECT DOCUMENTS to the "PROJECT RECORD" DOCUMENTS in the same quality as the original Contract Documents.

2.4 RECORD PRODUCT DATA

U. Maintain one set of marked-up paper copies of the Shop Drawings and Product Data, incorporating any modifications to the reviewed documents.

V. Preparation: Mark Product Data to indicate the actual product installation where installation varies from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders and record Drawings where applicable.
4. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.5 AGENCY DOCUMENTATION

W. Contractor shall prepare and upload all applicable forms pertaining to the Contractor as required by the Division of State Architect DSA Procedure 13-02, including but not limited to:
1. DSA 6-C - Contractor Verified Report.
2. NFPA System Record of Completion.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE:

X. Recording:
1. Keep all documents current, PROJECT "AS-BUILT" DOCUMENTS shall be kept current at all times. Post changes and revisions to project as-built documents as they occur; do not wait until end of Project.

2. The Project Inspector will review the PROJECT "AS-BUILT" DOCUMENTS periodically for the Architect at the time Payment Requests are processed. Should the PROJECT "AS-BUILT DOCUMENTS not be current and up to date, the Owner reserves the right to hold the Payment Request until compliance with the Contract Documents has occurred.

Y. Maintenance of Documents:
1. Maintain at job site the following:
   a. Contract Drawings.
   b. Project Manual/Specifications.
   c. Addenda.
   d. Reviewed shop drawings.
   e. Change Orders.
   f. All Modification Documents.
   g. Field test records.
2. Store documents in field office apart from documents used for construction.
3. Provide files and racks for storage of documents.
4. File documents in accordance with Project Filing Format or Uniform Construction Index.
5. Maintain documents in clean, dry, legible condition.
6. Do not use record documents for construction purposes.
7. Make documents available at all times for inspection by Architect, Owner and Owner's Inspector.

END OF SECTION

SECTION 01 81 22 – ACOUSTICAL PERFORMANCE REQUIREMENTS

PART 1 – GENERAL

1.1 SUMMARY

A. This project contains acoustically-sensitive spaces, requiring special acoustical products and construction detailing, special noise and vibration control products and construction detailing, and post-construction testing.

B. This section is the primary source for acoustical performance requirements in the project documents. Should conflicts arise between the requirements in this section and other portions of the contract documents, the requirements in this section shall take precedence, unless otherwise directed by the Architect. Under no circumstances, however, shall the requirements in this section take precedence over code or life safety requirements.

C. Related Section: Section 01 81 23 Noise and Vibration Control Requirements.

1.2 GENERAL REQUIREMENTS

A. Refer to the project drawings, specifications, and subsequent paragraphs in this Section for special acoustical products, special sound-isolating construction, and acoustical performance requirements.

B. Refer to the mechanical and electrical drawings and specifications and Section 01 81 23 for specific noise and vibration control criteria, products, and performance requirements.

C. All construction around performing arts spaces, teaching and learning spaces, athletic spaces, interior gathering spaces, staff spaces, and noisy building service spaces shall be constructed airtight, as described in this section and in the project drawings.

PART 2 – ACOUSTICAL PRODUCTS AND DETAILING

2.1 ACOUSTICALLY-RATED PRODUCTS

A. Fabric-Wrapped Sound Absorbing Wall Panels:

1. Refer to the project drawings and specifications for locations, thicknesses and NRC performance requirements for fabric-wrapped fiberglass wall panels.

2. Submit acoustical test reports certifying the specified acoustical performance.

B. Sound Diffusing Ceiling Panels:

1. Refer to the project drawings and specifications for locations, configurations and acoustical performance requirements for sound diffusing ceiling panels.

2. Submit Manufacturers' cutsheets certifying the specified acoustical performance.

C. Sound Absorbing Ceiling Tiles (ACT):

1. Refer to project drawings and specifications for locations and NRC and CAC performance requirements for acoustical ceiling tiles.

2. Submit Manufacturer' cutsheets certifying the specified acoustical performance.

D. Acoustical Metal Decking:

1. Refer to project drawings and specifications for locations and NRC performance requirements for acoustical metal decking.

2. Submit Manufacturer' cutsheets certifying the specified acoustical performance.

3. Prior to roofing application, submit photo proof to the Architect that insulation has been installed inside decking flutes per Manufacturer's instructions.

E. Sound Control Doors and Windows:

1. Refer to the project drawings and specifications for locations and STC and NIC performance requirements for sound control doors and windows.

2. Submit acoustical test reports certifying the specified acoustical performance.

3. Refer to Para. 3.1 of this section for testing requirements for sound control doors and windows.

F. Overhead Coiling Doors:

1. Refer to the project drawings and specification for locations and STC performance requirements for overhead coiling doors.

2. Submit acoustical test reports certifying the specified acoustical performance.

2.2 AIRTIGHT CONSTRUCTION DETAILING

A. All performing arts spaces, teaching and learning spaces, athletic spaces, interior gathering spaces, staff spaces, and noisy building service spaces on the project are designated "airtight" for the purposes of sound isolation and noise control. The requirements for such airtight construction include, but are not limited to, the requirements described herein and the details shown in the project drawings. All necessary products and detailing shall be provided to achieve airtight / leakproof construction, whether or not those products or details are specifically described or shown in the Project Documents.

B. Every precaution shall be taken to maintain construction completely airtight around all performing arts spaces, teaching and learning spaces, athletic spaces, interior gathering spaces, staff spaces, and noisy building service spaces on the project. Construction joints, structural penetrations, mechanical and electrical duct penetrations, pipe and conduit penetrations, electrical boxes and fixtures, cabinets, doors, access panels, windows, frames, supports, etc. all shall be built and installed in such manner as to prevent sound transmission. Provide lintels, extra frames, blocking, escutcheons, grouting, gaskets, packing, caulking, dense putties, taping, filling, etc. as required to stop sound transmission.

C. Applicable standards include ASTM E497 (Standard Practice for Installing Sound-Isolating Lightweight Partitions) and ASTM C919 (Practice for Use of Sealants in Acoustical Applications). Requirements include, but are not limited to:

1. Extend construction to a minimum of 1/8" and a maximum of 1/2" of adjacent construction or penetrations to provide a suitable space for packing and caulking.

2. Cut openings in construction accurately for electrical boxes, piping, ductwork and other penetrating elements. Leave enough space around such elements so they remain free of rigid connection with the surrounding construction.

3. Prior to packing and caulking penetrations as detailed herein, verify that all penetrating elements such as piping and ductwork are free and clear of the opening to be packed and caulked.

4. Where multiple layers of gypsum board are used, stagger all joints in adjacent layers a minimum of 24".

5. Apply all acoustical sealants and caulks in accordance with the manufacturer's instructions.

D. Representative details for airtight penetrations, recessed elements, edges, etc. are shown in the project drawings, including, but not limited to:

1. Partition Bases: Provide 1/4" (high) continuous bead of acoustical sealant at all locations where gypsum board meets structural flooring. The depth of the sealant shall equal the thickness of the gypsum layer or layers.

2. Partition Heads: Provide the same detail as for bases at flat structure. Provide details in the project drawings for other conditions.

3. Partition or Ceiling Joints at Dissimilar Materials: Provide 1/4" continuous bead of acoustical sealant at all locations where gypsum board meets dissimilar material. The depth of the sealant shall equal the thickness of the gypsum layer or layers.

4. Partition/Partition or Partition/Ceiling Joints: Provide standard corner taping detail.

5. Pipe, Duct, Conduit, or Structural Penetrations: Provide 1/4" wide bead of acoustical sealant around perimeter of small penetrating elements with controlled openings. Provide details in the project drawings for other conditions. The depth of the sealant shall equal the thickness of the gypsum layer or layers.

6. Electrical Boxes 4"x 4" or Under: Provide 1/4" wide bead of acoustical sealant around perimeters of electrical boxes. The depth of the sealant shall equal the thickness of the gypsum layer or layers. Provide sheet caulking continuously around the back side of boxes.

7. Electrical Boxes or Recessed Boxes Over 4"x 4": Provide one layer of 5/8" gypsum board continuous around the back of such boxes. Caulk or tape all joints and caulk all conduit penetrations with acoustical sealant.

E. The Contractor shall be alert for additional conditions that may require special details or materials in order to achieve airtightness and shall bring these to the attention of the Architect.

PART 3 – COMMISSIONING FOR ACOUSTICAL PERFORMANCE

3.1 TESTING OF SOUND CONTROL DOORS AND WINDOWS

A. At the Contractor's expense, sound control doors and windows shall be tested for field acoustical performance as directed by the Project Architect and/or Acoustical Consultant. Testing shall be provided by an independent Acoustical Consulting firm. That firm shall be a member of the NCAC, and testing shall be supervised by a Full or Board Certified Member of INCE.

B. Noise reduction tests shall be made in general conformance with the latest edition of ASTM E 336 with the microphone 3' or less from doors or windows. NIC ratings shall be calculated in accordance with the latest edition of ASTM E 413. Sound control doors and windows shall achieve the NIC ratings as specified. If doors or windows fail to achieve specified NIC ratings, they shall be adjusted, corrected, or replaced and retested until they meet the specified requirements. All such work shall be at no cost to the Owner.

3.2 TESTING FOR NOISE AND VIBRATION

Refer to Section 01 81 23 for testing and reporting requirements for building systems noise and vibration control in all performing arts spaces, teaching and learning spaces, athletic spaces, staff spaces, and interior gathering spaces on the project.

END OF SECTION 01 81 22

SECTION 01 81 23 – NOISE AND VIBRATION CONTROL

PART 1 – GENERAL

1.1 SUMMARY

A. This project contains acoustically-sensitive spaces which must be quiet and free from excessive building vibration. Special noise and vibration control products and construction detailing are required, along with post-construction testing.

B. This section is the primary source of requirements for noise and vibration control in the project documents. Should conflicts arise between the requirements in this section and other portions of the contract documents, the requirements in this section shall take precedence unless otherwise directed by the Architect. Under no circumstances, however, shall the requirements in this section take precedence over code or life safety requirements.

C. Objectionable noise and vibration caused by building systems shall be reduced to levels as close as possible to the maximum allowable noise and vibration criteria listed below. Adjustments and retesting of faulty or improperly-installed equipment or systems shall be provided at no cost to the Owner.

D. Related Section: Section 01 81 22 Acoustical Performance Requirements.

1.2 MAXIMUM ALLOWABLE NOISE CRITERIA FOR PROJECT SPACES

A. Maximum allowable background noise levels (NC and dBA) in project spaces due to operation of HVAC, plumbing or electrical equipment are listed below.

Spaces	Required Background Noise Level
BLDG L	
Live Room	20
Black Box Theatre and Control Room, Recording Control Room, Band/Instrument Room, Choir/Vocal Room, Percussion Room	25
Corridors and Vestibules Adj. to Black Box, Drama Room, Recording Vestibule, Offices	30
Lobbies, Circulation, Storage Rooms	40
Toilet Rooms	45

Spaces	Required Background Noise Level
BLDG M	
Gyms, Wrestling Room, Weight/Dance Room Activities/Campus Store, ABS Room, Offices, Team Rooms	35
Lobbies, Circulation, Toilets, Lockers, Showers,	45
BLDG Q	
Private Offices	30
Open Library Spaces, Library Desk, Huddle Rooms, Workrooms, Parent Rooms	
Dining, Tech Repair	40
Lobby, Circulation, Scullery, Scramble, Servery, Toilet Rooms	45
Kitchen	50

B. Refer to Para. 3.2 of this section including requirements for noise reduction adjustments, noise measurements, and reporting and submittals.

1.3 MAXIMUM ALLOWABLE VIBRATION CRITERIA FOR ROTATING EQUIPMENT

A. Rotating devices shall be balanced according to the schedule below. The following vibration displacement levels shall not be exceeded when the equipment is rigidly grounded to structure (with the isolators blocked or "grounded out.")

Equipment Type	RPM	mils peak to peak (max)
Fans	< 600	4
	600 to 999	3
	1000 to 2000	2
	> 2000	1
Pumps	1800	2
	3600	1

B. Refer to Para. 3.3 of this section including requirements for vibration reduction adjustments, vibration measurements, and reporting and submittals.

1.4 MAXIMUM ALLOWABLE NOISE FROM AIRHANDLING EQUIPMENT

A. Maximum allowable sound power levels for airhandling equipment shall not exceed the values for the equipment used as the basis of design for this project.

B. The sound generating characteristics of air handling units shall be tested to, and comply with, all requirements of this specification. Representative samples shall be subjected to tests in accordance with applicable standards and procedures in order to demonstrate such compliance. A special test for this project is not required if the manufacturer has previous certified test results that can be made applicable to this project.

C. Submit complete acoustical test reports showing that the proposed products have been tested in accordance with the latest versions of AMCA Standard 300, Test Code for Sound Rating, and AMCA Standard 301, Method for Calculating Fan Sound Ratings from Laboratory Test Data.

1.5 MAXIMUM ALLOWABLE NOISE FROM GRILLES, REGISTERS, AND DIFFUSERS

A. Noise generation from grilles, registers, and diffusers shall not exceed the maximum allowable noise criteria (NC) published in this section.

B. Submit a tabulation of proposed products, room/space identification, maximum allowable noise criteria, and product noise criteria (at maximum air volumes) for all project spaces.

1.6 MAXIMUM ALLOWABLE NOISE FROM LIGHTING SYSTEMS

A. Noise levels emanating from specified lighting equipment shall not exceed the maximum allowable noise criteria (NC) published in this section.

B. Submit a tabulation of proposed products, room/space identification, maximum allowable noise criteria, and product noise criteria for all project spaces.

1.7 NOISE CONTROL FOR HVAC SYSTEMS

A. Airborne and ductborne noise from airhandling systems shall be minimized.

B. Refer to the project drawings and specifications and subsequent portions of this section for requirement related to the following noise control products, including, but not limited to duct and plenum lining, duct silencers (sound traps), acoustical flexible ducts, and roof curb mass infill at RTUs.

C. Submit complete acoustical test reports showing that the proposed products have been tested for appropriate noise control performance.

1.8 VIBRATION CONTROL FOR HVAC SYSTEMS

A. Vibration or noise from HVAC equipment and systems shall not be transmitted to building structure and components, including, but not limited to, roofs, floors, beams, columns, walls, partitions, ceilings, studs, ceiling framing and suspension systems.

B. Refer to the project drawings and specifications and subsequent portions of this section for requirements related to the following vibration isolation products, including, but not limited to neoprene mounts and hangers, steel spring mounts and hangers, rooftop spring curbs, flexible duct and piping connectors, seismic restraints, and equipment frames.

C. Vibration isolation shall be provided at all vibration producing HVAC equipment and systems on the project, unless otherwise directed by the Architect. Vibration-producing equipment includes, but is not limited to split system equipment, fan coil units, utility and exhaust fans, condensing units, rooftop AC and OA units, and VRV units.

1. Furnish all labor, equipment, and components necessary for HVAC equipment and system vibration control, including, but not limited to vibration isolators, bases, seismic restraints, incidental equipment, and related materials. Assure that deflection, stability and seismic restraint requirements are met. Install, test, and adjust all vibration isolation equipment per the manufacturer's instructions.

2. The seismic resistance capability of all equipment shall be certified by a registered professional engineer in the state in which the project resides. The requirements of all applicable codes shall be met.

3. Rigorously avoid short-circuiting of vibration-isolated HVAC equipment and systems to building structure and components. Oversee all trades to prevent the short-circuiting of any vibration isolation system and bring conflicts to the Architect's attention.

4. Follow manufacturer's installation and adjustment instructions and adjust or replace all installations that are deemed defective in workmanship or materials by the Manufacturer or the Architect..

D. Submittals shall include the following:

1. A schedule indicating equipment tag number, location, type, and deflection of all vibration isolators.

2. Shop drawings of seismic restraints, steel brackets, steel rails, steel base frames, and concrete inertia bases showing all steel work, reinforcing, and vibration isolator and seismic restraint mounting attachment methods.

3. Calculations by a structural engineer licensed in the state in which the building is to be erected, certifying that all seismic restraints, bolts, cables and associated components will conform with all applicable code requirements.

4. See paragraphs 3.2 and 3.3 of this section for additionally-required, post-construction submittals.

1.9 VIBRATION CONTROL FOR PIPING SYSTEMS

A. Vibration or noise from plumbing or HVAC piping shall not be transmitted to building structure and components, including, but not limited to roofs, floors, beams, columns, walls, partitions, ceilings, studs, ceiling framing and suspension systems. Vibration isolation shall be provided at all active piping systems, unless otherwise directed by the Architect.

B. Refer to the project drawings and specifications and subsequent portions of this section for requirements and products related to piping vibration isolation.

C. Submit vibration isolation products and mounting / suspension details..

D. Insure that functional integrity, structural integrity, and manufacturers warrantees for piping systems are maintained, and that all applicable code requirements are met.

1.10 VIBRATION CONTROL FOR TRANSFORMERS

A. Vibration or noise from transformers shall not be transmitted to building structure and components, including, but is not limited to roofs, floors, beams, columns, walls, partitions, ceilings, studs, ceiling framing and suspension systems. Vibration isolation shall be provided for all transformers, unless otherwise directed by the Architect.

B. Refer to the project drawings and specifications and subsequent portions of this section for requirements and products related to transformer vibration isolation.

C. Submit vibration isolation products and mounting details.

D. Insure that functional integrity, structural integrity, and manufacturers warrantees for transformers are not compromised, and that all applicable code requirements are met.

PART 2 – PRODUCTS FOR NOISE AND VIBRATION CONTROL

2.1 ACOUSTICALLY-RATED NOISE CONTROL PRODUCTS

A. Duct Silencers:

1. The minimum allowable dynamic insertion loss, maximum allowable self generated noise, and maximum allowable pressure drop for duct silencer shall be as listed in the project documents and used as the basis of design for this project.

2. Acoustical and aerodynamic performance shall be determined in accordance with the latest edition of ASTM Standard E 477.

3. Submit complete acoustical test reports.

B. Duct and Plenum Liner

1. Provide duct and plenum lining at specified thicknesses and densities with the following minimum octave band sound absorption coefficients when tested in the F-25 Mounting configuration in accordance with ASTM E 795:

	Octave Band Center Frequency in Hertz					
	125	250	500	1000	2000	4000
1"-thick, 2.0pcf:	.15	.50	.55	.80	.85	.95
2"-thick, 2.0pcf	.25	.75	.90	.95	.95	.95

2. Submit complete acoustical test reports.

C. Acoustical Flexible Duct:

1. Must include fiberglass insulation and a sound-transparent inner liner constructed of spun-bonded nylon.

2. Submit compete acoustical test reports.

D. Rooftop Curb Infill System:

1. Provide a packaged, multi-layered infill system and acoustical sealant to meet an acoustical rating of STC-43 with octave band transmission loss values as listed below when tested in accordance with ASTM E90-10:

	Octave Band Center Frequency in Hertz					
	125	250	500	1000	2000	4000
Min. TL:	20	30	49	59	65	72

2. Submit complete acoustical test reports.

2.2 VIBRATION AND SEISMIC CONTROL PRODUCTS

A. Required Vibration Isolators: Including, but not limited to the following:

1. Neoprene Isolators: Minimum 0.2” deflection. For use with, but not limited to condensing units, transformers, and VRV units.

2. Steel Spring Isolators: 1” to 2” deflection. For use with, but not limited to base-mounted fans.

3. Neoprene Isolation Hangers: Minimum 0.2” deflection. For use with, but not limited to pipes and very small suspended fans.

4. Steel Spring Isolation Hangers: 1” to 2” deflection. For use with, but not limited to suspended fans.

5. Rooftop Spring Curbs: Minimum 2” deflection. For use with curb-mounted rooftop equipment.

B. Required Flexible Connectors: Including, but not limited to the following:

1. Flexible Pipe Connectors: For connection of piping to all vibration-isolated equipment.

2. Flexible Duct Connectors: For connection of ducting to all vibration-isolated equipment.

3. Flexible Electrical Connection: Flexible conduit installed grossly slack at all vibration-isolated equipment.

C. Required Seismic Restraints: Integral or supplemental seismic restraint systems for all vibration-isolated equipment. Such restraints shall not degrade vibration isolation performance and shall meet all applicable codes.

PART 3 – COMMISSIONING FOR NOISE AND VIBRATION CONTROL

3.1 RESPONSIBILITY

The Contractor shall engage a National Environmental Balancing Bureau (NEBB) Certified Sound and Vibration (S&V) Firm to perform all necessary noise and vibration measurements.

3.2 HVAC SYSTEM ADJUSTMENTS AND NOISE MEASUREMENTS

A. Required System Adjustments:

1. Coordinate with the Project Contractor, Mechanical Sub, TAB Contractor, Architect, Mechanical Engineer, and Acoustical Consultant and make necessary adjustments to insure noise from all HVAC systems is minimized in all occupied project spaces prior to testing. Communicate any conditions that prevent the S&V work from being completed in accordance with NEBB Procedural Standards.

2. If noise levels exceed the maximum allowable criteria required in this section, make additional adjustments or modifications at no cost to the Owner until the noise levels are at or less than the maximum allowable criteria listed in this section.

B. Required Noise Measurements and Reporting:

1. Noise measurements shall be made using a recently-calibrated Type 1 Sound Level Meter or Real Time Analyzer with Class II Octave Band Filters, a 1/2" random-incidence microphone, all capable of measuring octave band noise levels as low as NC-15. Noise measurements shall be made in all octave bands centered between 63 Hz and 8000 Hz, inclusive. No weighting shall be applied to these measurements.

2. Noise measurements in each space and at each position shall be measured for two HVAC operating conditions – “equipment on” and “equipment off.”

3. Noise measurements shall be made with spaces unoccupied, with doors and windows closed, at times when building activity is at a minimum, and with all possible non-HVAC noise sources turned off. Make note of any non-HVAC noise sources which cannot be eliminated from measurements.

4. Noise measurements shall be made 4' above floor level in each project space, at least 3’ from walls or other solid obstructions. In spaces up to 100 square feet in size, one measurement shall be provided in the center of each room. In spaces between 101 and 200 square feet in size, two measurements shall be provided in the center of each half of the room. For spaces above 201 square feet in size, four measurements shall be provided in the center of each quadrant of the room.

5. Noise measurement results shall be reported for all locations in all spaces on separate NC curve forms, indicating the unweighted decibel levels measured in both "equipment off" and "equipment on" conditions. Include the required noise criteria for each location on each form.

6. Submit a NEBB Certified S&V Report showing compliance with the maximum allowable noise criteria required in this section, and explain any observed discrepancies.

3.3 VIBRATION ISOLATION ADJUSTMENTS AND MEASUREMENTS

A. Required Vibration Isolation Adjustments and Reporting:

1. After each equipment unit installation is complete and under full operational load, vibration isolators shall be activated per Manufacturer's instructions and adjusted as needed to insure required isolation.

2. Inspect all vibration-isolated equipment, coordinate the work of all involved trades, and see that vibration isolators are not short-circuited by seismic restraints, drain lines, conduits, stanchions, control tubing, duct connections, pipe connections, etc. Ensure that hanger isolators and their rods or wires do not touch any other building component. All temporary blocks and shims shall be removed.

3. Coordinate with the Project Contractor, Mechanical Sub, TAB Contractor, Architect, Mechanical Engineer, and Acoustical Consultant and make necessary adjustments to insure vibration from all HVAC systems is minimized in all occupied project spaces prior to any required testing.

4. Submit a report certifying that each vibration isolator is achieving the specified static deflection under equipment load. If specified static deflections are not achieved, isolation equipment shall be further adjusted or replaced at no cost to the Owner until the specified static deflections are met.

B. Vibration Measurements and Reporting (If Required):

1. If the project Architect determines that any equipment item is exhibiting excessive vibration or any equipment item is causing excessive building vibration, equipment vibration measurements shall be carried out. Equipment adjustments or replacements shall be made at no cost to the Owner until the vibration levels are at or less than the maximum allowable criteria listed in this section.

2. Measure and record equipment vibration, bearing vibration, equipment base vibration, and building structural vibration adjacent to equipment, in accordance with NEBB Procedural Standards for Measurement of Noise and Vibration. Record velocity and displacement readings in the radial vertical, radial horizontal and axial planes, where measurements can be performed safely.

3. Carry out vibration measurements when other building vibration sources will not influence measurements of equipment being tested. Turn off equipment in the building that might interfere with testing. Restrict people from occupying areas where human activity may affect accuracy of measurements.

4. Measure and record vibration levels at discrete frequencies from 1 to 200 Hz in 1 Hz increments or in 1/3 octave bands from 12.5 Hz to 200 Hz, as indicated for the specific vibration or noise problem encountered.

5. Submit a NEBB Certified S&V Report showing compliance with the maximum allowable equipment vibration criteria required in this section, and explain any observed discrepancies.

END OF SECTION 01 81 23

INTENTIONALLY LEFT BLANK

SECTION 019113 – GENERAL COMMISSIONING REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Owner's Project Requirements, Basis of Design, and Commissioning Plan documentations are included by reference for information only.

1.2 SUMMARY

A. Section Includes:
   1. Building commissioning of the following systems:
      a. HVAC components and equipment, domestic hot water systems, energy management, control systems.
      b. HVAC system: Interaction of cooling, heating, and comfort delivery systems.
      c. HVAC Control System: Control hardware and software, sequence of operations, and integration of factory controls.
      d. Lighting Control System and interface with daylighting.
      e. Water heater Title 24 compliant.
   2. Building commissioning activities and documentation in support of the 2019 California Energy Code and 2019 California Green Building Standards Code - CALGreen.
      a. Verify that applicable equipment and systems are installed according to the Contract Documents, manufacturer's recommendations, and industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
      b. Verify and document proper performance of equipment and systems.
      c. Verify that Operation and Maintenance documentation is comprehensive and complete.
   3. Verify that Owner's operating personnel are adequately trained.
   4. Building commissioning is a process for achieving, verifying, and documenting that the performance of the facilities, systems, and assemblies meet defined objectives and criteria. The commissioning process includes specific tasks to be conducted during each phase in order to verify that design, construction, and training meets the Owner's/Architect's design intent.

B. The Owner, Architect/Engineer, and Commissioning Agent are not responsible for construction means, methods, job safety, or management function related to commissioning on the job site.

C. Related Work Specified Elsewhere (as applicable):
   1. SUBMITTAL PROCEDURES
   2. CLOSEOUT PROCEDURES
   3. OPERATION AND MAINTENANCE DATA
   4. PROJECT RECORD DOCUMENTS
   5. PLUMBING

6. HVAC/HVAC CONTROLS
7. ELECTRICAL

1.3 DEFINITIONS

A. Acceptance - A formal action, taken by a person with appropriate provider (which may or may not be contractually defined) to declare that some aspect of the Project meets defined requirements; thus permitting subsequent activities to proceed.

B. Basis of Design - The basis of design is the documentation of the primary thought processes and assumptions behind design decisions that were made to meet the design intent. The basis of design describes the systems, components, conditions and methods chosen to meet the intent. Some reiterating of the design intent may be included.

C. Checklists - Verification checklists that are developed and used during all phases of the commissioning process to verify that the Owner's project requirements are being achieved. This includes checklists for general verification, plus testing, training, and other specific requirements. Various checklists are prepared by the Commissioning Agent and the contractor to document equipment; system test completion.

D. Commissioning - Commissioning is a comprehensive and systematic process to verify that the building systems perform as designed to meet the Owner's requirements. Commissioning during- the construction, acceptance, and warranty phases is intended to achieve the following specific objectives:
   1. Verify and document that equipment is installed and started per manufacturer's recommendations; industry accepted minimum standards, and the Contract Documents.
   2. Verify and document that equipment and systems receive complete operational checkout by installing contractors.
   3. Verify and document equipment and system performance.
   4. Verify the completeness of operations and maintenance materials.
   5. Ensure that the Owner's operating personnel are adequately trained on the operation and maintenance of building equipment.

   The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.

E. Commissioning Plan - an overall plan developed by the Commissioning Agent that provides the structure, schedule, and coordination planning for the commissioning process.

F. Control System - A component of environmental, HVAC, security, and fire systems for reporting/monitoring and issuing of commands to/from field devices.

G. Data Logging - The monitoring and recording of flows, currents, status, pressures, etc., of equipment using stand-alone data recorders separate from the control system or the trending capabilities of control systems.

H. Deficiency - A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents, does not perform properly or is not complying with the design intent.

I. Design Intent - A dynamic document that provides the explanation of the ideas, concepts, and criteria that are considered to be very important to the Owner. It is initially the outcome of the programming and conceptual design phases.

J. Functional Performance Test - test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure set point). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing is not functional testing, in the commissioning sense of the word. Test and balancing primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The Commissioning Agent develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. Functional Performance Tests are performed after pre-functional checklists and startups are complete.

K. Issues Log - A formal and ongoing record of problems or concerns - and their resolution - that have been raised by members of the commissioning team during the course of the commissioning process.

L. Manual Test - using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").

M. Monitoring - the recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.

N. Non-Compliance - see Deficiency.

O. Non-Conformance - see Deficiency.

P. Owner's Design Intent (ODI) - A written document that details the functional requirements of a project and the expectations of how it will be used and operated. This includes Project goals, measurable performances criteria, cost considerations benchmarks, success criteria, and supporting information.

Q. Pre-functional Checklist - a list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the Commissioning Agent to the contractor. Pre-functional checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some pre-functional checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three-phase pump motor of a chiller system). The word "pre-functional" refers to before functional testing. Pre-functional checklists augment and are combined with the manufacturer's start-up checklist.

R. Quality Based Sampling - A process for evaluating a subset (sample) of the total population. The sample is based upon a known or estimated probability distribution of expected values; an assumed statistical distribution based upon data from a similar product, assembly, or system; or a random sampling that has scientific statistical basis.

S. Seasonal Performance Tests - Functional Performance Test that are deferred until the system(s) will experience conditions closer to their design conditions based on weather conditions.

T. Simulated Condition - Condition that is created for the purpose of testing the response of a system (e.g.: raising/lowering the set point of a set point of a thermostat to see the response of a VAV box).

U. Startup - The initial starting or activating of dynamic equipment, including completing construction checklists.

V. System Manual - A system focused composite document that includes the operation manual, maintenance manual, and additional information of use to the Owner during the occupancy and operations phase.

W. Procedure - A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems. The test procedures are specified in the Technical Specifications sections on the Contract Documents. Performance testing covers the dynamic functions and operations of equipment and systems under full operation. Systems are tested under various models; such as during low cooling loads, high loads, component failures, unoccupied, varying outside air, fire alarm, power failure, etc. The systems are run through all the sequences state.

X. Training Plan - A written document that details the expectations, schedule, budget, and deliverables of commissioning process activities related to training of project operating and maintenance personnel, users, and occupants.

Y. Trending - The monitoring by a building management system or other electronic data gathering equipment, and analyzing of the data gathered over a period of time. Trending of all equipment control points is required prior to functional testing.

Z. Verification - The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.

AA. Warranty Period - Warranty period for the entire project; including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Documents and accepted submittals.

1.4 COORDINATION

A. Perform commissioning services to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures.

B. Commissioning Agent shall provide overall coordination and management of the commissioning program as specified herein.

C. Commissioning Team: The commissioning process will require cooperation of the Contractor, subcontractors, vendors, installers, Architect/Engineer, Commissioning Agent, and Owner. The commissioning team shall be comprised of the following.
   1. Contractor
      a. Project Manager
      b. Test Engineer
   2. Subcontractors: As appropriate to product or system being commissioned.
   3. Commissioning Agent
      a. Project Manager
      b. Project Engineers
   4. Owner Representative(s)
   5. Architect/Engineer
      a. Architect
      b. MEP Engineers
      c. Specialty Consultant(s)

D. Progress Meetings: Attend construction job-site meetings, as necessary, to monitor construction and commissioning progress. Coordinate with contractor to address coordination, deficiency resolution and planning issues. Plan and coordinate additional meetings as required to progress the work.

E. Site Observations: Perform site visits, as necessary, to observe component and system installations.

F. Functional Testing Coordination:
   1. Equipment shall not be "temporarily" started for commissioning.
   2. Functional performance testing shall not begin until pre-functional, start-up, and test and balancing is completed for a given system.
   3. The controls system and equipment it controls shall not be functionally tested until all points have been calibrated and pre-functional checklists are completed.

1.5 QUALITY CONTROL

A. Qualifications for Commissioning Agents: Engaging commissioning service personnel that specialize in the types of inspections and tests to be performed.
   1. Inspection and testing service agencies shall be members of the Building Commissioning Association (BCA).

1.6 SUBMITTALS

A. Commissioning Agent shall submit the following:
   1. Basis of Design and Design Intent.
      a. Update as necessary during the work to reflect the progress on the components and systems. Forward updates to the Architect/Engineers in a timely manner.
   2. Scoping Meeting Minutes.
   3. Commissioning Plan: Submit within 30 calendar days of authorization to proceed.

a. Update as necessary during the work to reflect the progress on the components and systems. Forward updates to the Architect/Engineers in a timely manner.

4. Commissioning Schedule: Submit with Commissioning Plan.
   a. Update as necessary during the work to reflect the progress on the components and systems. Forward updates to the Architect/Engineers in a timely manner.
5. Functional performance test forms: Submit minimum 30 calendar days prior to testing.
6. Deficiency Report and Resolution Record: Document items of non-compliance in materials, installation or operation. Document the results from start-up/pre-functional checklists, functional performance testing, and short-term diagnostic monitoring. Include details of the components or systems found to be non-compliant with the drawings and specifications. Identify adjustments and alterations required to correct the system operation, and identify who is responsible for making the corrective changes.
   a. Update as necessary during the work to reflect the progress on the components and systems. Forward updates to the Architect/Engineers in a timely manner.
7. Final Commissioning Report: Compile a final Commissioning Report. Summarize all of the tasks, findings, conclusions, and recommendations of the commissioning process. Indicate the actual performance of the building systems in reference to the design intent and contract documents. Include completed pre-functional inspection checklists, functional performance testing records, diagnostic monitoring results, identified deficiencies, recommendations, and a summary of commissioning activities.
8. O&M Submittals:
   a. Training plan: Training plan shall include for each training session:
      Dates, start and finish times, and locations;
      Outline of the information to be presented;
      Names and qualifications of the presenters;
      List of texts and other materials required to support training.
   b. O&M Database.

1.7 RESPONSIBILITIES

A. The general responsibilities of various parties in the commissioning process are provided in this subsection. The specific responsibilities are in the Technical Specifications.

B. All Parties:
   1. Follow all quality requirements in the Contract Documents.
   2. Attend commissioning kickoff meeting and additional coordination meetings as necessary.

C. Architect (A/E):
   Construction Phase
   1. Attend the commissioning coordination meeting and selected commissioning team meetings.
   2. Perform normal submittal review, construction observation, as-built drawing review; O&M manual review, etc., as contracted.
   3. Provide design narrative documentation to Commissioning Agent.
   4. Coordinate resolution of system deficiencies identified during commissioning; according to the Contract Documents.
   5. Review and approve the O&M manuals.

D. Mechanical and Electrical Engineers (A/E)

Construction Phase

1. Perform normal submittal review, construction observation, as-built drawing review, etc.; as contracted. One site observation should be completed just prior to system startup.
2. Provide any design narrative and sequences documentation requested by the Commissioning Agent. The engineers shall assist in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings, or equipment documentation is not sufficient for writing detailed testing procedures.
3. Attend the commissioning meetings as necessary.
4. Participate in the resolution of system deficiencies identified during commissioning; according to the Contract Documents.
5. Review and approve the O&M manuals.

   Occupancy and Operations Phase

   a. Participate in the resolution of non-compliance, non-conformance, and design deficiencies identified during commissioning during warranty period commissioning.
   b. Attend lessons learned session.

E. Commissioning Agent: The Commissioning Agent will verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the Owner's Design Intent. When a random sample does not meet the requirement; the Commissioning Agent will report the failure in the "Issues Log".

Construction Phase

1. Coordinates and directs the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications with all necessary parties, frequently updated timelines and schedules and technical expertise.
2. Coordinate the commissioning work and; with the General Contractor and Owner/CM, help integrate commissioning activities into the Master Schedule.
3. Revise the Commissioning Plan as necessary.
4. Plan and conduct a commissioning scoping meeting and other commissioning meetings.
5. Request and review additional information requested to perform commissioning tasks; including O&M materials, contractor startup and checkout procedures.
6. Before startup; gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient clarity has been obtained in writing to be able to write detailed testing procedures.
7. Review and approve contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews.
8. Write and distribute construction checklists. Prepare and maintain completed construction checklist log.
9. Perform site visits, as necessary, to observe component and system installations. Attend selected planning and job site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitution relating to the commissioning process. Assist in resolving any discrepancies.
10. Witness all or part of any ductwork testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Document this testing and include the

documentation in O&M manuals. Notify owner's project manager of any deficiencies in results or procedures.

11. Approve construction checklist completion by selected site observation and spot-checking.
12. Recommend approval of systems startup by reviewing startup reports and by selected site observation.
13. Review test and balancing execution plan.
14. Oversee sufficient testing of the HVAC control system.
15. Recommend approval of air and water systems balancing by spot testing by reviewing completed reports and by selected sit observation.
16. With necessary assistance and review from installing contractors; write the performance test procedures for equipment and systems; including energy management control system trending, stand-alone data logger monitoring or manual performance testing.
17. Analyze any performance trend logs and monitoring data to verify performance.
18. Coordinate, witness, and recommend approval of manual performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved.
19. Maintain a master Issues Log and a testing record. Provide the commissioning team with progress reports, test results, and recommended actions.
20. Witness all or part of all Owner contracted tests or tests by manufacturer's personnel over which the Commissioning Agent may not have direct control. Document these tests and include this documentation in Commissioning Record in O&M manuals.
21. Review equipment warranties to ensure that the owner's responsibilities are clearly defined.
22. Oversee and approve the training of the owner's operating personnel.
23. Complete and maintain a commissioning record and building systems book(s).
24. Review and approve the preparation of the O&M manuals.
25. Provide a final commissioning report.
26. Coordinate the development of a systems manual.
27. Prepare a standard trend logging package of primary parameters that will provide the operations staff clear indications of system function in order to identify proper system operation and trouble shoot problems. The Commissioning Agent shall also provide any needed information on interpreting trends.

Occupancy and Operations Phase

a. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
b. Return to the Site/Project on or about 10 months into the 12 month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning. Also interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.
c. Assist in the development of a preventative maintenance plan, a detailed operating plan or an energy and resource management plan or as-built documentation.
d. Attend and facilitate lessons learned session.

F. Owner or Owner's Representative (CM)

Construction and Acceptance Phase

1. Attend a commissioning coordination meeting and other commissioning team meetings.
2. Perform the normal review of contractor submittals.
3. Furnish a copy of all Construction Documents, Addenda, Change Orders, and approved submittals.
4. Coordinate the resolution of non-compliance and design deficiencies identified in all phases of commissioning.
5. Provide the Owner's Design Intent documentation to the Commissioning Agent and contractor for information and use.
6. Provide the Basis of Design documents; prepared by the Architect and approved by the Owner to the Commissioning Agent and operation and maintenance training plan.
7. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.

   Occupancy and Operations Phase

   a. Assist the Commissioning Agent as necessary in the seasonal or deferred testing and deficiency correction required by the specifications.
   b. Attend lessons learned session.

G. Owner's Project Manager (PM)

Construction Phase

1. Manage the contract of the Architect/Engineer and the General Contractor.
2. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions.
3. Provide final approval for the completion of the commissioning work.

   Occupancy and Operations Phase

   a. Ensure that any seasonal or deferred testing and any deficiency issues are addressed.
   b. Attend lessons learned session.

H. Contractor: Contractor, their subcontractors, and vendors shall assign representatives with expertise and authority to act on their behalf and schedule them to participate in and perform commissioning process activities including, but not limited to the following:

Construction Phase

1. Perform customary quality control on all work performed under this contract.
2. Prepare O&M manuals, as-built drawings, construction observation, etc. according to the Contract Documents; including clarifying and updating the original sequences of operation to as-built/as-tested conditions.
3. Provide startup procedures for all equipment prior to equipment startup/testing.
4. Attend one commissioning coordination meeting at the beginning of construction.
5. Facilitate the commissioning coordination of the commissioning with the construction schedule.
6. Ensure that all subcontractors and vendors execute their installation, testing, and startup responsibilities as defined in this section and the technical specifications.
7. Provide submittals as required elsewhere in the contract including all changes thereto.
8. Participate in intermittent commissioning discussions held during weekly construction meetings.
9. Attend one commissioning meeting to coordinate equipment functional testing approximately 60 days prior to startup of the first piece of major equipment. Meeting will be chaired by the Commissioning Agent and may include various owner representatives including the CM, A/E, and PM.

10. Provide training of owner personnel as identified in contract specifications.
11. Provide trend logs and trend reports of all equipment control points to aid in demonstration of proper control sequence of operations prior to functional testing.

    Occupancy and Operations Phase
    a. Ensure that subcontractors complete all quality requirements identified in the contract specifications.
    b. Ensure that subcontractors correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings as the project progresses.
    c. Perform all guarantee work for materials furnished under the contract for the time specified in the contract; including all warranties and curing all latent defects within the time period provided in the contract.

I. Vendors/Subcontractors
1. Analyze specified products and verify that the A/E has specified the newest, most current equipment reasonable for this project's scope and budget.
2. Provide requested information regarding equipment sequence of operation and testing procedures as required in contract specifications.
3. Provide copy of all quality assurance test results/reports for equipment installed by factory representatives.

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT

A. Instrumentation shall meet the following standards:
1. Be of sufficient quality and accuracy to test and measure system performance within the tolerances required to determine adequate performance.
2. Be calibrated on the manufacturer's recommended intervals with calibration tags permanently affixed to the instrument being used.
3. Be maintained in good repair and operation condition throughout the duration of use on this project.

B. All standard testing equipment required to perform startup, initial system checkout, and required functional performance testing shall be provided by the contractor for the equipment being tested. Any specialized testing equipment not required to perform contract work will be provided by the Commissioning Agent.

C. Data logging equipment or software required to test equipment will be provided by the Commissioning Agent, but shall not become the property of the Owner.

2.2 COMMISSIONING PLAN

A. The Commissioning Agent is to develop a Commissioning Plan identifying the quality assurance processes to be implemented by the Owner. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
1. Commissioning during construction begins with an initial commissioning meeting conducted by the Commissioning Agent where the commissioning process is reviewed the project commissioning team members.

2. Additional meetings will be required throughout construction; scheduled by the Commissioning Agent through the Owner or CM with necessary parties attending to plan, scope, coordinate, schedule future activities and resolve problems.
3. Equipment documentation is submitted to the Commissioning Agent through the Owner or CM during the normal submittal process; including detailed startup procedures.
4. The pre-functional checklists are to be completed by the contractor prior to startup to demonstrate equipment is ready for startup.
5. Pre-functional checklists, equipment startup, trend logging and reporting, and test and balancing must be completed before functional performance testing.
6. Items of non-compliance in material, installation, or setup shall be corrected at no expense to the Owner.
7. The contractor ensures that the subcontractors' construction checklists are executed and documented and that startup and initial checkout are performed. The Commissioning Agent approving test and balancing, and checklists and startup plans. This also includes witnessing startup of selected equipment. Any testing failure is to be corrected at no additional cost to the Owner, and a re-test is to be performed, observed, and documented.
8. The Commissioning Agent develops and implements equipment and system performance test procedures. These procedures are approved by the Owner and CM.
9. The performance tests are executed by the contractor under the direction of the Commissioning Agent with the assistance of the facility staff. All documentation is by the Commissioning Agent.
10. The Commissioning Agent reviews the O&M documentation for completeness and provides the commissioning record for the O&M manuals.
11. Commissioning is to be completed before substantial completion.
12. The Commissioning Agent assists in the development and reviews and pre-approves the training program provided by the contractor.
13. Deferred testing is conducted as specified or required.

2.3 EQUIPMENT / SYSTEMS TO BE COMMISSIONED

A. The following equipment /systems will be commissioned in this Project:
1. Domestic water system - plumbing (Level 3)
2. HVAC ductwork and distribution system (Level 4)
3. HVAC equipment (Level 4)
4. HVAC instrumentation (Level 4)
5. HVAC test and balance (Level 5)
6. Interior and Exterior Lighting and Controls (Level 3)

Note: Levels defined in 3.4 PERFORMANCE TESTING AND VERIFICATION

PART 3 – EXECUTION

3.1 MEETINGS

A. Commissioning Coordination Meeting - Within 60 days of the Notice to Proceed (NTP), the Commissioning Agent, through the Owner/CM, will schedule, plan, and conduct an initial commissioning meeting. The contractor and its responsible parties previously identified shall attend.

B. Commissioning Agenda Discussions - At various times during the course of construction, commission related agenda will be discussed during the weekly project meetings along with

other quality related discussions. These discussions will be held weekly during the final 3 months of construction.

C. Functional Testing Meetings - Prior to HVAC equipment startup a commissioning meeting will be conducted to coordinate commissioning activities with equipment startup and testing.

3.2 COMMISSIONING PROCESS

A. The following activities outline the commissioning tasks and the general order in which they occur.
   1. The Commissioning Agent shall coordinate all activities.
      a. Design Review and Documentation.
      b. Documentation of Basis of Design and Design Intent.
      c. Design Development Review.
   2. Construction Document Review.
   3. Commissioning Scoping Meeting.
   4. Commissioning Plan.
   5. Submittals Review.
   6. Start-Up/Pre-Functional Checklists.
   7. Functional Performance Testing.
   8. Short-Term Diagnostic Testing.
   9. Deficiency Report and Resolution Record.
   10. Operations and Maintenance Training.
      a. O&M Manual.
      b. Training.
      c. O&M Database.
   11. Record Documents Review.
   12. Final Commissioning Report and Documentation.
   13. Deferred Testing.
      a. Unforeseen Deferred Tests.
      b. Seasonal Testing.
      c. End-of-Warranty Review.

3.3 SUBMITTALS

A. The Commissioning Agent will provide appropriate contractors with a specific request for the type of submittal documentation the Commissioning Agent requires facilitating the commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team. At minimum; the request will include the manufacturer and model number, the manufacturer's printed installation and detailed startup procedures, full sequence of operation, O&M data, performance test procedures, trend data, and logs/reports, control drawings, and details of owner contracted tests. In addition; the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the commissioning agent All documentation requested by the Commissioning Agent will be included by the subcontractors in their O&M manual contributions.

B. The Commissioning Agent will review and approve submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the commissioning process, to the performance of the equipment, and adequacy for developing test procedures.

This review is intended primarily to aid in the development of performance and only secondarily to verify compliance with equipment specifications. The commissioning agent will notify the Owner/CM of items missing or areas that are not in conformance with Contract Documents and which require resubmission.

C. The Commissioning Agent may request additional design narrative from the NE and controls contractor, depending on the completeness of the Owner's Design Intent documentation and sequences provided with the plans and specifications.

D. These submittals to the Commissioning Agent do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the contractor; though the Commissioning Agent will review and approve them.

3.4 PERFORMANCE TESTING AND VERIFICATION

A. Requirements - All systems shall be performance tested and verified to demonstrate that each is operating according to the documented design intent and contract documents. Performance testing facilitating bringing the systems from a state of individual equipment level completion to full dynamic system operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.
   1. Level 1 - The Commissioning Agent will periodically observe and inspect the installation of the building systems and may review project documentation to verify operational requirements meet the ODI.
   2. Level 2 - The Commissioning Agent will perform Level 1 activities and review inspection reports, test reports, and project deficiency lists prepared by others to verify operational requirements are met.
   3. Level 3 - The Commissioning Agent will perform Level 2 activities and inspect, witness testing, and/or operations of the system to verify operational requirements are met. These activities will be performed independently of the contractor.
   4. Level 4 - The Commissioning Agent will perform Level 2 activities and will witness contractor performance testing of the system. Contractor shall test up to 20% of the system to prove operational requirements are met. The test sections shall be chosen at random by the Commissioning Agent to ensure uniformity of the system. Failure of any test section shall require retesting of that section and an additional test section equivalent in scope. Coordination will be required to avoid impact to the construction schedule.
   5. Level 5 - The Commissioning Agent will perform Level 2 activities and will witness contractor performance testing of the system. Contractor shall test up to 100% of the system to prove operational requirements are met. Failure of any test section shall require retesting of that section. Coordination will be required to avoid impact to the construction schedule.

B. Coordination and Scheduling - The contractor shall provide sufficient notice regarding their completion schedule for the pre-functional checklists, startup of all equipment, test and balancing, and controls systems completion to allow the performance verification to be scheduled. The commissioning team shall oversee, witness, and document the performance of all equipment and systems. The Commissioning Agent in association with the contractor/subcontractors and facility staff shall execute the tests. Performance verification testing shall be conducted only after the contractor has documented the systems are complete and operational; meeting contract requirements. The control system shall be sufficiently tested

and approved by the Commissioning Agent before it is used and trend data/logs and reports provided to verify performance of all components or systems. The air and water balancing shall be completed before performance testing of air or water related equipment or systems. Testing proceeds from components to sub-systems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems shall be checked.

C. Development of Test Procedures - Before test procedures are finalized; the contractor shall provide the A/E and the Commissioning Agent all requested documentation and a current list of changes affecting equipment or systems; program code, control sequences, and testing parameters. Using the testing parameters and requirements in the technical specifications, the Commissioning Agent shall update/develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each contractor/subcontractor or vendor, as appropriate, shall provide assistance to the Commissioning Agent in developing the final procedures. Prior to finalization, the A/E shall review and concur with the test procedure.

D. Test Methods
1. Performance testing and verification may be achieved by manual testing or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. The Commissioning Agent may substitute specified methods or require an additional method to be executed other than what was specified, with the approval of the Owner/CM. The Commissioning Agent will determine which method is most appropriate for tests that do not have a specified method.
2. Simulated Conditions - Simulating conditions shall be allowed; though timing the testing to experience actual conditions is encouraged whenever practical.
3. Overridden Values - Overriding sensor values to simulate a condition; such as overriding the outside air temperature reading in a control system to be something other than it really is, is acceptable.
4. Simulated Signals - Using a signal generator which creates a simulated signal to test and calibrate transducers and direct digital control constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overridden values.
5. Altering Setpoints - Rather than overriding sensor values; and when simulating conditions is difficult, altering Setpoints to test a sequence is acceptable.
6. Indirect Indicators - Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the test parameters, that the indirect readings through the control system represent actual conditions and responses.
7. Setup - Each performance test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The contractor/subcontractor(s) assisting the Commissioning Agent in executing the test shall provide all necessary materials, system modifications, etc, to produce the necessary flows, pressures, temperatures, etc., necessary to execute the test according to the specified conditions. At completion of the test, the contractor/subcontractor(s) shall return all affected equipment and systems to their approved operating settings.

E. Problem Solving - The burden of responsibility to solve, correct, and retest malfunctions/failures is with the contractor.

3.5 DOCUMENTATION, NON-CONFORMANCE, AND APPROVAL OF TESTS

A. Documentation - The Commissioning Agent shall witness and verify/pre-approve the documentation of the results of all functional performance tests.

B. Non-Conformance
   1. Corrections of minor deficiencies identified may be made during the tests at the discretion of the Commissioning Agent. In such cases the deficiency and resolution will be documented on the procedure form or on an attached sheet.
   2. Cost of retesting a performance test shall be borne by the contractor.
   3. The contractor shall submit in writing to the CM at least as often as commissioning meetings are being scheduled. The status of each outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreement and proposals for their resolutions.
      a. The Commissioning Agent retains the original non-conformance forms until the end of the project.
      b. Retesting shall not be considered a justified reason for a claim of delay or for a time extension by the contractor.

C. Approval - The Commissioning Agent notes each satisfactory demonstrated function on the test form. Final approval of the performance test by the Owner is made after review by the Commissioning Agent.

3.6 DEFERRED TESTING

A. Unforeseen Deferred Tests: If a test cannot be completed due to the building structure, required occupancy condition, or other deficiency, the functional testing may be delayed upon recommendation of the Commissioning Agent and the approval of the Owner. These tests are conducted in the same manner as the seasonal tests as soon as possible.

B. Seasonal Testing:
   1. Schedule, coordinate, observe, and document additional testing for seasonal variation in operations and control strategies during the opposite season to verify performance of the HVAC system and controls. Complete testing during the warranty period to fully test all sequences of operation.
   2. Update O&M manuals and Record Documents (As Built Drawings) as necessary due to the testing.

C. End-of-Warranty Review: Conduct end of warranty review prior to the end of the warranty period. Review the current building operation with the facility maintenance staff. The review shall include outstanding issues from original or seasonal testing. Interview facility staff to identify concerns they may have with building operation. Provide suggestions for improvements and assist owner in developing reports or documentation to remedy problems.
   1. Update O&M manuals and Record Documents (As Built Drawings) as necessary due to the testing.

3.7 SYSTEMS MANUAL / OPERATIONS AND MAINTENANCE MANUALS / DATA

A. Commissioning Record and O&M Manuals.

1. The Commissioning Agent will prepare a Systems Manual documenting the commissioning process and identifying operational requirements and parameters for future retesting. The systems manual will include:
   a. O&M manuals prepared by the General Contractor.
   b. The Commissioning Plan.
   c. System reports including design narratives and criteria including sequences. Each system shall contain the startup plan and report, approvals, corrections, construction checklists, completed performance tests, trending and analysis, training plan, and recommended recommissioning schedule.
   d. Final Commissioning Report including an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope, and a general description of testing and verification methods. For each piece of commissioned equipment, the report should contain the disposition of the Commissioning Agent regarding the adequacy of the equipment, documentation, and training meeting the contract Documents in the following areas: 1) equipment meeting the equipment specifications, 2) equipment installation, 3) performance and efficiency, 4) equipment documentation and design intent, and 5) operator training. All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc., shall also be listed. Each non-compliance issue shall be referenced to the specific performance test, inspection, trend log, etc. where the deficiency is documented. The performance and efficiency section for each piece of equipment shall include a brief description of the verification method used (manual testing, Building Automation System trend logs, data loggers, etc.) and include observations and conclusions from the testing.

3.8 TRAINING OF OWNER PERSONNEL

A. The contractor shall provide training coordination, scheduling of subcontractors, and ensure that training is completed. All training shall be coordinated through the CM with the Commissioning Agent.

B. The contractor shall ensure that each subcontractor and vendor (mechanical, plumbing, fire, electrical, specialty, etc.) shall have the following responsibilities:
   1. Provide to the Commissioning Agent through the CM a training plan sixty (60) days before the planned training covering the following elements:
      a. Equipment
      b. Intended audience
      c. Location of training
      d. Objectives
      e. Subject covered (description, duration of discussion, special methods, etc.)
      f. Duration of training on each subject
      g. Instructor for each subject
      h. Methods (classroom lecture, manufacturer's quality video, site walk-through. actual operational demonstrations, written handouts, etc.)
   2. Provide designated Owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment that makes up the system.
   3. Training shall normally start with classroom sessions followed by hands-on demonstration/training on each piece of equipment.

END OF SECTION

SECTION 031101 – CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Concrete Formwork materials, and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 15 14 DRILLED ANCHORS
   4. 03 20 00 REINFORCEMENT
   5. 03 30 00 CAST-IN-PLACE CONCRETE
   6. 03 35 00 POLISHED CONCRETE FINISHING
   7. 04 22 00 CONCRETE MASONRY UNITS
   8. 05 12 00 STEEL AND FABRICATIONS
   9. 06 10 00 ROUGH CARPENTRY
   10. 06 22 00 MILLWORK
   11. 07 40 00 METAL PANELS
   12. 07 92 00 SEALANTS
   13. 31 20 00 EARTHWORK
   14. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   15. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the latest edition of the following standards:
      a. ACI American Concrete Institute
      b. APA The Engineered Wood Association (formerly the American Plywood Association)
      c. PS Product Standards of the U.S. Department of Commerce, latest edition
      d. WCLIB West Coast Lumber Inspection Bureau

1.3 DEFINITIONS

A. Terms used throughout this section.
   1. Unexposed:
      a. "Unexposed to View" for determining what forms to use for an unfinished concrete surface.
   2. Exposed:
      a. "Exposed to View" for determining what forms to use for a finished concrete surface.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
a. Forming materials.
b. Tie rods and spreaders.
c. Formwork for exposed concrete.
d. Form coatings and release agents.
2. Shop Drawings:
a. The Contractor shall submit drawings showing the proposed form tie locations for exposed form indentations.
3. Samples.
a. Form liners for specific finished concrete surfaces.
4. Quality Assurance/Control Submittals:
a. Manufacturer's written Instructions:
1) Instructions for specific form liner manufacturer indicated.
5. Closeout Submittals:
a. Record Documents in accordance with Specification Section – PROJECT DOCUMENTS.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
2. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the Work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Mockups:
1. Cast in accordance with Specification Section – CAST-IN-PLACE CONCRETE, Part 1 Article titled "SUBMITTALS", paragraph titled "Mockups" for requirements.
a. Provide with all applicable joints, grooves, textures, etc.

1.6 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period: One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES.
   a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified product manufacturer:
   a. MDO Plywood: SIMPSON TIMBER PRODUCTS.
   b. HDO Plywood: SIMPSON TIMBER PRODUCTS.
   c. Permanent Forms:
      1) Fiberglass Forms MOLDED FIBERGLASS FORM COMPANY.
2. Specified product accessories:
   a. Chamfer Strips: MEADOW / BURKE COMPANY.
   b. Cement Compound Plugs: MEADOW / BURKE COMPANY.
   c. Double Sided Foam Tape: 3M COMPANY.
   d. Rustication Strips: MEADOW / BURKE COMPANY.
   e. Spreaders and Ties: MEADOW / BURKE COMPANY.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Unexposed finish forms:
1. Provide plywood, lumber, or another acceptable material.
   a. Lumber shall be dressed on at least two edges and one side for tight fit, complying with WCLIB Standard Grading and Dressing Rules #17, for Douglas Fir Form Lumber.
   b. When plywood is used, provide panels complying with PS1, B-B (Concrete Form) Plywood, Group 1, EXT-APA mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

B. Exposed finish forms:
1. Provide plywood panel type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practical sizes to minimize number of joints and to conform to joint system shown on the drawings.

a. Single Pour Forms: Provide liner panels that are complying with PS1, MDO Plywood, B-B, Group 1, EXT-APA, mill-oiled, edge-sealed, with each piece bearing legible inspection trademark, which are limited to "single-pour use" forms, that are manufactured by SIMPSON TIMBER PRODUCTS, or approved equivalent.

b. Multiple Pour Forms: Provide HDO Plywood "Multipour" liner panels, which are limited to "double-pour use" forms, that are manufactured by SIMPSON TIMBER PRODUCTS, or approved equivalent.

C. Permanent Forms:

1. Abandoned in place:

a. Provide forms for concrete pan-type construction with covers and closures.

b. Forms designed to be left in place, shall be metal or fiberglass pan forms that will not be subject to moisture damage or decay.

c. Provide standard or tapered end forms if required to create shapes indicated.

D. Non-Compressive High Density Foam Fill:

1. Foam-Control Geofoam, EPS19, complying with ASTM D 6817 "Standard Specification for Rigid Cellular Polystyrene Geofoam", with the following physical characteristics:

a. Density, min., kg/m^3: 18.4.

b. Compressive Resistance, @ 1 percent deformation, min., psi: 40.0.

c. Flexural Strength min., psi: 207.0.

d. Oxygen index, min., volume percent: 24.0.

2. Accessories: Provide all adhesives, "geogripper" plates, etc. to comply with manufacturer's written installation instructions for a complete and functional installation.

2.3 ACCESSORIES

A. Cement Compound Plugs:

1. Provide gray colored cement compound plugs ("SnaPlug" by MEADOW / BURKE, or approved equivalent) in highly visible concrete surface areas.

a. Provide "flush type" in cone holes of size appropriate to the hole size created by tie-holes.

2. Provide a waterproof neoprene adhesive ("SnaPlug Bonder" by MEADOW / BURKE, or approved equivalent), resistant to weather aging and bacterial growth, for adhering cement compound plugs into cone holes.

B. Chamfer Strips:

1. Provide wood chamfer strips free of knots, for forming edges of cast-in-place concrete.

C. Double Sided Foam Tape: Provide "Scotch" double sided, high density, pressure sensitive adhesive, foam tape as manufactured by The Tape Division of 3M PRODUCTS, INC., or approved equivalent.

D. Form release agent:

1. Provide commercial formulation form release agent with a maximum volatile organic compounds (VOC's) in compliance with the CARB in the area where the project is located, that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2. Provide form liner manufacturer's form release agent when a particular form liner is used to maintain compatibility with form release agent and the form liners used for this project.

E. Curved Form Boards
   1. Form curved walks with flexible curved forms.

F. Rustication Strips:
   1. Provide wood rustication strips free of knots, for forming straight continuous reveals (either vertically or horizontally) and PVC rustication strips as manufactured by MEADOW / BURKE, for forming curved continuous reveals (either vertically or horizontally).

G. Spreaders and ties for loose plywood forming:
   1. Spreader Ties: Use metal spreaders and ties for surfaces to be sacked. Use type that will give positive tying and accurate spreading for accurate sizing of cast walls or forms. Snap type shall leave no metal closer than 1-1/2 inches from exposed surface of concrete and have spreader cones no larger than 1 inch diameter.

H. Nailer Strip:
   1. Provide decay resistant pressure treated wood nailer strips of sizes and locations indicated on the drawings.
      a. For roof systems, provide compatible materials with the roof system manufacturer's applications.
      b. Provide fire retardant pressure treated wood nailer strips when the roof assembly requires a Class A rating.
   2. All pressure treated wood (decay or fire-retardant) shall be in accordance with the applicable standards of the AWPA as referenced in the Specification Section - ROUGH CARPENTRY.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface preparation:
   1. Consult with other Trades relative to required openings, and items to be embedded in concrete (i.e., piping, conduit, hangers, reglets, anchors, inserts, sleeves, etc.). Coordinate work specified under other sections to ensure proper, adequate interfacing between trades, for openings, chases, blockouts, and other required interfacing items.

3.2 ERECTION

A. All formwork shall be:
   1. Designed and constructed in accordance with ACI Standard 347 "Recommended Practice for Concrete Formwork".
      a. Follow ACI 303R "Guide to Cast-In-Place Architectural Concrete" for further recommendations in design and use of Patterned Form Liners.
   2. Construct to size, shape, alignment, elevation and position of all concrete elements.
      a. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required in the work. Use selected materials to obtain required finishes.
      b. Orient circular fiberglass forms so that the seam is always facing the nearest adjacent wall, or an obscure side not highly visible. Contact the Architect for conditions not easily determined.

3. Properly separate and securely tie with Spreaders and Ties to maintain proper shape. Wood spreaders shall not be allowed to remain in concrete work.
    a. Use "Penta-Ties" where indicated on the drawings. Glue in cement compound plugs.
4. Brace, support and center sufficiently to carry without excessive deflection all live and dead loads imposed during construction and placement of concrete, and to insure safety to workers and passersby.
    a. Block adjoining permanent pan units left in place to prevent lateral deflection of forms while placing concrete.
5. Properly construct to eliminate all open joints or discontinuous surfaces.
    a. Solidly butt joints with double sided foam tape, apply silicone sealant at concrete face, and provide backup at joints to prevent cement paste or mortar from leaking.

B. All joints shall be:
1. Uniform and backed by 2 inch material.
2. Continuous and level or plumb.
3. Sufficiently tight (with double sided foam tape and silicone sealant) to prevent leakage of cement paste.
    a. Locate joints of formwork whenever possible at rustication joints.
4. Subject to Architect's approval.

3.3 INSTALLATION

A. General: Design, engineer, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.
1. Access Openings: Shall be provided in forms for cleaning and inspection of forms and reinforcement.
    a. In Wall Forms: Provide openings for each pour, composed of a form section held out until inside of each formed cavity has been cleaned, so that no "access hole" is visible in the finished concrete surface.
2. Architectural Concrete elements shall be formed with MDO (or HDO) form plywood where face uniformity is required such as on signs, plaques, kiosks, and landscape elements.
3. Side forms at unexposed footings may be omitted if excavation stands without caving.
    a. Make footing trench two (2) inches wider than width of concrete footing indicated on the drawings, when earth is used as a form.
    b. Cut trenches true and straight.
    c. Make side cuts neat and plumb.
    d. Bottom of trenches shall be level with reasonably sharp corners.
4. Formwork above grade (stairs, curbs, exposed faces of concrete foundations, etc.) shall be:
    a. Plywood type as specified treated with Sealer.
    b. Constructed with plumb and level joints.
    c. Separated with removable or snap type Spreaders and Ties. Do not use wire ties.
5. Unintentional indentations in the surface of the concrete left after removal of spreaders and ties shall be filled and sacked unless the architect's approval is given to do otherwise.
    a. Install Cement Compound Plugs where exposed form tie indentations occur.
6. Sleeves, anchors and bolts, angles, supports, ties and other materials in connection with concrete construction shall be secured in position before the concrete is placed.

3.4 CONSTRUCTION

A. Special Techniques – Form Removal and Reuse of Forms:
1. All forms shall be completely removed.
2. Time of Removal shall be in accordance with ACI 301 "Specifications for Structural Concrete", which requires concrete to reach its specified compressive strength. Variations to the time of removal are listed below subject to the concrete reaching its specified compressive strength:
   a. Dependent on weather conditions.
      1) Due to excessive cold weather for a long duration of days, and subject to the Architect's approval, the time for removal may be extended if deemed necessary.
   b. Dependent on cylinder test results.
   c. Dependent on recommendations of additive manufacturer when additives are admitted to the mix.
   d. Typically (verify with three statements above before initiating the following):
      1) Foundation Side Forms: Five (5) days after concrete is poured.
      2) Wall Forms: Ten (10) day after concrete is poured.
      3) Column Forms: Ten (10) days after concrete is poured.
      4) Beam, Slab and Joist Soffit Forms:
         a) Twenty-One (21) days after concrete is poured.
         b) Re-shore as required to support dead loads and any construction loads applied.
   e. Remove forms in a manner that will not harm concrete. Do not hammer or pry against concrete.
3. Curved Form Boards
   a. Provide staking in sufficient quantities, order for the surface of the concrete to have a consistent and smooth curved element.
4. Nails, tie wires and form ties shall be cut off flush with face of concrete.
5. Snap type spreaders to be snapped off inside the wall surface.
6. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release compound as specified for new formwork.
7. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to the Architect.

B. Site Tolerances:
1. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 "Guide to Formwork for Concrete" limits:
   a. Provide Class A tolerances (permitted irregularities are 1/8" in 10' for both gradual and abrupt) for all concrete surfaces exposed to view, or surfaces that will receive additional applied finishes.
2. Concrete work out of alignment, or level or plumb exceeding the allowable tolerance will be cause for rejection of the whole work affected. Such work shall be removed and replaced as directed by Architect with no additional cost to Owner.

3.5 CLEANING

A. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Re tighten forms and bracing before placing concrete, as required, to prevent leakage of cement paste and maintain alignment.

B. Remove all wood used for formwork from trenches. No wood shall be left buried in the earth.

C. Final cleaning shall be in accordance with Specification Section – PROJECT CLOSEOUT.

END OF SECTION

SECTION 031514 – DRILLED ANCHORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all Drilled Anchor materials, labor, equipment and services necessary for Expansion, Adhesive, and Screw Anchors in Concrete, and Concrete Masonry Units, and related items necessary to complete the Project as indicated by the Contract Documents unless otherwise specifically excluded.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 11 01 CONCRETE FORMWORK
   4. 03 20 00 REINFORCEMENT
   5. 03 30 00 CAST-IN-PLACE CONCRETE
   6. 04 22 00 CONCRETE MASONRY UNITS
   7. 05 12 00 STEEL AND FABRICATIONS
   8. 05 30 00 METAL DECK
   9. 06 10 00 ROUGH CARPENTRY
   10. 06 41 23 MODULAR CASEWORK
   11. 09 22 16 METAL FRAMING
   12. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Submit manufacturer's product data for all expansion and adhesive anchors to be used in this project.
         1) Submit current ICC Evaluation Services research or evaluation reports evidencing maximum allowable shear and withdrawal load data.
   2. Quality Assurance / Control Submittals:
      a. Test Reports: Submit to DSA, copy to Project Inspector and Contractor.
         1) Tension Testing as required.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility:
   1. To ensure consistent quality of anchorage, obtain drilled anchors from a single manufacturer.
   2. To ensure consistency of anchorage, obtain adhesive for anchorage from a single manufacturer.

B. Manufacturer Qualifications: Provide drilled and adhesive anchors from a manufacturer that can demonstrate ICC approvals that are current and acceptable to review by the DSA/SSS.

C. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:
   1. ICC International Code Council.
   2. IR Interpretation of Regulations.

D. Job Testing: For verifying satisfactory installation workmanship, an independent laboratory will perform proof load tests of drilled anchors acting in tension or shear in the presence of the Project Inspector.
   1. When drilled-in expansion-type anchors or other post-installed anchors acceptable to the enforcement agency are used in lieu of cast-in-place bolts, the allowable shear and tension values and installation verification test loads shall be acceptable to the enforcement agency.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in original, unopened packages with manufacturer's labels identifying products legible and intact.

B. Store materials inside, under cover and in a manner to keep them dry, protected from the weather, surface contamination, corrosion, damage from construction traffic and other causes.

1.5 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period: One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES.
      a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 GENERAL

A. Refer to X/S102 for ICC report numbers.

B. The products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must comply with the requirements of this project. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

2.2 MATERIALS

A. Provide manufacturers standard drilled anchors (expansion or adhesive) for installation into Concrete or Concrete Masonry Units unless noted otherwise.
   1. Metal Finishes (corrosion resistant):
      a. Zinc Plated Carbon Steel.
      b. Stainless Steel.

2.3 EXPANSION ANCHORS:

A. Specified product manufacturer: HILTI INC.
   1. Acceptable alternative manufacturer, subject to compliance with requirements:
      a. DEWALT/POWERS.
      b. SIMPSON.

B. Wedge Anchors: The WEDGE category features a small split expansion ring installed on a tapered (integral cone) part of the stud at the bottom. As the nut is tightened, withdrawing the stud portion from the hole, the expansion ring engages the concrete and is further expanded on the tapered part of the stud.

C. Sleeve Anchors: The SLEEVE category is similar to the wedge except a large expansion sleeve is used instead of a small expansion ring. The outside of the sleeve defines the anchor diameter with the threaded stud being of a smaller diameter since it fits inside the sleeve. The stud has an integral cone expander at the bottom similar to the wedge category. The expansion mechanism is similar to the wedge category except the top of the sleeve is normally in contact with the nut/washer and is initially forced down over the cone expander as the anchor is tightened. As the sleeve is expanded, it engages the concrete and continues to expand as the wedge anchor.

D. Shell Anchors: The SHELL category has the most variations, but all use a tapered cone expander, either internal or external, to expand the shell of the anchor against the hole. The anchor is either hammered down over an external expander or a special tool is used to drive an internal expander further into the anchor.

2.4 ADHESIVE ANCHORS

A. Specified product manufacturer: HILTI INC.
   1. Acceptable alternative manufacturer, subject to compliance with requirements:
      a. DEWALT/POWERS.
      b. SIMPSON.

B. Adhesive Anchors which chemically bonds Steel Rods or Deformed Steel Reinforcement Dowels to concrete or masonry elements:
   1. Threaded Steel Rods with minimum yield strength of 36 ksi and complying with ASTM A36 "Specification for Carbon Structural Steel," or ASTM A193 "Specification for Alloy-Steel and Stainless Steel Building Materials for High Temperature or High Pressure Service and Other Special Purpose Applications," Grade B7.
   2. Deformed Steel Reinforcement Dowels shall be a minimum of Grade 60 and comply with ASTM A615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement" or ASTM A706 "Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement."

3. Adhesives, consisting of two primary components that are stored separately, and having a mixing nozzle provided by the manufacturer combining the components prior to placing in the holes.
4. Long term durability and stability of the adhesive anchor material and its resistance to loss of strength and chemical change at elevated temperatures shall be established to the satisfaction of the enforcement agency.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:
1. Coordinate and provide anchors and installation instructions from the manufacturer for items to be embedded in Concrete or Concrete Masonry Unit construction. Manufacturer's written installation instructions shall be available on the project site.

3.2 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices where necessary for securing designated items indicated on the drawings, or as necessary for a complete and proper job to in-place construction.
1. Install the anchors in accordance with the requirements given in the ICC Evaluations Services Report recommendations for the specific anchor used.
2. When installing expansion anchors through metal deck into concrete, the anchors should be installed in the center of the low flute of the decking where practicable in minimum 20 gage deck.
   a. The minimum depth of embedment shall be 1-1/2 inches above the top flute of the decking (except 1/4 and 5/16-inch diameter anchors for ceilings) when the slab thickness above the top of the flute is at least 3 inches.
   b. Shell type anchors shall not be used on the underside of concrete and metal deck construction due to damage caused to the concrete when hammering in the shell anchors.
3. Install Adhesive Anchors by placing adhesive into specially prepared holes, then insert rods or dowels into holes in a manner that disperses the adhesive to assure maximum contact between adhesive, surface of the holes and surface of the anchor.
   a. Adhesive anchors shall not be used in overhead applications.

B. Cutting, Fitting, and Placement: Perform cutting, drilling and fitting required for designated items of construction. Set work accurately in location, alignment and elevation, level true and free of rack, measured from established lines and levels.
1. The minimum edge distance and spacing of wedge and adhesive anchors shall not be less than ten (10) diameters or as required by ICC Evaluation Service Report unless specifically shown on drawings.

C. Use care and caution to avoid cutting or damaging reinforcing bars in Reinforced Concrete or Concrete Masonry Construction.

D. Do not install expansion or adhesive anchors in recently placed concrete which has not had a minimum 28 day curing period and which has not been accepted as having a minimum compressive strength of 3000 psi.

3.3 FIELD QUALITY CONTROL

A. Testing, General:
1. Perform testing in accordance with ACI 318 "Building code Requirements for Structural Concrete and Commentary," and herein specified.
   a. When expansion or adhesive anchors are listed for sill plate bolting applications, 10 percent of the anchors shall be tension tested.
   b. When expansion or adhesive anchors are used for other structural applications, all such anchors shall be tension tested.
      1) Expansion-type anchors shall not be used as hold-down bolts.
   c. When expansion or adhesive anchors are used for nonstructural applications such as equipment anchorage, 50 percent or alternate bolts in a group shall be tension tested, except that if the design load is less than 75 pounds, only one anchor in ten need be tested. See drawings for items weighing 75 pounds or less.
      1) The tension testing of the anchors shall be done in the presence of the Project Inspector and a report of the test results shall be submitted to the enforcement agency DSA/SSS.
2. When expansion anchors are used for ceiling hanger wires, 1 out of 10 must be field tested for 200 pounds of tension per IR 25-2.
   a. When expansion anchors are used for ceiling bracing wires, 1 out of 2 must be field tested for 440 pounds in tension.
   b. Test ceiling anchors with wires attached.
3. The proof load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, calibrated spring-loading devices, etc.
4. If any anchor fails testing, test all anchors of the same category not previously tested until twenty (20) consecutive pass, then resume the initial testing frequency.
   a. The cost of any additional testing as a result of failures shall be the responsibility of the Contractor at no additional cost to the Owner.
5. When a drilled-in adhesive anchor is used in lieu of a required cast-in-place bolt, cost of testing shall be the responsibility of the Contractor at no additional cost to the Owner.

B. Testing:
1. Expansion Anchors:
   a. Anchor diameter refers to the thread size for the WEDGE & SHELL categories, and to the anchor outside diameter for the SLEEVE category and Adhesive anchors.
   b. Apply proof test loads to WEDGE & SLEEVE anchors without removing the nut if possible. If not, remove nut & install a threaded coupler to the same tightness of the original nut using a torque wrench & apply load.
   c. For SLEEVE/SHELL internally threaded categories, verify that the anchor is not prevented from withdrawing by a baseplate or other fixtures. If restraint is found, loosen and shim or remove fixture(s) prior to testing.
   d. Reaction loads from test fixtures may be applied close to the anchor being tested, provided the anchor is not restrained from withdrawing by the fixture(s).
   e. SHELL type anchors shall be tested as follows:
      1) Visually inspect 25 percent for full expansion as evidenced by the location of the expansion plug in the anchor body.
         a) Plug location of a fully expanded anchor shall be as recommended by the manufacturer, or , in the absence of such compensation, as determined on the job site following the manufacturer's written installation instructions.

b) At least 5 percent of the anchors shall be proof loaded as indicated in the Test Values schedule on the drawings, but not less than three anchors per day for each different person or crew installing anchors. or;

c) Test installed anchors per ACI 318 "Building code Requirements for Structural Concrete and Commentary".

2. Adhesive Anchors:
   a. Adhesive anchors shall be tension tested. The tension test load shall equal twice the allowable load for the specific location of the anchor to be tested (i.e., accounting for edge distance) or 80 percent of the yield strength of the bolt (0.8AbFy), whichever is less.
      1) The test procedure for expansion-type anchors in the test values table shall also be used for the adhesive anchors.
   b. Where adhesive anchors are used as shear dowels across cold joints in slabs-on-grade and the slab is not part of the structural system, testing of those dowels is not required.
   c. Anchors shall exhibit no discernible movement during the tension test.
3. Test equipment (including torque wrenches) is to be calibrated by an approved testing laboratory in accordance with standard recognized procedures.
   a. Alternate torque test procedures and test values for SHELL type anchors may be submitted to the enforcement agency for review and approval on a case-by-case basis when test procedures are submitted and approved by the enforcement agency.
4. The following criteria apply for the acceptance of installed anchors:
   a. HYDRAULIC RAM METHOD: The anchor should have no observable movement at the applicable test load[. For wedge and sleeve type anchors, a practical way to determine observable movement is that the washer under the nut becomes loose].
   b. <u>TORQUE WRENCH METHOD:</u> The applicable test torque must be reached within the following limits:
      1) Wedge or Sleeve Type: One-half (1/2) turn of the nut.
         a) One-quarter (1/4) turn of the nut for the 3/8 inch sleeve anchor only.
      2) Torque testing of adhesive anchors is not permitted.
5. If the manufacturer's recommended installation torque is less than the test torque note in the table, the manufacturer's recommended installation torque shall be used in lieu of the tabulated values.
6. Testing should occur 24 hours minimum after installation of the subject anchors.
7. Required Maximum Test Values for Concrete, or Concrete Masonry Units in tension for the ranges and sizes of Drilled Anchors are shown on the drawings.

END OF SECTION

SECTION 032000 – REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all reinforcement material, labor, equipment and services necessary to completely install all reinforcing materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 11 01 CONCRETE FORMWORK
   4. 03 15 14 DRILLED ANCHORS
   5. 03 30 00 CAST-IN-PLACE CONCRETE
   6. 04 22 00 CONCRETE MASONRY UNITS
   7. 05 12 00 STEEL AND FABRICATIONS
   8. 31 20 00 EARTHWORK
   9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   10. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. The following References and Manufacturer's Standards shall apply to this Specification Section:
   1. ACI American Concrete Institute
   2. ASTM American Society for Testing and Materials
   3. AWS American Welding Society
   4. CRSI Concrete Reinforcing Steel Institute

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data:
      a. Manufacturer's specification and installation instructions for splice devices.
         1) Bar supports.
   2. Shop Drawings
      a. Detail in accordance with ACI 315 "Details and Detailing of Concrete Reinforcing".
      b. Indicate bending diagrams, assembly diagrams, splicing and laps of bars and shapes, dimensions and details of bar reinforcing and assemblies. Correctness of all reinforcing requirements and work is the responsibility of Contractor. Identify such shop drawings with reference thereon to sheet and detail numbers from Contract Drawings.
         1) Do not use scaled dimensions from Contract Drawings in determining the lengths of reinforcing bars.
         2) No reinforcing steel shall be fabricated without approved shop drawings.

3) One of the required submittal copies shall be reproducible transparency.
4) Any deviations from the contract documents must be clearly indicated as a deviation on the shop drawings.
5) Areas of high congestion, including member joints and embed locations shall be fully detailed to verify clearances and assembly parameters and coordination with other trades.

c. Certificates of Compliance with specified standards:
1) Reinforcing Bars.
2) Welded wire fabric.
3) Welding electrodes.

3. Samples
a. Only as requested by Architect.

4. Quality Assurance/Control Submittals:
a. Test Reports – Testing Laboratory shall submit to DSA/SSS, Project Inspector, Architect, Structural Engineer and the Contractor one (1) copy of each report showing results of test.
1) Certified mill test reports of supplied reinforcing indicating chemical and physical analysis. Tensile and bend tests shall be performed by the mill in accordance with ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Structural Concrete".
2) Testing Laboratory reinforcement tests in accordance with CBC Table 1705A.2.1, CBC Section 1910A, and the provisions of Specification Section – TESTING LABORATORY SERVICES.
3) Owner will pay for tests of samples taken from identified bundles accompanied by mill analysis.

b. Certificates of Compliance with specified standards:
1) Reinforcing bars.
2) Welded wire fabric.
3) Welding electrodes.
4) Welder's Certification.

5. Closeout Submittals:
a. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
b. Warranty.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
a. Installation shall be done only by an installation firm normally engaged in this business. All work shall be performed by qualified mechanics working under an experienced supervisor.

2. Welding Qualifications:
a. Welding procedures, welding operators and welders shall be qualified in accordance with AWS D1.4 – "Structural Welding Code Reinforcing Steel".
b. Welders shall be recently qualified by Test as prescribed in AWS "Standard Qualifications Procedure".
1) Welders whose work fails to pass inspection shall be re-qualified before performing further welding.

3. Manufacturer/Supplier Qualifications:
a. Acceptable Manufacturers/Suppliers shall be regularly engaged in the manufacture of steel bar and wire fabric reinforcing.

4. Testing Laboratory will be approved by DSA/SSS, and selected by the Architect and the Owner.

B. Regulatory Requirements:
1. In accordance with Specification Section – REGULATORY REQUIREMENTS and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.
2. General:
   a. Reinforcement work shall conform to ACI 301 "Specifications for Structural Concrete for Buildings", and CBC Section 1905A as minimum standards.

C. Mock-Ups:
1. Provide mock-up prior to application of work and prior to installation of any materials.
2. Mock Ups will be used for establishing construction sequence, installation requirements of materials, and and shall be representative of the intended end-use configuration.
3. Mock-Up Assemblies:
   a. Slab on Metal Deck: Mock-Ups shall be placement of reinforcement and shall integrate related work, including but not limited to, Specification Section - CAST-IN-PLACE CONCRETE and Specification Section - METAL DECK.
4. Installation:
   a. The Project Inspector, the Architect, Contractor’s Superintendent and Sub-contractor’s Superintendent shall observe the installation of materials and work.
   b. Installation crew for the Mock-Ups shall be the Reinforcement and Cast-In-Place Concrete installers for this project and installers, as necessary, of other related work assemblies.
   c. Unacceptable Mock Ups shall be removed and reinstalled until the work is deemed compliant with Project Requirements and quality of work is acceptable by Owner, Architect, and Inspector.
5. Protect the Mock-Ups during the course of construction.
6. Remove Mock-Ups and dispose of materials when no longer required and when directed by the Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Deliver reinforcement to Project plainly tagged, completely fabricated and ready to set.

B. Storage and protection:
1. Store reinforcement above the ground surface on platforms, skids or other supports, protected from dirt, rust, or other substances which will prevent bonding to the concrete.
2. Use all necessary care to maintain identification after bundles are taken apart.

1.6 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period: One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES.
   a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Deformed Bars: In accordance with ASTM A 706 "Low Alloy Steel Deformed Bars for Concrete Reinforcement" and ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement", Grade as indicated on the structural drawings.

B. Tie Wire: In accordance with ASTM A 82 "Cold Drawn Wire for Concrete Reinforcement", plain, cold-drawn steel.

C. Welded Wire Fabric: In accordance with ASTM A 185 "Welded Steel Wire Fabric for Concrete Reinforcement".

D. Steel Dowels: Same grade as bars to which dowels are connected.

2.2 ACCESSORIES

A. Supports for Reinforcement: Provide bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening, deformed bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.
1. Supports and spacing of spacers per standards set forth by CRSI/WCRSI Manual of Standard Practice.
2. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
3. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are protected by plastic [color to match adjacent concrete surfaces] in accordance with CRSI Class I, or stainless steel in accordance with CRSI, Class II.

B. Welding Electrodes: As per AWS D1.4 "Structural Welding Code for Reinforcing Steel".

C. Mechanical Couplers: Mechanical Couplers shall develop 125 percent of the specified yield strength of the bars, and shall comply with ACI 318 "Building Code Requirements for Structural Concrete and Commentary", Section 12.14.3.

2.3 FABRICATION

A. Bending: In accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary", except as modified by CBC Sections 1905A.
1. Fabricate reinforcement in accordance with the requirements of ACI 315 "Details and Detailing of Concrete Reinforcement", where specific details are not shown.
2. Inside diameter of bends for stirrups and ties shall not be less than 1-1/2 inches for No. 3 bars, 2 inches for No. 4 bars and 2-1/2 inches for No. 5 bars.

3. Where bent bars are straightened: field bending of bars will only be done in accordance with DSA/SSS approval per ACI 318 "Building Code Requirements for Structural Concrete and Commentary", Section 7.3.2. Steel reinforcement shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the drawings shall not be used. Heating of bars will not be permitted.
4. Provide offsets in rebar (1:6 maximum) where required to maintain clearances.

B. Column ties shall terminate with a minimum turn of 135 degrees plus an extension of at least 6 bar diameters but not less than 4 inches at the free end of bar.

C. Allowable Tolerances:
1. Fabrication:
   a. Sheared length: 1 inch.
   b. Depth of truss bars: Plus 0., minus 1/2 inch.
   c. Ties: Plus or minus 1/2 inch.
   d. All other bends: Plus or minus 1 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Placing:
1. Place Reinforcement accurately.
2. Do not move bars beyond allowable without concurrence of the Architect.
3. Do not heat, bend, or cut bars without concurrence of the Architect.
4. Reinforcement shall not be bent after being embedded in hardened concrete.
5. Tie Reinforcement together at all intersections with Tie Wire.
6. Support Reinforcing Bars by bar supports. Place and secure in accordance with CRSI "Specifications for Placing Bar Supports".
7. Placement and support shall be complete.
8. Do not use Reinforcing Bars with kinks or bends except when detailed on the structural drawings.
9. Architect shall approve placement and support before concrete is deposited.
10. Spiral reinforcing shall comply with ACI 318 "Building Code Requirements for Structural Concrete and Commentary".

B. Spacing:
1. Clear space between parallel Reinforcing Bars shall not be less than 1 bar diameter nor less than 1 inch, unless otherwise noted on drawings.

C. Splicing:
1. At splices, lap Reinforcing Bars 53 diameters minimum, unless otherwise indicated on Drawings.
   a. Lap Splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
   b. Splice Devices: Install in accordance with manufacturer's written instructions.
      1) Obtain the Architect's review before using.
   c. Do not splice bars except at locations shown without the concurrence of the Architect.
      1) Where splices in addition to those indicated are required, indicate location on shop drawings clearly and highlight "for the Architect's approval".
2. Stagger splices as indicated on drawings. Splice locations shall be as shown on drawings or shall be approved by Architect and DSA/SSS.

a. Near floors.
b. Ductile concrete columns must splice at the centerline of the column height.
c. As detailed on the drawings.

3. Where vertical Reinforcing Bars are offset at a splice, the slope of the inclined portion of bar with the axis of the column or wall shall not exceed 1 in 6.
4. Welded Wire Fabric:
   a. Install in long lengths, lapping 24 inches at end splices and one mesh at side splices.
   b. Offset laps in adjacent widths.
   c. Place fabric in approximately the middle of the slab thickness unless otherwise shown on the drawings.
   d. Wire tie lap joints at 12 inch centers.
   e. Use concrete blocks to support mesh in proper position.
5. Mechanical bar splices shall be approved by the Architect and DSA/SSS.

D. Welding:
1. Welding is not permitted unless specifically detailed on Drawings or approved by the Architect.
2. Weld under supervision of qualified Testing Laboratory selected by Owner. Cost of supervision to be paid by the Owner. Weld only ASTM A 706 "Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement", unless otherwise noted.
3. Employ shielding metal-arc method and meet requirements of AWS D1.4 "Structural Welding Code for Reinforcing Steel".
4. Welding is not permitted on bars where carbon equivalent is unknown or is determined to exceed 0.55.
5. Welding shall not be done within two bar diameters of any bent portion of a bar which has been bent cold.
6. Welding of crossing bars is not permitted.
7. Provide material properties supplemental report for bars other than ASTM A706 "Low Alloy Steel Deformed Bars for Concrete Reinforcement".
8. Weld in accordance with AWS D1.4 "Structural Welding Code for Reinforcing Steel".
   a. Weld only where indicated on the drawings.
   b. Employ shielding metal-arc method and meet requirements of AWS D1.4 "Structural Welding Code for Reinforcing Steel".
   c. Weld only ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement", unless otherwise approved by the Architect and DSA/SSS.
9. Inspection provided per CBC Table 1705A.3.

E. Allowable Tolerances:
1. Placement:
   a. Concrete cover to form surfaces: Plus or minus 1/4 inch.
   b. Minimum spacing between bars: Plus or minus 1/4 inch.
   c. Crosswise of members: Spaced evenly with 2 inches of stated separation.
   d. Lengthwise of members: Plus or minus 2 inches.
2. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 2 bar diameters.

F. Drawing Notes: Refer to notes on drawings for additional reinforcement requirements.

G. Mechanical, Electrical and Plumbing Drawings:
1. Refer to Mechanical, Electrical and Plumbing drawings for formed concrete requiring reinforcing steel.

2. All such steel shall be included under the work of this section.

3.2 CONSTRUCTION

A. Corrective Measures:
1. Notify Architect if conduit, piping, inserts, sleeves, etc. interfere with placement of Concrete Reinforcement as indicated on Drawings. Notify Architect immediately if any Concrete Reinforcement is found to be misplaced after concrete has been poured.
2. Do not cut, bend, kink or hickey misplaced reinforcement.
3. Make corrections only as directed by Architect and approved by DSA/SSS.
4. This Contractor shall bear the cost of any alteration, corrections or replacements of Concrete Reinforcing to concrete required because of misplaced reinforcement.

3.3 FIELD AND QUALITY CONTROL

A. Site Tests:
1. When inspections are indicated for reinforcement placement on the Structural drawings, a special inspector shall be employed to inspect reinforcing placement per CBC Table 1705A.3.
2. Inspect shop and field welding in accordance with AWS D1.4 "Structural Welding Code for Reinforcing Steel", including checking materials, equipment, procedure and welder qualifications as well as the welds. Inspector will use non-destructive testing or any other aid to visual inspection that he deems necessary to assure himself of the adequacy of the weld.

B. Inspections:
1. All reinforcing steel whose properties are not identifiable by mill test reports shall be tested in accordance with ASTM A 706 "Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement". One series of tests shall be performed for each missing report. Contractor shall pay for test required due to lack of positive identification, by means of a back charge by the Owner.
2. When tests are indicated for reinforcing steel on the structural drawings, the reinforcing steel used shall be tested in accordance with ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement". One tensile and one bend test for each 2-1/2 tons of steel or fraction thereof, shall be made.

C. Tests and Inspection shall be performed by Owner's Testing Laboratory except when needed to justify rejected work, in which case the cost of re-tests and re-inspection shall be borne by the Contractor.

3.4 CLEANING

A. Reinforcement, at time concrete is placed, shall be free of loose rust scale, mud, oil or other coating that will destroy or reduce the bond.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Cast-In-Place Concrete materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Footings.
      b. Foundation Walls.
      c. Slab on Grade.
      d. Slab on Metal Deck.
      e. Building Walls.
      f. Site Improvements.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 11 01 CONCRETE FORMWORK
   4. 03 15 14 DRILLED ANCHORS
   5. 03 20 00 REINFORCEMENT
   6. 03 39 01 MOISTURE EMISSION REDUCING CURING AGENT
   7. 03 35 00 POLISHED CONCRETE FINISHING
   8. 04 22 00 CONCRETE MASONRY UNITS
   9. 05 12 00 STEEL AND FABRICATIONS
   10. 05 30 00 METAL DECK
   11. 06 10 00 ROUGH CARPENTRY
   12. 06 22 00 MILLWORK
   13. 07 14 16 FLUID-APPLIED WATERPROOFING
   14. 07 18 50 VAPOR-ALKALINITY CONTROL
   15. 07 40 00 METAL PANELS
   16. 07 84 00 FIRESTOPPING
   17. 07 92 00 SEALANTS
   18. 08 41 00 STOREFRONTS
   19. 08 41 23 STOREFRONT TEMPERATURE RISE
   20. 09 22 16 METAL FRAMING
   21. 09 30 00 TILE
   22. 09 64 66 RESILIENT WOOD FLOOR
   23. 09 65 10 RESILIENT BASE AND ACCESSORIES
   24. 09 65 16 RESILIENT SHEET
   25. 09 65 19 RESILIENT TILE
   26. 09 67 23 RESINOUS FLOORING
   27. 09 68 40 CARPET
   28. 10 05 00 MISCELLANEOUS SPECIALTIES
   29. 10 14 00 IDENTIFYING DEVICES
   30. 10 14 53 ROAD AND PARKING SIGNAGE
   31. 10 21 13 TOILET PARTITIONS
   32. 10 51 13 METAL LOCKERS
   33. 10 56 26 MOBILE STORAGE UNITS
   34. 11 66 00 ATHLETIC EQUIPMENT

35. 11 66 43 SCOREBOARDS
36. 12 66 13 TELESCOPING BLEACHERS
37. 12 93 13 BICYCLE RACKS
38. 14 24 23 HYDRAULIC ELEVATORS
39. 31 20 00 EARTHWORK
40. 31 31 00 SOIL TREATMENT
41. 32 12 00 PAVEMENT
42. 32 19 19 ORNAMENTAL METAL
43. 32 31 13 CHAIN LINK
44. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
45. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
1. In accordance with the following standards:
   a. ACI American Concrete Institute
   b. ASTM American Society of Testing Materials.
   c. RFCI The Resilient Floor Covering Institute
   d. RIS Redwood Inspection Service
   e. RMAI Rubber Manufacturers Association Inc.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:
1. Make ready all interior concrete substrates to receive flooring:
   a. Ensure the proper levelness and flatness of all concrete substrates for the intended flooring products.
      1) If leveling materials are required because of inadequate leveling during the pour and curing periods, follow all manufacturers written instructions for the proper preparation and application of these products.
      2) Verify that the concrete substrates are at the right RH (Relative Humidity) and Alkalinity Levels for the leveling materials in accordance with manufacturers written instructions.
   b. Keep finished concrete substrates clean and ready for scheduled flooring applications during the construction process.
      1) Protect those substrates from excessive moisture build-up, and keep free of moisture puddles.
      2) Ensure that construction equipment does not leak fluids on substrates that would prevent bonding of flooring adhesives at the proper time for flooring installations.
   c. Provide concrete substrates that are within acceptable limits of RH and that the Alkalinity of the concrete substrates are within the acceptable levels for adhesively applied flooring at the scheduled time for flooring installations.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Coordination Drawings:
   a. Layout drawings for construction, control and expansion joints.

1) Coordinate joints with floor patterns.

2. Product Data.
   a. Submit data on all products listed under MATERIALS, and ACCESSORIES within this specification section.
3. Quality Assurance/Control Submittals:
   a. Coordinate with Specification Section - TESTING LABORATORY SERVICES for additional Testing Requirements as required by DSA.
   b. Material samples and mix designs:
      1) Material samples and mix designs as required for testing shall be submitted to Architect at least fourteen (14) days prior to any concrete work and shall include results of test data used to establish proportions.
         a) Grout samples and colors for colored surfaces upon Architect's request only.
   c. Continuous batch plant inspection required per CBC Section 1705A.3.3, or may be waived per CBC Section 1705A.3.3.2.
   d. Provide periodic batch plant inspection, per CBC Section 1705A.3.3.1.
      1) Comply with ASTM C94, Sections 9 and 10.
      2) Provide batch tickets that include material quantities and weights.
      3) Concrete loads shall not be placed without the batch plant ticket.
      4) Provide the batch plant ticket to the Project Inspector.
   e. Test Reports:
      1) Testing Laboratory shall submit to Architect, Structural Engineer, Owner, and to the DSA one (1) copy of each report showing results of tests.
         a) Report shall state that tests were made in accordance with specifications.
         b) Report shall state whether materials were in conformance with specifications.
         c) Report shall state whether the curing of the concrete slabs are within parameters required for future flooring installations.
      2) Moisture and Alkalinity Tests.
         a) Relative Humidity (RH).
         b) Moisture Vapor Emission Report (MVER).
   f. Certificates:
      1) Submit three (3) copies of certificates.
         a) Provide Vapor Retarder manufacturer's certificate of inspection and compliance to installation procedures.
         b) Cement manufacturer's Mill Certificate of Compliance with the specification.
         c) Certificates for aggregates and admixtures.
4. Closeout Submittals:
   a. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
   b. Warranty.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   2. Manufacturer/Supplier Qualifications:

a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the Work.

3. Testing Laboratory Qualifications:
   a. Qualified Testing Laboratory and personnel approved by DSA.
      1) Cost of testing and inspection will be paid by the Owner unless otherwise specified. The Owner shall pay all costs of re-inspection and/or re-tests due to non-compliance with specifications and/or failures, but the Contractor shall reimburse the Owner for these tests when billed or deducted from its payment.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. All materials, equipment and placing operations shall be subject to inspection, tests and approval at all items. Testing Agent shall have free and unhampered access to all places where concrete materials are stored proportioned and mixed.
      b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Mockups:
   1. Provide mockups prior to application of work and prior to installation of any materials.
   2. Mockups shall be used for establishing construction sequences, installation requirements of materials, and shall be representative for the intended end-use configuration.
   3. Mockup Assemblies:
      a. Slab on Metal Deck Mockups shall be placement of concrete and shall integrate all other related work, including, but not limited to, Specification Section - REINFORCEMENT.
         1) Mockups shall be a minimum overall size of 10'-0" x 8'-0" by thickness required.
         2) Placement of concrete shall not displace the reinforcing as to proper height with chairs, tying of reinforcement, and location of reinforcement with relationship to Metal Deck Flutes.
      b. Polished Concrete Finishing: Mockups shall be the placement of concrete and shall integrate all other related work, but not limited to, Specification Section - POLISHED CONCRETE FINISHING.
      c. Slab-On-Grade: Mockups shall be the finish and texture of concrete.
         1) Mockups shall be a minimum overall size of 3' x 3' x 4" thick panels.
         2) Provide Mockups for each texture and finish required.
   4. Installation of Mockups:
      a. The Project Inspector, the Architect, and Contractor's Superintendent shall observe the installation of materials and work.
      b. Installation crew for the Mockups shall be the Cast-In-Place Concrete, Reinforcement and Polished Concrete Finishing installers for this project and installers, as necessary, of other related work.
      c. Unacceptable Mockups shall be removed and reinstalled until the work is deemed to be in compliance with the project requirements and is acceptable by the Owner, Architect and Project Inspector.
   5. Allow 24 hours for inspection of mockup before proceeding with work.
   6. Protect the Mockups during the course of construction.
   7. Remove mockup and dispose of materials when no longer required and when directed by the Architect at the end of the project.

D. Meetings:
1. Preinstallation Conference: Conduct conference at Project site.
   a. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
      1) Contractor's superintendent.
      2) Independent testing agency responsible for concrete design mixtures.
      3) Ready-mix concrete manufacturer.
      4) Vapor retarder manufacturer.
      5) Curing products manufacturer.
      6) Concrete Subcontractor.
      7) Polished concrete finish Subcontractor.
   b. Review the following:
      1) Special inspection and testing and inspecting agency procedures for field quality control.
      2) Construction joints, control joints, isolation joints, and joint-filler strips.
      3) Semirigid joint fillers.
      4) Vapor-retarder installation.
      5) Anchor rod and anchorage device installation tolerances.
      6) Cold and hot weather concreting procedures.
      7) Concrete finishes and finishing.
      8) Curing procedures.
      9) Forms and form-removal limitations.
      10) Shoring and reshoring procedures.
      11) Methods for achieving specified floor and slab flatness and levelness.
      12) Floor and slab flatness and levelness measurements.
      13) Concrete repair procedures.
      14) Concrete protection.
      15) Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
      16) Protection of field cured field test cylinders.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
      1) Schedule installation review at the start of installation with the Vapor Retarder Manufacturer to ensure all of the manufacturers written instructions are complied with.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
      1) Prior to covering up the Vapor Retarder installation with concrete, have the Vapor Retarder manufacturer inspect and provide a certified report to the Architect the condition of the Vapor Retarder prior to being covered with concrete, and that the installation was in full compliance with the manufacturer's written instructions.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 PROJECT CONDITIONS

A. Environmental requirements:
1. Cold Weather Requirements:

a. Do not pour concrete unless air temperature is at least 40 degrees Fahrenheit and rising.
b. Do not pour concrete on frozen ground or ice.
c. Heat and otherwise prepare materials in accordance with ACI Standard 306.
d. Maintain concrete temperature at 50 degrees Fahrenheit (minimum) the first three (3) days after pouring. Protect concrete from freezing the first six (6) six days, after placing.

2. Hot Weather Requirements:
   a. Do not pour when temperature exceeds 90 degrees Fahrenheit.
   b. During hot weather, proper attention shall be given to ingredients, production methods, handling, placing, protection, and curing to prevent excessive Concrete temperatures or water evaporation, which will impair the required strength or serviceability of the member or structure.

1.7 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period: One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES
      a. Warranty period: One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Cement:
      a. Natural (Grey) Portland Cement:
         1) LEHIGH PORTLAND CEMENT COMPANY.
         2) MARTIN MARIETTA (TXI CEMENT COMPANY).
      b. White Cement:
         1) LEHIGH WHITE CEMENT
         2) MARTIN MARIETTA (TXI CEMENT COMPANY).
   2. Admixtures:
      a. Water Reducing, High Range:
         1) W.R. GRACE CONSTRUCTION PRODUCTS.
      b. Shrinkage Control:
         1) Specified product manufacturer: SIKA CONTROL-40.
         2) Acceptable alternative product manufacturer:

a) EUCLID: "Eurcon SRA Floor".

c. Integral Concrete Waterproofing:

1) Specified product manufacturer: XYPEX.

a) ADMIX C-500.

3. Vapor Retarders:

a. Specified product manufacturer: STEGO INDUSTRIES.

1) "Stego-Wrap" ("Yellow" color).

b. Acceptable alternative product manufacturers:

1) EPRO SERVICES, INC.: "Ecoshield-E15" ("Red" color).

2) INSULATION SOLUTIONS, INC. "Viper Vaporcheck II" ("Blue" color).

3) W.R. MEADOWS: "Perminator 15" ("Green" color).

4. Bonding Agents:

a. Specified product manufacturer: CONRAD SOVIG CO., INC.

1) "Cemlok-NE".

b. Acceptable alternative product manufacturers:

1) THE EUCLID CHEMICAL COMPANY: "Eucoweld".

2) LARSON PRODUCTS CORPORATION: "Weld-Crete".

3) SONNEBORN: "Sonobond".

4) W.R. GRACE CONSTRUCTION PRODUCTS: "Darweld C".

5) W.R. MEADOWS: "Deck-O-Weld".

5. Epoxy Adhesives and Mortar Materials:

a. Specified product manufacturer: W.R. MEADOWS.

1) "Rezi-Weld," "LV, 1000" or "Gel-Paste" as suitable for application.

b. Acceptable alternative product manufacturers:

1) THE EUCLID CHEMICAL COMPANY: "Euco #456".

6. Epoxy Concrete Mortar:

a. Specified product manufacturer:

1) GENERAL POLYMER CORPORATION: "TPM 115".

b. Acceptable alternative product manufacturers:

1) ANTI-HYDRO CORPORATION: "A-H Emery Epoxy Topping #170".

7. Concrete Mortar:

a. Specified product manufacturer:

1) THE EUCLID CHEMICAL COMPANY: "Tammspatch II".

b. Acceptable alternative product manufacturers:

1) MASTER BUILDERS: "Embeco 411-A".

8. Non-Shrink Grout:

a. Specified product manufacturer:

1) MINWAX CONSTRUCTION PRODUCTS COMPANY

a) "POR-ROK", Epoxy Grout.

b. Acceptable alternative product manufacturers:

1) MASTER BUILDERS: "713".

2) MASTER BUILDERS: "928".

9. Drypack Grout Materials:

a. Specified product manufacturer:

1) THE EUCLID CHEMICAL COMPANY: "Euco Dry Pack Grout".

b. Acceptable alternative product manufacturers:

1) W.R. MEADOWS: "Pac-It Grout".

10. Waterstops:

a. Specified product manufacturer:

1) GREENSTREAK PLASTIC PRODUCTS COMPANY.

a) Polyvinyl Chloride Type.

11. Fiber Expansion Joint Filler:
    a. Specified product manufacturer:
        1) W.R. MEADOWS: "Sealtight Fiber Expansion Joint Filler".
    b. Acceptable alternative product manufacturer:
        1) CELOTEX CORP.: "Flexcell".
        2) PHILLIP CAREY MFG. CO.: "Elastic Fiber Expansion Joint".
12. Semi-Rigid Joint Filler:
    a. Specified product manufacturer:
        1) W.R. MEADOWS: "Rezi-Weld Flex".
13. Polished Concrete Joint Filler:
    a. Specified product manufacturer: EUCLID "Euco 700".
14. Stair Nosings:
    a. Specified product manufacturer:
        1) WOOSTER PRODUCTS INC.:
            a) Straight Nosings: "SUPERGRIT TYPE 231BF".
15. Pre-Cast:
    a. Bench:
        1) Specified product manufacturer:
            a) QUIKRETE PRODUCTS CORPORATION: Model "Contemporary Modern - #Q2MD60B".
16. Curing Paper:
    a. Specified product manufacturer:
        1) FORTIFIBER CORPORATION: "Orange Label Sisalkraft".
17. Slab Curing Compound (SCC):
    a. Specified product manufacturer:
        1) THE EUCLID CHEMICAL COMPANY: "Cure-Crete WB".
    b. Acceptable alternative product manufacturers:
        1) W.R. MEADOWS: "Sealtight 1100 CLEAR".
18. Clear Floor Sealer (CFS):
    a. Specified product manufacturer:
        1) THE EUCLID CHEMICAL COMPANY: "Diamond Clear VOX".
    b. Acceptable alternative product manufacturers:
        1) W.R. MEADOWS: "Sealtight VOComp 25".
19. Clear Floor Hardener CFH):
    a. Specified product manufacturer:
        1) L.M. SCHOFIELD COMPANY: "Emerchrome Clear Floor Hardener".
20. Cementitious Based Underlayment Compound (CBUC):
    a. Specified product manufacturer:
        1) ARDEX: "V-1200".
    b. Acceptable alternative product manufacturers:
        1) MAPEI: "Ultraflex".
        2) QUIKRETE PRODUCTS CORP.: "QUIKRETE No. 1249".
21. Truncated Domes:
    a. Specified Cast-In-Place Replaceable Truncated Dome Mat product manufacturer:
        1) ADA SOLUTIONS, INC.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Concrete:

1. Cement: Type II or IV in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary", Chapter 3, and ASTM C 150 "Specifications for Portland Cement".
    a. Provide white cement for mixing when the Project requires patching for defective work, to match adjacent material color. See Specification Section - CAST-IN-PLACE CONCRETE, Part 3 Article titled "APPLICATIONS", the paragraph titled "Sack Finish".
2. Water: Clean and free from deleterious amounts of acids, alkalis, salts, organic material, or other substances that may be deleterious to concrete or reinforcing.
3. Aggregates:
    a. Normal weight aggregates in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary", Chapter 3 and ASTM C33 "Standard Specifications for Concrete Aggregates". Crushed Granite or "Perkins" type aggregates are acceptable materials.
        1) Maximum Aggregate Size: 1-1/2 inches for standard aggregate.
        2) Coarse aggregate when tested in accordance with State of California Highways Test Methods 227 shall have a cleanliness value of 75 minimum.
        3) Fine aggregates when tested in accordance with State of California Highways Test Methods 217 shall have a sand equivalent of 75 minimum.
4. Admixtures: Admixtures shall be in accordance with the provisions of ACI 318 "Building Code Requirements for Structural Concrete and Commentary", Section 3.6, and shall not be used until prior approval from DSA has been obtained. Calcium Chloride is not permitted.
    a. Air Entraining:
        1) Conform to ASTM C 260 "Specifications for Air-Entraining Admixtures for Concrete".
    b. Fly Ash (Not to exceed 15 percent of the total cementitious material per DSA:
        1) Conform to ASTM C 618 "Specification for Coal Fly Ash and Raw or Calcined Natural Possolan for Use in Concrete".
        2) Class "C" Fly Ash is not permitted per CBC 1903A.6.
    c. Water Reducing, High Range: On approval of DSA , the Architect and the Structural Engineer, the Contractor may use a High Range Water Reducing Admixture complying with ASTM C 494 "Specification for Chemical Admixtures for Concrete". Use one of the following materials:
        1) Finish Enhancing Water Reducer; "ADVA 170" by GRACE Construction Products, or approved equivalent.
            a) ASTM C 494 "Specification for Chemical Admixtures for Concrete", Type F.
    d. Shrinkage Control:
        1) Conform to ASTM C 494 "Specification for Chemical Admixtures for Concrete", Type S.
        2) Verify and provide Shrinkage control compatible with Polished Concrete Finishing.

B. Rock Base:
1. Clean mixture of crushed stone or uncrushed gravel, in accordance with ASTM D 448 "Standard Classification for Sizes of Aggregate for Road and Bridge Construction".
    a. Top Layer:
        1) Percent passing a 1-inch sieve: 100 percent.
        2) Percent passing No. 8 sieve: 0 to 5 percent.
    b. Bottom Layer:
        1) Percent passing a 2-inch sieve: 100 percent.
        2) Percent passing No. 8 sieve: 0 to 5 percent.

C. Sand Base:
1. Sand to be washed and of natural siliceous or igneous origin, having hard, strong, and durable particles.
2. Sand shall comply with ASTM C 33 "Specification for Concrete Aggregates", generally as follows:
   a. Percent passing 3/8 inch sieve: 100 percent.
   b. Percent passing No. 4 sieve: 95 to 100percent.
   c. Percent passing No. 50 sieve: 10 to 30 percent.
   d. Percent passing No. 100 sieve: 2 to 10 percent.

D. Vapor Retarder:
1. Vapor Retarder: Physical Requirements in accordance with ASTM E 1745 "Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs", Class A Material, are as follows:
   a. Thickness: 15 mils minimum.
   b. Permeance: 0.012 Perms.
      1) Maintain permeance of less than 0.01 perms after mandatory conditioning tests per ASTM E 154 "Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover", Sections 8, 11, 12, and 13.
   c. Tensile Strength: 45.0 lbf/in.
      1) Per ASTM E 154 "Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover", Sec. 9, ASTM D 828 "Standard Test Method for Tensile Properties of Paper and Paperboard Using Constant-Rate-of-Elongation Apparatus":
   d. Resistance to Puncture: 2200 grams.
      1) ASTM E 154 "Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover", Sec. 10, ASTM D 1709 "Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method":
   e. Resistance to decay:
      1) Per ASTM E 154 "Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover".
   f. Use pressure sensitive seam tape compatible with materials to be seamed in accordance with manufacturer's written recommendations.
      1) Water vapor Transmission Rate: 0.3 perms or lower.
         a) Per ASTM E 96 "Test Methods for Water Transmission of Materials".
   g. Vapor Proof Mastic: 0.3 perms or lower.
      1) Water vapor Transmission Rate: 0.3 perms or lower.
         a) Per ASTM E 96 "Test Methods for Water Transmission of Materials".
   h. Pipe Boots: Construct pipe boots from vapor retarder material, pressure sensitive seam tape, and /or mastic per manufacturer's written instructions.
   i. Vapor Stakes:
      1) Density: 0.0289 lb/cu.in.
         a) Per ASTM D 1505 "Test Method for Density of Plastics by the Density-Gradient Technique".
      2) Specific Gravity: 0.0477.
         a) Per ASTM D 792 "Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement".

2.3 ACCESSORIES

A. Bonding Agents: Polyvinyl acetate or acrylic base, mixed in accordance with the manufacturer's written recommendations.

B. Mortar:
1. Site Mix:
a. Composed of Concrete Materials indicated in Specification Section - CAST-IN-PLACE CONCRETE, Part 2 Article titled "MATERIALS".
1) Mix: One part cement to 3 parts aggregate (all aggregate shall pass No. 4 sieve).
2) Mixing: Thoroughly mixed in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary".
2. Concrete Mortar:
a. Greater than 1/4 inch thick: Floor leveling, patching and repair, non-shrink trowel applied concrete mortar where repair areas of fill.
3. Epoxy Concrete Mortar:
a. Less than 1/4 inch thick: Floor leveling, non-shrink trowel applied epoxy concrete mortar where repair areas to fill.
4. Epoxy Mortar and Adhesive Materials:
a. Modified Polyamide, high modulus mortar, strength to match adjacent concrete or greater, in accordance with ASTM C 881 "Specification for Epoxy-Resin-Base Bonding Systems for Concrete", Grade 1, Type III, Class B & C, and in accordance with ACI 503.4, mixed in accordance with the manufacturer's written recommendations.

C. Grout:
1. Strength to match adjacent concrete or greater, composed of Concrete Materials indicated in Specification Section - CAST-IN-PLACE CONCRETE, Part 2 Article titled "MATERIALS".
a. Mix: Same proportions as concrete mix except omit coarse aggregate and adjust water to produce a thick consistency. Provide mix design per CBC Section 1904A.2.
b. Mixing: In accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary", mixed in accordance with the manufacturer's written recommendation.
2. Non-Shrink Grout: Flowable, non-shrink, self-leveling, non-staining, non-metallic grout, strength to match adjacent concrete or greater, and in compliance with ASTM C 1107 "Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)", mixed in accordance with the manufacturer's written recommendation.
3. Drypack Grout: Non-staining, non-shrink, non-metallic grout, strength to match adjacent concrete or greater, and in accordance with ASTM C 1107 "Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)", mixed in accordance with the manufacturer's written recommendation.

D. Waterstops: Provide polyvinyl chloride type waterstops, model number and size to fit the construction required, in accordance with the Corps of Engineers standard CRD-C 572.

E. Fiber Expansion Joint Filler: 1/4" thick at vertical joints and 1/2" thick under thresholds (unless specifically noted otherwise), asphalt saturated fiber expansion joint filler, in accordance with ASTM D 1751 "Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)".

F. Semi-Rigid Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240 “Standard Test Method for Rubber Property – Durometer Hardness”.

G. Polished Concrete Joint Filler: A two-component, 100% solids semi-rigid epoxy for filling control and construction joints in industrial concrete floors. This product supports the joint edges and reduces spalling of the edges caused by wheel traffic. EUCO 700 has been designed for use in compliance with ACI 302 recommendations for epoxy joint fillers used in control and construction joints.

H. Stair Nosings:
1. Straight nosings with integral anchors and temporary protective tape.
   a. 3" wide x 1/4" thick x 1/4" nose at underside x length as required.
   b. Suitable for poured concrete and steel pan-concrete filled treads.
      1) For poured concrete, install full step length less approximate 3" clearance.
      2) For steel pan-concrete filled, install full step length (stringer to stringer) less 1/8" clearance.
   c. Color of grit strips shall be selected by the Architect from the manufacturer's standard range.
   d. Nosings shall be installed before "Initial Set" of the concrete or cement occurs.
   e. Puddle the concrete, tamp the nosings to insure proper concrete formation around the anchors.
   f. Remove the protective tape as soon as practical.

I. Pre-Cast Concrete:
1. Bench:
   a. QUIKRETE PRODUCTS CORP., or approved equivalent.
   b. Model #: Contemporary "Modern", #Q2MD60B.
      1) 60 inch x 30 inch x 15 inch.
   c. Material: SRC.
   d. Color / Finish: Natural.
   e. Texture: Smooth.
   f. Sealer: MT (Matte Finish).
   g. Anchor Bolt: See architectural details.

J. Curing Paper (Absorptive Covers): Products complying with:
1. ASTM C 171 "Specification for Sheet materials for Curing Concrete".

K. Slab Curing Compound (SCC): Provide liquid-type membrane-forming sealing compound, non-yellowing, VOC compliant cure and seal, complying with ASTM C 309 "Specification for Liquid Membrane-Forming Compounds for Curing Concrete", Type I, Class A, that when dry is clear in color. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq.ft./gal.

L. Clear Floor Sealer (CFS): Provide liquid-type membrane-forming sealing compound, non-yellowing, VOC compliant cure and seal, complying with ASTM C 309 "Specification for Liquid Membrane-Forming Compounds for Curing Concrete", Type I, Class A, that when dry is clear in color. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq.ft./gal.

M. Clear Floor Hardener (CFH): Provide products that are ready-to-use, dry-shake type, VOC compliant clear hardeners, with surface conditioning and dispersing agents, portland cement blended with hard, graded aggregate, mixed in accordance with the manufacturer's written recommendations.

N. Sack Finish Materials: For repair and patching of defective areas.

1. Provide sack finish materials composed of Concrete Materials indicated in Specification Section - CAST-IN-PLACE CONCRETE, Part 2 Article titled "MATERIALS". Sand shall be fine.
2. Mix: One part cement to one part fine sand with enough water to provide a creamy consistency.

O. Cementitious Based Underlayment Compounds (CBUC): Provide free-flowing, self-leveling, pumpable, cement based compound for applications from 1-1/4 inch thick to feathered edges, 4500 psi minimum in accordance with ASTM C 109 "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. (or 50-mm) Cube Specimens").

P. Truncated Domes:
1. General:
   a. Forms and mats shall be in accordance with ADA Standards for Accessible Design, Section 4.29.2, CBC Sections 11B-705, California Government Code Section 4451(d), and IR 11B-4.
2. Cast-In-Place Replaceable Mat:
   a. Provide and install cast-in-place mat of homogeneous glass and carbon reinforced composite material.
      1) Provide Integral Uniform Color throughout product, Yellow, approximate 33538 of SAE AMS-STD-595A.
      2) Material Physical Characteristics:
         a) Compressive Strength: greater than 28,000 psi per ASTM D 695.
         b) Tensile Strength: greater than 11,000 psi per ASTM D 638.
         c) Water Absorption: less than 0.10 percent per ASTM D 570.
         d) Slip Resistance: less than 1.00 Wet/Dry Static per ASTM C 1028.
         e) Flame Spread Index: less than 25 per ASTM E 84.
      3) Dimensions: Statistics of Truncated Domes per CBC 11B-705.1:
         a) Base Diameter of Dome: 0.90 to 0.92 of an inch.
         b) Top Diameter of the Dome: 0.45 to 0.47 of an inch.
         c) Height of the Dome: 0.2 of an inch.
         d) Center to Center Spacing of Domes in-line pattern: 2.3 to 2.4 inches.
         e) All edges of panel shall have a square edge.
         f) Size of Mats: As required per the drawings.

2.4 MIXES

A. Mix Design and Proportions in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary":
1. Initial mix design shall be prepared for all concrete by recognizing testing laboratory (approved by Architect). In the event that additional mix designs are required due to depletion of aggregate sources, aggregate not conforming to Specifications, or at request of Contractor, these mixes shall be prepared as above.
2. Contractor shall notify the Testing Laboratory and Architect of intent to use concrete pumps to place concrete so that mix designs can be modified accordingly.
3. Mix designs with Fly Ash content greater than 15 percent of the total weight of cementitious materials shall be proportioned by ACI 318 "Building Code Requirements for Structural Concrete and Commentary".
   a. Provide 3 percent air entrainment typical, 6 percent for mixes with f'c greater than 4,000 psi when required.

4. Owner's testing laboratory shall review all mix design before submittal.
5. All concrete shall have the following minimum compressive strengths in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary" at 28 days and shall be proportioned within the following limits:
   a. Foundations, Elevator Pits, Tie Beams: Use for unexposed foundation concrete except as otherwise specified:
      1) Strength: 3,500 psi at 28 days.
      2) Max. Aggregate Size: 1-1/2 inch.
      3) Max. Water/Cement Ratio: 0.58.
      4) Admixture: Water Reducing.
      5) Weight: 145 pcf.
   b. Building Slab On Grade: Use for interior building slab on grade, except as otherwise specified:
      1) Strength: 4,000 psi at 28 days.
      2) Max. Aggregate Size: 1 inch.
      3) Max. Water/Cement Ratio: 0.45.
      4) Admixture: Water Reducing + Fly Ash.
         a) Plus Shrinkage Content: 0.03 percent Laboratory Tests, 0.035 percent Field Tests at 28 days.
      5) Weight: 145 pcf.
   c. Standard Weight: Use for standard weight concrete over metal deck and roof platforms:
      1) Strength: 4,000 psi at 28 days.
      2) Max. Aggregate Size: 3/4 inch.
      3) Max. Water/Cement Ratio: 0.52.
      4) Admixture: Water Reducing + Fly Ash.
      5) Weight: 145 pcf.
   d. Site: Use for exterior concrete slabs on grade such as walks, site work, mechanical and electrical pads and miscellaneous site items:
      1) Strength: 3,000 psi at 28 days.
      2) Max. Aggregate Size: 1 inch.
      3) Max. Water/Cement Ratio: 0.60.
      4) Admixture: Water Reducing.
      5) Weight: 145 pcf.
   e. Lean mix: Used for Back Fill of over excavated trenches, encasement of all penetrations, plumbing pipe, mechanical pipe under footings (plumbing & mechanical pipes and electrical conduits):
      1) Strength: 1,500 psi at 28 days.
      2) Max. Aggregate Size: 3/8 inch.
      3) Max. Water/Cement Ratio: 0.62.
      4) Admixture: None.
      5) Weight: 145 pcf.

B. Consistency of Concrete: Concrete slump, measured in accordance with ASTM C 143 "Test method for Slump of Hydraulic-Cement Concrete", shall fall within the following limits:
   1. For General concrete placement: 3 inch plus or minus 1 inch.
      a. Polished Concrete Mix: 5" maximum.
   2. Mixes employing the specified high range water reducer shall provide a measured slump not to exceed 7 inch +/- 1 inch after dosing, 2 inch +/- 1 inch before dosing.
      a. Polished Concrete Mix: 6" maximum if using water reducing admixture in lieu of water.
   3. Concrete slump shall be taken at point of placement. Use water reducing admixtures as required, to provide a workable consistency for pump mixers. Water shall not be added in route by truck or at the jobsite without written review by the Architect.

C. Mixing:
1. Equipment: All concrete shall be machine mixed. Provide adequate equipment and facilities for accurate measurement and control of materials.
2. Method of Mixing to comply with ACI 318 "Building Code Requirements for Structural Concrete and Commentary":
   a. Transit Mixing: Comply with ASTM C 94 "Specification for Ready-Mixed Concrete". Ready mixed concrete shall be used throughout, except as specified below.
      1) On-Site Mixing: Use only if method of storing material, mixing of material and type of mixing equipment is approved by Architect.
      2) Approval of site mixing does not relieve Contractor of any other requirements of Specifications.
3. Mixing Time: After mix water has been added, concrete shall be mixed not less than 1-1/2 minutes nor more than 1-1/2 hours. Concrete shall be rejected if not deposited within the time specified.
4. Admixtures:
   a. Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.
   b. Water Reducers may be used in concrete slabs on grade identified with a Polished Concrete Finish - coordinate with Specification Section - POLISHED CONCRETE FINISHING.
   c. Admixtures shall be charged into mixer as a solution and shall be dispensed by an automatic dispenser or similar metering device. Powdered admixtures shall be weighed or measured by volume as recommended by manufacturer. Accuracy of measurement of any admixture shall be within plus or minus 3 percent.
   d. Two or more admixtures may be used in same concrete, provided such admixtures are added separately during batching sequence, and provided further that admixtures used in that combination retain full efficiency and have no deleterious effect on concrete or on properties of each other.
   e. All admixtures are to be approved by Architect prior to commencing this work.
5. Re-tempering:
   a. Concrete shall be mixed only in quantities for immediate use. Concrete, which has set shall be discarded, not re-tempered.
   b. Indiscriminate addition of water to increase slump is prohibited.
   c. When concrete arrives at project with slump below what is suitable for placing, water may be added only if neither maximum permissible water-cement ratio nor maximum slump is exceeded.
      1) Water shall be incorporated by additional mixing equal to at least half of total mixing time required.
      2) Any addition of water above that permitted by limitation of water-cement ratio shall be accompanied by a quantity of cement sufficient to maintain proper water-cement ratio.
      3) Such additions shall only be used if approved by the Architect.
      4) In any event, with or without addition of cement, not more than 2 gallons of water per cubic yard of concrete, over that specified in the design mix, shall be added.
6. Cold Weather Batching: When temperature is below 40 degrees F, or is likely to fall below 40 degrees F during a 24 hour period after placing, provide adequate equipment for heating concrete materials.
   a. No frozen materials or materials containing ice shall be used.
   b. Temperatures of separate materials, including mixing water, when placed in mixer shall not exceed 100 degrees F.

c. When placed in forms, concrete shall have a temperature between 50 degrees F and 85 degrees F.

7. Hot Weather Batching: Concrete deposited in hot weather shall have a placing temperature below 85 degrees F. If necessary, ingredients shall be cooled to accomplish this.

2.5 FINISHES

A. Slab Finishes:

1. Tooled Finishes:
   a. Scratch Finish: Apply scratch finish to slab surfaces to receive concrete floor topping or mortar setting beds for tile, and other bonded applied cementitous finish flooring material.
   b. Float Finish: Apply float finish to slab surfaces to receive trowel finish and other finishes as specified; membranes, elastic waterproofing, elastic roofing, or sand-bed terrazzo.
   c. Trowel Finish: Apply a non-slip trowel finish to surfaces to be covered with resilient flooring, thin-set ceramic or quarry tile, paint or another thin film-finish coating system
   d. Sweat Trowel Finish: Apply a non-slip steel trowel ("sweat") finish (tight circular motion pattern approved by the Architect) to slab surfaces exposed to view.
      1) All exterior concrete paving and concrete finishes, at exterior concrete platforms, steps, ramps, walks, and other areas requiring non-slip finishes, unless otherwise indicated, shall have a non-slip finish (as defined by PCA - Portland Cement Association "Design and Control of Concrete Admixtures") applied in the following manner:
         a) Medium Finish: On all surfaces having a pitch of less than 5 percent, Equivalent to a "Medium Finish" term, with at least a 1/16" reveal.
         b) Rough Finish: On all surfaces having a pitch greater than 5 percent, Equivalent to a "Heavy Finish" term, with at least a 1/8" reveal.
   e. Broom Finish: All concrete paving and concrete finishes, and exterior concrete platforms, steps, ramps and other areas requiring non-slip finishes, unless otherwise indicated, shall have a non-slip broom finish (as defined by PCA - Portland Cement Association "Design and Control of Concrete Mixtures") applied in the following manner:
      1) Medium Broom Finish.
         a) 1/16" reveal.
      2) Rough Broom Finish.
         a) 1/8" reveal.
   f. Sandblast Finish:
      1) "Light Sandblast Finish": 1/16 inch reveal.
      2) "Medium Sandblast Finish": 1/4 inch reveal.
   g. Truncated Dome Finish:
2. Applied Finishes:
   a. Slab Curing Compound (SCC): Used as a curing compound for exterior slabs on grade with no flooring applications.
   b. Clear Floor Hardener Finish (CFH): Used to prevent "dusting", where a light degree of hardness is required to the interior slab finish.
3. Repair finishes (Vertical surfaces):
   a. "Sack Finish": Applied to defective surfaces mixed to the color and consistency required to match the adjacent materials in color and strength.

2.6 SOURCE QUALITY CONTROL

A. Test, Inspection:
1. Inspection of Mix:
a. Quality and quantity of material used shall be subject to continuous inspection by a qualified person. Sampling and testing of cement and aggregates in accordance with Title 24, Part 1, Section 4-335, and CBC Section 1705A, and Table 1705A.3.
b. Maintain sources of material supply constantly after approval of concrete mix.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Contractor shall inspect bearing soil and report soft or loose unsuitable bearing soil to Architect.
2. Architect will furnish Contractor with corrective measures necessary to remedy field condition.
3. Do not pour concrete until suitable bearing surfaces are achieved.
4. At Engineered Fill, remove soft and loose unsuitable fill and replace with concrete. Cost shall be paid by Contractor.
5. Contractor shall inspect and identify any site conditions and/or design information that prevents the Contractor from complying with the laws, regulations and/or building codes governing ADA access compliance.

3.2 PREPARATION

A. Transportation of Concrete:
1. Handle Concrete from mixer to place of final deposit as rapidly as practical by methods which shall prevent the separation or loss of the ingredients in accordance with ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing".
2. Do not move concrete horizontally by means of vibrators.
3. Deposit concrete as nearly as practical at its final position in a manner which, will ensure that required quality is obtained.
4. Chutes shall slope not less than 4 inches and not more than 6 inches per foot of horizontal run.

B. Protection:
1. At old concrete or concrete which has begun to set upon which Concrete is to be placed:
a. Surface shall be level, cleaned of all laitance and rough with solidly embedded large aggregate exposed.
b. Rough surface by chipping entire surface not earlier than 5 days after set, by high pressure hosing (80 pounds per square inch) 2 to 4 hours after placing or by sand blasting with coarse silica sand, roughness amplitude shall be at least 1/4 inch.
c. Not more than 1/2 hour prior to pouring concrete, place 2 inch thick uniform layer of grout on old concrete.

C. Surface preparation:
1. Prepare all Sand Base, andmaterial as applicable prior to forming footings and trenches.

2. Remove all water from excavation. Divert flow of water through drains using methods to avoid washing over freshly deposited concrete.
3. Remove hardened concrete, wood chips, shavings and other debris from interior of forms and from reinforcing steel by vacuum process.
    a. No wooden ties or blocking shall be left in concrete except where indicated for attachment of other work.
4. Forms shall have been erected, adequately braced, cleaned, sealed, lubricated if required, and bulkheaded where placing is to stop.
5. Any wood forms other than plywood shall be thoroughly water soaked before placing any concrete.
    a. The wetting of forms shall be started at least 12 hours before concreting.
6. Reinforcing steel shall have been placed, tied and supported.
7. Coordinate with Specification Section - SOIL TREATMENT before placing any concrete.
8. Embedded work of all trades shall be in place in the forms and adequately tied and braced.
9. Reinforcing steel, at the time the concrete is placed around it, shall be cleaned of scale, mill scale or other contaminants that will destroy or reduce bond.
10. Concrete surfaces to which fresh concrete is to be bonded shall be brush cleaned to remove all dust and foreign matter and to expose the aggregate, and then coated with the bonding adhesive herein specified.
11. Prior to placing concrete for any slabs on grade, the moisture content of the subgrade below the slabs shall be adjusted to at least optimum moisture.
12. No concrete shall be placed until formwork, reinforcement, and embedded items have been approved by the Architect.
    a. Clean forms of all debris and remove standing water.
    b. Thoroughly clean reinforcement and all handling equipment for mixing and transporting concrete.
    c. Concrete shall not be placed against reinforcing steel that is hot to the touch.
13. Provide runways or other approved means for wheeled equipment. Do not wheel equipment over reinforcing or formwork.

3.3 INSTALLATION

A. Placing of Rock Base, Sand Base:
1. Rock Base:
    a. Shall occur after scarification and compaction operations.
    b. Preparation of sub-grade and selection and placing of Rock Base subject to continuous inspection and supervision of Geotechnical Engineer.
    c. Compact Rock Base to a density of not less than ninety-two (92) percent, but not more than ninety-five (95) percent, in accordance with Test Designation ASTM D 1557 "Test methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)".
        1) Density of each layer of Rock Base shall be tested and verified that it meets required density of Geotechnical Engineer prior to placing any other succeeding layers.
    d. Roll Rock Base under interior (and any designated exterior slabs) to smooth surface, free of large or sharp particles.
    e. Conduct work to minimize inspection costs.
    f. Costs of initial compaction tests shall be borne by the Owner.
        1) Contractor shall pay for all re-tests required due to failure of initial tests.
2. Sand base:
    a. Shall occur after scarification and compaction operations.

b. Preparation of any sub-grade Engineered Fill, Rock Base sub-bases, placing of Vapor Retarder, and placing of Sand Base subject to continuous inspection and supervision of Geotechnical Engineer.

c. Compact Sand Base to a density of not less than ninety-two (92) percent, but not more than ninety-five (95) percent, in accordance with Test Designation ASTM D 1557 "Test method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/cu.ft.)".

AD1-SP02 Refer to Specification Section 03 30 00 CAST-IN-PLACE CONCRETE.

1. Refer to Article 3.3, A, 2 Sand Base.
2. The sand base can be omitted if the concrete contractor is experienced at limiting slab curb and grind the floor smooth if curling occurs.

1) Density of each layer of Sand Base shall be tested and verified that it meets required density of Geotechnical Engineer prior to placing any succeeding layers.

d. Roll Sand Base under interior (and any designated exterior slabs) to smooth surface, free of large or sharp particles.

e. Conduct work to minimize inspection costs.

f. Costs of initial compaction tests shall be borne by the Owner. Contractor shall pay for all re-tests required due to failure of initial tests.

3. Vapor Retarder:

a. Follow ASTM E 1643 "Standard Practice and Procedure for Installation of Vapor Retarder used in Contact with Earth Fill Under Concrete Slabs".

b. General:

1) Level, tamp or roll Earth Fill or Base Material beneath the slab in thickness as indicated on the drawings. Remove all sharp objects that could puncture the Vapor Retarder.

2) Unroll Vapor Retarder over the area where the slab is to be poured, with the longest direction parallel with the direction of the pour.

3) Cut to size, if necessary. Vapor Retarder used shall completely cover the pour area.

4) All joints/seams, both lateral and butt, shall be overlapped six (6) inches and taped using a compatible four (4) inch wide Pressure Sensitive Seaming Tape.

a) Tape areas shall be free from dust, dirt and moisture to allow maximum adhesion of the pressure sensitive tape.

5) Vapor Retarder shall overlap six (6) inches and seal to top of all footings and against any vertical walls. Provide manufacturer's written recommended sealant.

6) Repair any damaged areas in accordance with manufacturer's written recommendations, and overlap all repairs a minimum of six (6) inches in all directions with Vapor Retarder Material, Pressure Sensitive Tape, and Vapor Proofing Mastic.

7) Follow manufacturer's written recommendations for all Vertical Wall Applications.

c. Penetrations:

1) Seal all penetrations and check that all pipe, ductwork, rebar, wire penetrations and block-outs are thoroughly sealed.

2) Single Pipe Penetrations may be sealed using pipe boot constructed from the product.

a) Cut a piece of plastic, width - 12 inches, length - 1 and 1/2 times the circumference of the pipe with scissors; cut slits half the width of the film, and wrap the boot around the pipe; tape onto pipe and completely tape the base to the Vapor Retarder.

3) Multiple pipe penetrations in close proximity and very small pipes may be sealed using Vapor Proofing Mastic.

a) Cut out small area around pipes; cut a patch of Vapor Retarder extending at least 6 inches past the cut out in all directions; cut X's or small circles in the patch and install over pipes; overlap at least 6 inches and tape; build up 40-60 mils of mastic, or as needed to completely fill all voids between the pipe and Vapor Retarder.

4) No penetration of the Vapor Retarder is allowed except for reinforcing steel and permanent utilities.

a) In the case that forms must be used vapor stakes should be used to hold forms in place.

b) Penetrate plastic with stake; treat stake as pipe penetration (see above "penetration" paragraphs; leave stake permanently in concrete; using a power saw, cut stake off above the seal, but below the concrete finished surface; the lower portion of the vapor stake remains in place, permanently plugging the penetration.

B. Joints:

1. General: Construct joints straight, horizontal, true with faces perpendicular to surface plane of concrete and free of "overhangs" or "lips" to line.

2. Construction Joints:

a. Location: as indicated or as approved by Architect.

1) Install as to least impair strength of structure, appearance of concrete and shall conform to typical details and in accordance with ACI Standards.

a) Joints between concrete and masonry shall be considered construction joints.

b. Spacing: Pour lengths shall be as follows, unless specifically noted otherwise.

1)	Foundations:	100 feet maximum
2)	Walls:	60 feet maximum
3)	Structural Slabs:	60 feet o.c. maximum
4)	Interior Slabs on grade:	30 feet o.c. maximum
5)	Exterior Slabs on grade:	30 feet o.c. maximum

c. Installation:

1) Construction joints shall have level tops, vertical sides.

2) Construction joints shall be thoroughly cleaned and roughened by removing entire surface film and exposing clean aggregate solidly embedded in mortar matrix.

3) See drawings for doweling and required keys.

4) Roughen construction joints by any of the following methods:

a) By sandblasting joint.

b) By thoroughly washing joint, using a high pressure hose, after concrete has taken initial set. Washing shall be done not less than 2 hours nor more than 4 hours after concrete has been poured, depending upon setting time.

c) By chipping and wire brushing.

d) Vertical construction joints need not be roughened

5) All decisions pertaining to adequacy of construction joint surfaces and to compliance with requirements pertaining to construction joints shall be reviewed with the Architect.

6) Just before starting new pour, horizontal and vertical joint surfaces shall be dampened (but not saturated).

7) Before placing regular concrete mix, horizontal and vertical joint surfaces shall be covered with a layer of mortar composed of cement and fine aggregate of same proportions as that used in prescribed mix, but omitting coarse aggregate.

3. Expansion Joints:

a. Location: as indicated or as approved by Architect.
   1) Exterior slabs on grade: locate at walks, curbs, gutters, etc.
      a) Locate at each side of structure/vertical surface, curb transition opposite apron joints, end of curb returns, and back of curb when adjacent to walk.
   2) Interior slabs on grade: Install at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
b. Spacing:
   1) Exterior Slabs on grade: 30 feet o.c. maximum, unless otherwise noted.
   2) Interior Slabs on grade: as indicated or required for construction.
c. Installation:
   1) Install Expansion Filler in expansion joints.
      a) Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless noted otherwise.
      b) Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface.
      c) Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
      d) "Glue" Expansion Filler to edge of previous pour.
   2) When concrete has taken initial set, the edge of concrete surface shall be rounded by tooling to top of Expansion Filler.
   3) Interrupt reinforcing at all expansion joints.
      a) Refer to Drawings for detail.

4. Control Joints (Contraction Joints):
   a. Location: as indicated or as approved by Architect.
      1) Construction and expansion joints shall be considered as control joints.
   b. Spacing:
      1) Exterior Slab on grade: 10 feet o.c. maximum, unless otherwise noted.
      2) Interior Slab on grade: 15 feet o.c. maximum.
         a) Maximum area not to exceed 225 sf.
         b) Maximum length to width not to exceed 1 to 1 1/2 ratio.
         c) Conform to bay spacing wherever possible (at column centerlines, half bays, third bays, etc),
   c. Installation: Form weakened-plane control joints, sectioning concrete into areas as indicated.
      1) Use saw cuts 1/8 inch wide by 1/4 of slab depth, or tooled joints with rounded edges 1/8 inch wide by 1/4 of slab depth, unless specifically noted otherwise.
      2) Control joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing without dislodging aggregate and with no spalling of edges on either side of the joint.
      3) Slab reinforcing need not be terminated at control joints.

C. Placing of Concrete - General:
   1. All concrete shall be placed under direct observation of the Owner's Inspector.
   2. Notify Owner's Inspector not less than forty-eight (48) hours prior to pouring of first concrete.
   3. Place concrete in accordance with ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing."
   4. Do not place Concrete outside of regular working hours except to complete work already started.
   5. Do not use Concrete which has been mixed for a period longer than one and one-half (1-1/2) hours or which has started to stiffen or set.

6. Re-mixing on concrete, which has started to set, shall not be permitted.
7. Pouring of concrete shall be a continuous operation until the completion of the Section or Panel in accordance with ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing."
8. Consolidation:
    a. Concrete shall be thoroughly compacted and worked to all points with solid continuous contact to forms and reinforcement to eliminate air pockets and honeycombing.
    b. Power vibrators shall be used immediately following pour.
    c. Spading by hand, hammering of forms or other combination of methods will be allowed only where permitted by Architect.
    d. In no case shall vibrators be placed against reinforcing steel or used for extensive shifting of deposited fresh concrete.
    e. Provide and maintain standby vibrators, ready for immediate use.
9. Keep a record of times, dates and locations of all concrete placing operations for the duration of the project. Record shall be available to Architect and Owner's Inspector at all times.
10. In no case shall concrete be poured into an accumulation of water ahead of pour.
11. If any concrete operation, once planned, can not be completed in a continuous operation, placement shall stop at temporary bulkheads located where resulting construction joints will least impair the strength of the structure. The location of construction joints shall be as shown on the drawings, or as approved by Architect.
12. Hot Weather Concreting: Unless otherwise directed by the Architect, perform all work in accordance with ACI 305.1 "Specification for Hot Weather Concreting" when air temperature rises above 75 degrees F and the following:
    a. Mixing Water: Keep water temperature as low as necessary to provide for the required concrete temperature at time of placing. Ice may be required to provide for the design temperature.
    b. Aggregate: Keep aggregate piles continuously moist by sprinkling with water.
    c. Temperature of Concrete: The temperature of the concrete mix at the time it is being placed in the forms shall not exceed 85 degrees F.
        1) The method employed to provide this temperature shall in no way alter or endanger the design mix or the design strength required.
        2) Dampen subgrade and formwork before placing concrete.
        3) Remove all excess water before placing concrete.
        4) Keep concrete continuously wet when air temperature exceeds 85 degrees F for a minimum of 48 hours after placing concrete.
    d. Protection: Minimize evaporation from concrete in place by providing shade and windbreaks. Maintain such protection for 14 days minimum.
13. Cold Weather Concreting: Follow recommended ACI 306R "Cold Weather Concreting" procedures when air temperature falls below 40 degrees F, as approved by Architect.
    a. Concrete placed in freezing temperature shall have a temperature of not less than 50 degrees F.
    b. Maintain this temperature for at least 7 days.
    c. No chemicals or salts shall be used to prevent freezing and no accelerating agents shall be used without prior approval from Architect.
14. Concrete shall not be placed if sand over-lying the vapor retarder (barrier) has been allowed to attain a moisture content greater than 5 percent due to precipitation or excessive watering.

D. Placing of Concrete at Footings, Walls, Columns, etc.:
1. Concrete shall be placed in layers not to exceed twenty-four (24) inches in depth, and shall be thoroughly compacted.
    a. Wait forty minutes before placing next layer.

b. Re-vibrate six (6) inches into previous lift before next lift is added.
c. Locate top of lift at or below top of wall opening.

2. Use openings in forms, elephant trunks or other approved methods to prevent accumulation of concrete on forms and reinforcement above the level of pour.
   a. Unconfined free falls shall not exceed five (5) feet.
3. Where placing or consolidation is restricted by close assemblage of reinforcing and/or forms use a Modified Mix Concrete with smaller aggregate and/or pour 3 inches of neat grout into form prior to regular mix.
4. Concrete shall not be flowed horizontally along forms.

E. Placing of concrete at slab on grade:
1. Slabs on grade shall not be poured until the sub-grade has been thoroughly compacted and properly prepared, complete with vapor retarder or barrier, nor until reinforcement and inserts are securely fastened in place.
   a. Sub-grade above and below vapor retarder where installed resilient flooring products or rubber/vinyl-backed products are proposed to be installed shall not be moistened prior to pouring concrete.
2. No greater area shall be poured at one time than can be properly finished without checking.
3. Slabs on grade shall be laid out in a checkerboard pattern when applicable. Pour and allow alternate slabs to set.
   a. Fill out balance of checkerboard pattern with subsequent pour.
4. Concrete shall be poured as dry as possible, consistent with good workmanship.
   a. Water shall not be added to mix to improve workability without approval of the Architect.
5. Concrete shall be compacted by hand tamping and by mechanical vibration.
   a. After the concrete is thoroughly compacted, the surface shall be screeded off, any surface water removed an finish applied as specified.
6. The Contractor may, on approval of DSA and the Architect, use a Finish Enhancing Admixture (High Range Water Reducer).

F. Placing of concrete over Metal Decks:
1. Provide a work plan detailing the means and methods to be used for placement of concrete, including screeding procedures and locations of any construction joints, which will achieve the performance criteria noted below.
   a. A pre-construction meeting shall be scheduled by the General Contractor, to include the concrete sub-contractor, Polished Concrete sub-contractor, Architect, Structural Engineer, and Owner's Representative to discuss the work plan and performance objectives.
2. Deposit concrete near columns then screed away from columns over beams, then to the areas of higher deflection.
3. The final top of concrete elevation shall not deviate be more than 3/8" above or below the top of concrete elevation noted on the plan.
4. Concrete over Metal Deck shall be screeded flat between screed rails to comply with flatness requirements.
   a. Measurements shall be taken uniformly across the floor area.
   b. Areas of non-compliance shall be reviewed by the Owner and Architect and may require additional floor leveling.
5. In no case shall the depth of concrete over metal deck be less than that specified on the plan.
   a. Note that the concrete depth will vary due to deck and beam deflections during concrete placement, and shall be considered in the estimating of concrete volume, cost and placement strategies.

6. The contractor shall coordinate the pour so as to not over stress the structure and evenly distribute the pours to minimize deflection for the structural members in order to minimize slab cracking.

G. Placing of concrete by pumps:
1. If pumps are used to place concrete, the fines (3/8" and smaller) shall not exceed 45 percent of the total volume of aggregate. Standby equipment must be provided to insure completing pours to planned cutoffs.
2. Pumps shall handle concrete at a uniform rate without bleeding or segregation of aggregates. Concrete from end of the hose shall have a free fall not to exceed four (4) feet. Aluminum pipe shall not be used to transport pumped concrete.

H. Installation of nonshrink grout or drypack: Install under base plates immediately after erection of structural steel.
1. General: Ram in thin layers, using a short length of ram, the free end of which shall be struck with a heavy hammer or mallet, several blows for each layer, to compact the mixture. When completed, the exposed drypack shall show slight indication of moisture.
2. Curing: Cure with a curing compound or with moisture-retaining barrier kept wet.

3.4 APPLICATION

A. Finishes application:
1. Screed, consolidate, and level concrete slabs prior to any Finishes.
2. Tooled Finishes:
   a. Scratch finish:
      1) After screeding, consolidating, and leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
   b. Float finish:
      1) After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating.
      2) Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both.
      3) Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power units.
      4) Finish surfaces to tolerances indicated.
      5) Cut down high spots and fill low spots.
      6) Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
   c. Trowel finish:
      1) After floating, begin first trowel-finish operation using a power-driven trowel.
         a) Begin final troweling when surface produces a ringing sound as trowel is moved over surface.
         b) Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances indicated.
         c) Grind smooth any surface defects that would telegraph through applied floor covering system.
      2) Where thin set ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
   d. Sweat Trowel Finish:

1) Apply a non-slip "Sweat Trowel" finish (tight circular motion approved by the Architect) to exterior slabs in the final troweling operation
   a) Medium Finish: On all surfaces having a pitch of less than 5%.
   b) Rough Finish: On all surfaces having a pitch of more than 5%.

e. Broom finish:
   1) Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route for the indicated broom finish.
   2) Medium Broom Finish: On all surfaces having a pitch of less than 6 percent.
   3) Rough Broom Finish: On all surfaces having a pitch of more than 6 percent.

3. Sandblast Finishes:
   a. "Light Sandblast Finish" by the Abrasive Blast Method:
      1) Miscellaneous concrete structures as indicated on the drawings.
      2) Perform abrasive blasting after compressive strength of concrete exceeds 2000 psi. Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at same age for uniform results.
      3) Surface Continuity: Perform abrasive-blast finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in depths of blast to match design reference sample or mockup.
      4) Abrasive blast corners and edges of patterns carefully, using backup boards, to maintain uniform corner or edge line. Determine type of nozzle, nozzle pressure, and blasting techniques required to match design reference sample or mockup.
      5) Sufficient to expose fine aggregate with occasional exposure of coarse aggregate as follows:
         a) Maximum Reveal: 1/16 inch.
         b) Cracks, voids, protrusions, spalls, or non-uniform color or texture will not be acceptable.
   b. "Medium Sandblast Finish" by the Abrasive Blast Method:
      1) Miscellaneous concrete structures as indicated on the drawings.
      2) Perform abrasive blasting after compressive strength of concrete exceeds 2000 psi. Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at same age for uniform results.
      3) Surface Continuity: Perform abrasive-blast finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in depths of blast to match design reference sample or mockup.
      4) Abrasive blast corners and edges of patterns carefully, using backup boards, to maintain uniform corner or edge line. Determine type of nozzle, nozzle pressure, and blasting techniques required to match design reference sample or mockup.
      5) Sufficient to expose fine aggregate with occasional exposure of coarse aggregate as follows:
         a) Maximum Reveal: 1/4 inch.
         b) Cracks, voids, protrusions, spalls, or non-uniform color or texture will not be acceptable.
4. Truncated Dome Finishes:
   a. Cast-In-Place Replaceable Truncated Domes Mat:
      1) Installation: Install into freshly poured concrete per manufacturer's instructions.

a) Tamp and vibrate into freshly poured concrete to ensure that there are no voids or air pockets.
b) Field level flush to the adjacent concrete surfaces to permit proper water drainage and eliminate tripping hazards.

2) Cut and set into size and configuration as indicated.
a) Minimize any catilever effect when cutting between successive embedment ribs.
b) Top of the body shall be fully seated and flush with adjacent concrete substrate.

3) Orient domes such that the rows of inline trucated domes are parallel with the direction of the ramp.
a) When multiple mats are used, the truncated domes shall be aligned between the tactile warning surfaces and throughout the entire tactile warning surface installation.

4) Do not create voids between the underside of the tile and the concrete.
a) No walking, leaning or external forces shall be placed during and after installation and the concrete curing stage.

5) Remove protective plastic sheeting within twenty four (24) hours of installation.

6) Clean mat by method specified by manufacturer.

7) If requested, clean mats not more that four (4) days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project.

8) All traffic is prohibited until adhesive and sealant have cured.

5. Applied Finishes:
a. Slab Curing Compound Finish (SCC):
1) Apply Clear Slab Curing Compound Sealer Finish in accordance with manufacturer's written recommendations, and in exterior areas only as indicated by the Contract Documents.
b. Clear Floor Sealer Finish (CFS):
1) Apply Clear Floor Sealer Finish in accordance with manufacturer's written recommendations, and in areas as indicated by the Contract Documents.
c. Clear Floor Hardener Finish (CFH):
1) Apply Clear Floor Hardener Finish in accordance with manufacturer's written recommendations, and in areas as indicated by the Contract Documents.

6. Repair Finishes:
a. "Sack Finish": Use only enough water as required for handling and placing.
1) Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than one (1) inch.
a) Make edges of cuts perpendicular to the concrete surface.
b) Thoroughly clean, dampen with water, and brush-coat the area to be patched with a bonding agent.
c) Place patching mortar before bonding agent has dried.
2) For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color.
a) Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching.
b) Compact mortar in place and strike-off slightly higher than surrounding surface.

B. Concrete curing and protection:
1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
   a. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material.
   b. Apply according to manufacturer's written instructions after screeding and bull floating, but before power floating and troweling.
2. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than ten (10) days.
3. Formed Surfaces:
   a. Wet forms immediately after pouring.
   b. Keep forms and exposed surfaces wet until forms are removed.
   c. Keep all surfaces wet after forms are removed for ten (10) days after placement of Concrete.
4. Concrete Slab Curing Methods:
   a. One spray coat of clear curing compound.
      1) Agitate curing compounds thoroughly by Mechanical means continuously during use and spray or brush uniformly in accordance with manufacturer's written recommendations.
      2) Not applicable for:
         a) Slabs designated for Adhesively Applied Floor Coverings.
         b) Slabs designated for Resinous Flooring on top of concrete slab.
         c) Slabs designated for Polished Concrete Finishing.
   b. Curing paper:
      1) Anchor the paper or film securely and seal all edges in such a manner as to prevent moisture escaping from concrete.
      2) Protect all exposed surfaces with "Curing Paper". Curing Paper shall be kept moist.
      3) Contractor shall be responsible for protection of finished concrete against injury by rain, cold, vibration, animal tracks, marking by visitors, vandalism, etc.
      4) Required for the following:
         a) All interior concrete slabs.

3.5 CONSTRUCTION TOLERANCES

A. Exterior Site Improvements:
1. Placement of all concrete shall not exceed 0.02 feet variance from designated grades.
2. Surface variation of all concrete slabs shall not exceed 0.01 foot in 10 feet.
3. Construction of all concrete subject to ADA access compliance, including Accessible Path of Travel, curb returns, parking stalls and unloading areas, barrier free amenities and / or other applicable site improvements shall conform to the Americans with Disabilities Act, California Title 24 and the California Building Code, regardless of any construction tolerances. Examples of minimum and maximum limits related to ADA access compliance include, but are not limited to:
   a. Accessible Path of Travel cross-slope shall not exceed 2 percent.
   b. Accessible Path of Travel longitudinal slopes shall not exceed 5 percent.
   c. Ramp longitudinal slopes shall not exceed 8.33 percent.
   d. Walks shall not have less than 48 inches in unobstructed width.
4. Contractor shall maintain all grades and slopes through out construction and until Notice of Completion has been filed.

B. Building Slabs:
1. General: Uniformly slope slab surfaces to drains where indicated on the drawings.
2. FF and FL: The Contractor shall measure according to ASTM E 1155 "Standard test method for Determining FF (Floor Flatness) and FL (Floor Levelness) Numbers," within twenty-four (24) hours of the pour.
    1) Cut down high spots, and fill low spots, and adjust pour techniques to achieve floor tolerances specified.
    2) Contractor shall pay for and have a Certified Report in writing from an Independent Testing Agency that concrete substrates requiring FF and FL only are constructed to the specified tolerances, and are ready for floor coverings that require FF and FL.
3. Building Slabs on Grade:
    a. Specified overall values of flatness, **FF 35**; and of levelness, FL 25; with minimum local values of flatness, FF 24; and of levelness, FL 17.
4. Building Slabs on Grade with Polished Concrete Finish:
    a. Specified overall values of flatness, **FF 50**; and of levelness, FL 25; with minimum local values of flatness, FF 40; and of levelness, FL 17.
5. Suspended Slabs:
    a. Specified overall values of flatness, **FF 35**; and of levelness, FL 20; with minimum local values of flatness, FF 24; and of levelness, FL 15.
6. Suspended Slabs with Polished Concrete Finish:
    a. Specified overall values of flatness, **FF 45;** and of levelness, FL 35; with minimum local values of flatness, FF 30; and of levelness, FL 24.

3.6 REPAIR/RESTORATION

A. Minor Defects:
1. Minor defects in concrete shall mean any of the following:
    a. Pour joints, voids, rock pockets, tie holes, etc. where strength, and durability is not adversely affected.
    b. Shrinkage Cracks where slabs are not exposed or where appearance is not important
    c. Minor defects of pour joints, voids, rock pockets, tie holes, etc.
    d. Immediately after removing forms, inspect all concrete surfaces. Patch any pour joints, voids, rock pockets, tie holes, etc., as soon as possible, but not until the defect has been examined by the Architect.
    e. Chip away defective areas to a minimum depth of one inch, with edges perpendicular to surface. Clean area to be patched of all laitance.
    f. Coat area to be patched with Bonding Agent. Patch with Mortar mixed with Bonding Agent thoroughly compacted into place and screeded off to leave the patch slightly higher than the surrounding surface. After at least one hour finish patch to match the adjoining surface. Cure patch by application of curing compound or by wetting for seven (7) days.
    g. Fill tie holes solid with mortar after cleaning and thoroughly wetting. Fill through holes by means of a plunger-type grease gun.
    h. Remove fins and rough surfaces from all exposed concrete.
2. Minor defect of shrinkage cracks:
    a. After entire slab is finished and fully cured, shrinkage cracks larger than 1/32 inch wide shall be filled with cement grout and struck off level with surface.

B. Serious Defects:
1. Serious defects in concrete shall mean any of the following:

a. Concrete not meeting 100 percent of the specified 28 day compressive strength.
b. Concrete exhibiting rock pockets, voids, spalls, streaks, cracks, exposed reinforcing to extent that strength, durability, or appearance is adversely affected.
c. Concrete significantly out of place, line or level.
d. Concrete not containing the required embedded items.
e. Shrinkage Cracks where slabs are exposed and appearance is important.
f. Concrete where patching does not satisfactorily restore quality and appearance of surface.

2. Upon determination that concrete strength is defective:
   a. Should cylinder tests fall below minimum strength specified, concrete mix for remainder of work shall be adjusted to produce required strength. Core samples shall be taken and tested from cast-in-place concrete where cylinders and samples indicate inferior concrete with less than minimum specified strength.
   b. Cores of hardened concrete shall be taken and tested in accordance with ASTM C 39 "Test method for Compressive Strength of Cylindrical Concrete Specimens" and ASTM C 42 "Test method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete". Number and location of such cores shall be subject to the approval of Architect.
   c. Cost of core sampling and testing will be paid for by the Contractor.
   d. "500 psi" and "85 percent" reduction in ACI 318 "Building Code requirements for Structural Concrete and Commentary", Section 26.12.4 will not justify low cylinder tests.
   e. If core tests indicate that concrete is below the strength specified, the concrete shall be deemed defective, and shall be removed and replaced without additional cost to the Owner.
3. Major defect of shrinkage cracks.
   a. After entire slab is finished and fully cured, unsightly shrinkage cracks shall be repaired in a manner satisfactory in appearance to the Architect. If this cannot be accomplished, concrete shall be considered defective.
4. Upon determining that concrete surface is defective:
   a. Contractor may restore concrete to acceptable condition by cutting, chipping, pointing, patching, grinding, if this can be done without significantly altering strength of structure.
   b. Permission to patch defective areas will not be considered a waiver of the right to require removal if patching does not, in the opinion of the Architect, satisfactorily restore quality and appearance.
   c. If patching does not restore concrete to specified quality and appearance, the concrete shall be deemed defective, and shall be removed and replaced without additional cost to the Owner.
   d. No repair work shall begin until concrete has been examined and procedures have been reviewed by the Architect and Structural Engineer and approved by DSA .
5. Repair defects by complete removal of concrete and replacement or repair defects with Shotcrete in accordance with CBC Sections 1908A, strength to match mix design and material being repaired.
6. Place and cure Shotcrete in accordance with CBC Section 1908A.
7. Inspect and test Shotcrete as per CBC Section 1908A.10.

C. Cost of repairing shall be borne by the Contractor.

3.7 FIELD QUALITY CONTROL

A. Contractor's Field Quality Control:

1. Contractor shall protect slabs receiving flooring products from excess moisture after the curing process, removing excess moisture after rains, broken water pipes, etc., to ensure that the monolithic slabs are dry enough for application of flooring products. When all spaces have been enclosed, acclimate the building as soon as possible with the building's own mechanical heating and cooling system, and other outside devices as required to properly prepare the monolithic slabs for flooring installation.
    a. The test sites for the RH Tests shall be at the same room temperature and humidity expected during normal use. If this is not possible, then the test site conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative humidity (plus or minus 10 percent relative humidity) 48 hours prior to, and during testing.
2. Contractor shall maintain temperature and humidity in a manner not deleterious to the flooring materials installed until the Owner assumes occupancy.

B. Inspection:
1. Project Inspector shall inspect placement of concrete and grout.

C. Manufacturer's Field Services:
1. Contractor shall notify Vapor Retarder manufacturer at least one week prior to the Pre-Construction Conference regarding the Vapor Retarder installation, and will schedule subsequent visits at the appropriate times with at least one week's notice to ensure proper installation of the Vapor Retarder in accordance with the Manufacturer's Written Instructions.
2. Manufacturer shall provide and written Inspection and installation certification to the Architect that full compliance with the manufacturer's written instructions were followed and adhered to prior to covering with concrete.

3.8 CLEANING

A. The top of all concrete foundations receiving concrete masonry units shall be washed free of all laitance and loose concrete, and roughened to a roughness amplitude of 1/4".

B. Remove all debris, excess materials, tools, and equipment resulting from or used in this operation at completion of work.

END OF SECTION

SECTION 033510 – POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely provide polished concrete finishing materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. 03 11 01 CONCRETE FORMWORK
4. 03 30 00 CAST-IN-PLACE CONCRETE
5. 07 92 00 SEALANTS
6. 09 65 10 RESILIENT BASE AND ACCESSORIES
7. 09 68 40 CARPET
8. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
9. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
1. In accordance with the following standards:
a. ACI American Concrete Institute.
1) ACI 302.1R "Guide for Concrete Floor and Slab Construction".
b. ASTM American Society of Testing Materials.
c. NFSI National Floor Safety Institute.
1) NFSI Test Method 101-A "Standard for Evaluating High-Traction Flooring Materials, Coatings, and Finishes".
d. RILEM Reunion Internationale des Laboratoires D’Essais et de Recherches sur les Materiaux et les Consructions.
1) RILEM Test Method 11.4 "Standard Measurement of Reduction of Moisture Penetration Through Horizontal Concrete Surfaces".

1.3 DEFINITIONS

A. New Concrete: Concrete poured as part of this Project. Refer to Specification Section - CAST-IN-PLACE CONCRETE.

B. Existing Concrete: Any slab existing (or poured) prior to this Project.

1.4 SYSTEM DESCRIPTION

A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete system. Any items not specifically noted but necessary for a complete system shall be provided under this section.
   1. Fire Rating: Class "A" Fire Rated when tested in accordance with ASTM E 84 “Test Method for Surface Burning Characteristics of Building Materials”.
   2. Abrasion Resistance:
      a. ASTM C 779 "Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces", Method A, high resistance, no more than 0.008 inch (0.20 mm) wear in 30 minutes.
   3. Reflectivity: Increase of 35 percent as determined by standard gloss meter.
      a. ASTM E 430, "Standard Test Methods for measurement of Gloss or High-Gloss Surfaces by Abridged Goniophotometry".
   4. Waterproof Properties: RILEM Test Method 11.4, 70 percent or greater reduction in absorption.
   5. High Traction Rating after Polishing: NFSI 101-A, non-slip properties.
      a. Static Coefficient of Friction: For Polished Concrete Floors, all walkway surfaces shall comply with the ADA Requirements and the following minimum values as determined by testing identical products per ASTM C 1028 "Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method":
         1) Level Surfaces: Minimum 0.6.
         2) Ramps: Minimum 0.8.

B. Design Requirements:
   1. Verify Hardened Concrete Properties:
      a. Minimum new concrete compressive strength Minimum 3,500 psi required.
      b. Floor slab to be polished is Normal Weight Concrete.
         1) That no Lightweight Aggregate Concrete is used in the mix.
         2) That no Air Entrained Concrete Admixture is used in the mix.
   2. Verify Placement Properties:
      a. That the natural concrete slump of concrete mix was between 4-1/2 inches – 5 inches maximum.
         1) Polished Concrete Mix: 6" maximum if using water reducing admixture in lieu of water.
      b. Flatness and Levelness Requirements in accordance with ASTM E 1155 "Standard test method for Determining FF (Floor Flatness) and FL (Floor Levelness) Numbers":
         1) Flatness: SOV, greater than FF 45, MLV, greater than FF 30.
         2) Levelness: SOV, greater than FL 35, MLV, greater than FL 24.
   3. Verify that the finish of the concrete slab was accomplished with Hard-Steel Trowels, and that the minimum passes for the slab was at least three (3) passes, and that there were no burn marks.
      a. Finish shall comply with ACI 302.1R, Class 5 Floor.
   4. Verify that the Curing Options used for the floor slab were at least one of the following:
      a. Sheet membrane (ASTM C 171 "Specification for Sheet materials for Curing Concrete").
         1) Polyethylene Film is NOT ALLOWED.
      b. Damp Curing Process:
         1) Seven Day Cure minimum.

5. Verify that no Spray-On "Cure and Seal" curing compounds were used.

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
   a. Submit product data for specified products.
   b. Material Safety Data Sheets (MSDS).
   c. Standard Colored Concrete dyes or stains for selection by the Architect.
   d. Joint and Crack filler color range for selection by the Architect.
2. Shop Drawings.
   a. Typical layout showing the colored concrete treatment areas per color choice.
   b. Typical layout including dimensions and floor grinding schedule.
   c. Plan view of floor and joint pattern layout.
3. Quality Assurance/Control Submittals:
   a. Test Reports:
      1) Submit three (3) copies of reports.
         a) Certified test reports showing compliance with specified performance characteristics and physical properties as cited in Design Requirements article.
         b) Manufacturers Field Reports indicating that the manufacturer has read and instructed the installer of the proper procedures in regards to the Manufacturer's installation instructions prior to the start of the Polishing Operations.
         c) Manufacturers Field Reports indicating Installers compliance with Manufacturer's Installation Instructions at the end of the Polishing Operations.
   b. Certificates:
      1) Submit three (3) copies of certificates.
         a) Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria, and physical requirements.
         b) Letter of certification from the National Floor Safety Institute confirming the system has been tested and passed phase Two Level of certification when tested by Method 101-A.
         c) Current contractor's certificate signed by manufacturer declaring contractor as an approved installer of polishing system.
   c. Manufacturer's Written Instructions:
      1) Submit three (3) copies of manufacturer's written procedural instructions.
4. Closeout Submittals in accordance with the following:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
   c. Warranty in accordance with Specification Section - WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:

a. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
b. Installer trained and holding current manufacturer's certification for Polished Concrete Finish installation.
1) Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions and data sheets.
2) Use only manufacturer certified Polished Concrete Finishing installers.
3) Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

2. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
b. CBC California Building Code (CBC 11B-302.1).

C. Mockups:
1. Mock-Up Size: One 100 ft^2 sample panel at jobsite at location as directed under conditions similar to those which will exist during actual placement.
a. Mockups shall be located in a space that is not visible to the public, such as ancillary spaces, maintenance rooms, mechanical rooms, or rooms that will receive carpet. Refer to Finish Schedule.
b. Mockup grinding grades GGL II thru III for each color and finish for the Architect to select.
c. Show:
1) Several intensities of colors for selection by Architect. More intense dye concentrations may be required to achieve color.
2) Colors immediately adjacent to show workmanship in control of pattern.
3) Partial sample of graphic at 100% scale.
4) Partial sample of pattern: filled joints, colored, scored.
2. Allow 24 hours for inspection of mock-up before proceeding with work.
3. Mock-up will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application, polished concrete shine, color, and proposed protection methods during construction.
a. Coordinate with Specification Section – CAST-IN-PLACE CONCRETE for Integral Color applications and color selections.
4. Remove mock-up and dispose of materials when no longer required and when directed by the Architect.

D. Meetings:
1. New Concrete: Schedule prior to the concrete pour.
a. Coordinate the work with other work being performed.
b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements, such as:

1) Environmental requirements.
2) Concrete mix requirements.
3) Concrete curing requirements.
4) Concrete protection requirements.

2. Pre-Installation: Schedule prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements, such as:
      1) Environmental requirements.
      2) Scheduling and phasing of work.
      3) Coordinating with other work and personnel.
      4) Protection of adjacent surfaces.
      5) Surface preparation.
      6) Repair of defects and defective work prior to installation.
      7) Cleaning.
      8) Preparation and application of the Stains or Dyes to the floor areas in compliance with the floor coloring plan.
      9) Application of liquid hardener, densifier.
      10) Installation of polished floor finishes.
      11) Protection of finished surfaces after installation.
3. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
4. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems, which may impede issuance of warranties or guaranties.
   b. Maintaining installed work until the Final Inspection by the Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from damage.
   2. Ordering: Comply with manufacturer’s ordering instructions and lead time requirements to avoid construction delays.
   3. Delivery:
      a. Deliver materials in manufacturer's original packaging with identification labels and seals intact.

B. Acceptance at Site:
   1. Damaged products will not be accepted.
   2. Products must be in manufacturer's original unopened containers with labels indicating brand name, product number, and grade.

C. Storage and protection:
   1. Storage and Protection:
      a. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
         1) Store under cover in a cool place with temperatures between 40 and 90 degrees F. Protect from freezing. Don’t stack packages or buckets more than three high.

b. Protect concrete slab prior to stains, dyes, and polishing:
   1) Protect from petroleum stains during construction.
   2) Diaper hydraulic power equipment.
   3) Restrict vehicular parking.
   4) Restrict use of pipe cutting machinery.
   5) Restrict placement of reinforcing steel on slab.
   6) Restrict use of acids or acidic detergents on slab.
   7) Restrict use of adhesives on slab.

2. Waste Management and Disposal:
   a. Remove from site and legally dispose of packaging materials.

1.8 PROJECT CONDITIONS

A. Environmental requirements:
   1. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles.
   2. Rain: The work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.
   3. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.
   4. Temporary Lighting: Provide a minimum 200W light source, placed 8 feet above floor surface, for each 425 sq ft of floor being finished.
   5. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with manufacturer’s instructions.
   6. Verify that the concrete surface meets the Design Requirements within this specification.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.9 SEQUENCING AND SCHEDULING

A. Sequence with Other Work: Comply with manufacturer’s written recommendations for sequencing construction operations. It is imperative that this work be done before any framing is in place upon the slab, otherwise the consistency of the finish would be compromised if done at a later date within the construction operations.
   1. Grinding:
      a. Identify the areas of existing or new slab construction, and coordinate the Grinding Grade Level required for each area.
   2. Dye and Polishing:
      a. Provide dye operations in accordance with manufacturer's written instructions before the polishing operations begin.

1.10 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period: One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES
a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified Polishing Concrete Finishing product manufacturer:
a. L & M CONSTRUCTION CHEMICALS: "PermaShine System".
b. Acceptable alternative manufacturers:
1) ADVANCED FLOOR PRODUCTS: "RetroPlate 99".
2) DAYTON SUPERIOR: "Diamond Polish Floor Systems".
3) THE BOMANITE CO.: "Manufacturer's Standard".
4) PERFECT POLISH: "Natural Wonder Floor System".
5) SCHOFIELD: "Formular One".
6) W.R.MEADOWS: "Indurashine".
2. Specified Concrete Dye product manufacturer:
a. L & M CONSTRUCTION CHEMICALS, INC.: "Vivid Concrete Dyes".
b. Acceptable alternative manufacturers:
1) ADVANCED FLOOR PRODUCTS: "Manufacturer’s Standard".
2) AMERIPOLISH: "Manufacturer's Standard".
3) DIAMATIC: "Manufacturer’s Standard".
4) DAYTON SUPERIOR: "Pro Aqua Vivid Dyes".
5) THE BOMANITE CO.: "Pantene Teres Dyes".
6) PERFECT POLISH: "Manufacturer’s Standard".
7) SCHOFIELD: "Formula One" Liquid Dye Concentrate.
3. Specified Hardener / Densifier product manufacturer:
a. L & M CONSTRUCTION CHEMICALS, INC.: "FGS Hardener Plus".
1) Acceptable alternative product manufacturers:
a) THE BOMANITE CO.: "StabilizerPro".
b) THE BOMANITE CO.: "VitraFinish".
c) DYAMATIC: "Flor-Sil" Densifier and "Flor-Finish" Finish
d) W.R.MEADOWS: "Bellatrix" or "Liqui-Hard".
4. Specified Joint Filler product manufacturer:
a. L & M CONSTRUCTION CHEMICALS, INC.: "Joint Tite 750".
1) Acceptable alternative product manufacturers:
a) EUCLID: "Quick Joint 200".

5. Specified Protective Cover product manufacturer:
   a. RAM BOARD: "Ram Board".
      1) Acceptable alternative product manufacturers:
         a) McTECH GROUP: "EZcover".
6. Specified Cleaning Solution product manufacturer:
   a. L & M CONSTRUCTION CHEMICALS, INC. "FGS Concrete Conditioner".

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Products:
1. Water shall be potable.
2. Concrete Dyes:
   a. Provide fast-drying dye, packaged in premanufactured units ready for mixing with VOC Exempt Solvent, formulated for application to polished cementitious surfaces.
      1) Provide manufacturer’s Standard Color Options for selection by Architect.
3. Joint Filler: Semi-rigid, 2-component, self-leveling, 100% solids, rapid curing, polyurea control joint and crack filler with Shore A 80 or higher hardness.
4. Hardener / Sealer / Densifier: Water based, odorless liquid, VOC compliant, environmentally safe chemical hardening solution leaving no surface film.
   a. Acceptable Material:
      1) L & M CONSTRUCTION CHEMICALS, INC. "FGS Hardener Plus".
      2) THE BOMANITE CO. "StabilizerPro".
      3) THE BOMANITE CO. "VitraFinish".
      4) W.R.MEADOWS "Bellatrix" or "Liqui-Hard".
5. Cleaning Solution: Mild, highly concentrated liquid concrete cleaner and conditioner containing wetting and emulsifying agents; biodegradable, environmentally safe and certified High Traction by National Floor Safety Institute (NFSI).
   a. Acceptable Material, or approved equivalent:
      1) L & M CONSTRUCTION CHEMICALS, INC.:
         a) "FGS Concrete Conditioner".

2.3 FINISHES

A. Gloss Reading Standards, in accordance with ASTM E 430, "Standard Test Methods for measurement of Gloss or High-Gloss Surfaces by Abridged Goniophotometry".
1. GL-5 (Semi-Gloss) 800 grit.
   a. Gloss Reading: 38-42.
   b. Maximum Level of Slip Resistance (COF): 0.656.
   c. Mohs Hardness Factor Range: 7.5

B. Verification of Performance:
1. Ensure concrete finishing components and materials are from a single manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which, affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
   3. Determine the Grind Grade level related to the depth of cut, indicating the amount of aggregate that is to be revealed during the initial grinding of the surface:
      a. GGL-II - Grind Grade Level II (Salt and Pepper Finish):
         1) Exposing the fine aggregate such as sand and small aggregate within the substrate. Generally, this level of grind can be achieved within 1/16 inch of the surface.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Provide planetary heads and orbiting machinery for a consistent and unburnished polishing effect.

B. Layout:
   1. Lines shall be straight and true, except otherwise indicated.
   2. In accordance with approved joints and floor pattern.

C. Assistance:
   1. Application shall be in direct consultation and review of the manufacturer.

D. Floor Surface Polishing and Treatment:
   1. Provide polished concrete floor treatment in entirety of slab indicated by drawings. Provide consistent finish in all contiguous areas.
   2. Apply floor finish prior to installation of fixtures and accessories.
   3. Dyed and Polished Concrete:
      a. Locate demarcation line between dyed surfaces and other finishes.
      b. Polish concrete to final finish level.
      c. Apply selected diluted dyes to polished concrete surface in accordance with manufacturer's written recommendations.
      d. Allow dye to dry.
      e. Remove residue with dry buffer, reapply as necessary for desired result.
      f. Score pattern lines from 1/16 inch to 1/8 inch deep between color changes.
   4. Apply Hardener / Sealer / Densifier as follows:
      a. First coat at 250 ft^2/gal. (or per manufacturer's written recommendations).
      b. Second coat at 350 ft^2/gal. (or per manufacturer's written recommendations).
      c. Follow manufacturer’s recommendations for drying time between successive coats.
   5. "Diamond" grit-polish concrete floor surfaces with planetary/rotary power disc machine recommended by floor finish manufacturer. Sequence with coarse to fine diamond grit using dry method.
      a. Comply with manufacturer’s recommended diamond polishing grits for each sequence to achieve desired finish level. Level of sheen shall match that of approved mock-up.
      b. Expose aggregate in concrete surface only as determined by approved mock-up.
      c. All concrete surfaces shall be as uniform in appearance as possible.
   6. Grind & polish perimeter and edges to match field. Hand tools and multiple passes may be required to achieve uniform finish. Visible change in finish from field finish will not be accepted.
   7. Remove defects and re-polish defective areas.
   8. Finish edges of floor finish adjoining other materials in a clean and sharp manner.

3.4 ADJUSTING

A. Polish to higher gloss those areas not meeting specified gloss levels per mock-up.

B. Fill joints greater than 1/8 inch deep flush to surface with color-matching material.

C. Fill cracks greater than 1/8 inch deep flush to surface with color-matching material.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Leave area free of debris.
   2. Clean any soiled surfaces immediately.
   3. Finish shall be clean and ready for the application of any additional finishes.
   4. In accordance with manufacturer's written instructions and recommendations.

3.6 PROTECTION

A. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 033901 - MOISTURE EMISSION REDUCING CURING AGENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Curing agent.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 03 35 10 POLISHED CONCRETE FINISHING
   5. DIVISION 09 SPECIFICATION SECTIONS RELATED TO FLOORING

1.2 REFERENCES

A. American Concrete Institute (ACI):
   1. 301 - Structural Concrete for Buildings
   2. 302.1R-15 Guide for Concrete Floor Slab Construction

B. ASTM International (ASTM):
   1. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
   2. ASTM C156 - Standard Test Method for Water Loss (from a Mortar Specimen) Through Liquid Membrane-Forming Curing Compounds for Concrete
   3. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete (Section 6)
   4. ASTM C1202-93 - Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
   5. ASTM E96 - Standard Test Method of Water Vapor Transmission of Materials
   6. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Chloride

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Warranties with finished floor materials.
   2. In accordance with POLISHED CONCRETE FINISHING.

B. Meetings:
   1. Pre-Installation:
      a. Coordinate the work with other work being performed.
      b. Attendees:
         1) Owners Representatives.
         2) Construction Management Group.
         3) General Contractor/Prime Contractor's superintendent.
         4) Independent testing agency .

5) Ready-mix concrete manufacturer.
6) Concrete Placement Contractor.
7) Concrete Curing Agent technical representative.
8) Concrete Polishing contractor.
9) Architect.
10) Project Inspector.

c. Agenda items include:
1) Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2) Environmental requirements.
3) Scheduling and phasing of work.
4) Coordinating with other work and personnel.
5) Protection of adjacent surfaces.
6) Surface preparation.
7) Protection of finished surfaces after installation.
8) Cast-in-place concrete installation procedures.
9) Cast-in-place concrete finishing techniques.
10) Curing agent application techniques.
11) Concrete protection measures.
12) Repair of defects and defective work prior to installation.
13) Cleaning.

2. Progress:
a. Review for proper work progress.
b. Identify problems and propose corrective measures.
c. Identify measures to maintain or regain project schedule if necessary.

3. Completion:
a. Establish method and procedures to maintain protections while progressing to project completion.

1.4 SUBMITTALS

A. Product Data:
1. Manufacturer's product data sheets.

B. Shop Drawings:
1. Submit shop drawings indicating warranted area.
2. Photo documentation of application.

1.5 CLOSEOUT SUBMITTALS

A. In accordance with the following:
1. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
2. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
3. Warranty in accordance with Specification Section - WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall furnish written proof of operations as a formulator of specialty concrete treatments for at least 20 years. Manufacturer shall provide documentation of completed successful projects performed during this period.
2. Installer Qualifications: An installer acceptable to manufacturer for installation of materials as required for this Project.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

B. Storage and Handling Requirements:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
2. Products shall be stored in a dry, protected area. Maintain minimum temperature of 40 deg F and maximum temperature of 85 deg F.

1.8 FIELD CONDITIONS

A. Environmental Conditions:
1. Refer to CAST-IN-PLACE CONCRETE.

1.9 WARRANTY

A. Manufacturer Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period Twenty (20) Years.

B. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 CONCRETE CURING AGENT, MOISTURE EMISSION AND ALKALINITY CONTROL SYSTEM

A. Specified product manufacturer, or approved equivalent:
1. SINAK "VC-5."

B. Concrete Curing Agent, Moisture Emission Reducing System:
1. Exceed the performance of 28-day water-cured quality concrete per ASTM C-39, ASTM C-1202.
2. Initial Surface Absorption Tests BS 1881: Part 5 - Performance shall be equal to 7 day-water cured concrete samples.
3. ASTM C-309 Section 6 (Water Retention) - Pass.
4. ASTM E-96 (Water Vapor Transmission) 0.8 g/m2.

5. Reduce or eliminate cure-related cracking.
6. Shall not to leave a film or coating on the concrete surface.
7. Will not interfere with the bonding or performance of all floor covering adhesives and or roofing assemblies.
8. Compatible with all bond-breakers, patching compounds, leveling products, and joint sealants.

C. Moisture Emission and Alkalinity Control:
1. Shall protect all types of floor coverings and surface treatments from failure by reducing moisture and alkalinity originating from the concrete. Protection must include moisture, moisture vapor, hydrostatic pressure, and alkalinity as well as assurance of adhesive bond.

D. Fire / Safety / Habitability Criteria:
1. Flammability: Provide water-based materials.
2. Hazard Rating: Materials used shall comply with local and federal VOC criteria.
3. Air Quality Compliance:
   a. Product shall be UL 2818 Gold Certified - GREENGUARD
   b. Shall be listed as Super-Compliant by the South Coast Air Quality Management District
   c. Shall exceed SCAQMD Rule 1113.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The concrete shall be placed in accordance with normally accepted standards and guidelines by American Concrete Institute (ACI) 302. Water/cement ratio is recommended to be .45 but must be no greater than 0.50 as verified by transit-mix delivery slips certifying contents of the pour.

B. Site verification of conditions:
1. Examine substrates, areas, and conditions, with Installers present, for compliance with requirements and other conditions affecting performance of the Work.
   a. Prior to work in this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
   b. Verify that work in this section may be installed in strict accordance with the original design, all pertinent codes and regulations and all pertinent portions of the referenced standards.
   c. Verify that the under-slab vapor barrier is in compliance with ACI 302 1R-15, fig 5.2.3.2 for slabs to receive flooring. Place concrete directly over barrier.
   d. Verify concrete finish is within material manufacturer's acceptable range.
2. In the event of discrepancy, immediately notify the Architect. Do not proceed with application in area of discrepancy until all such discrepancies have been fully resolved.
3. Execution of work indicates acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) that could impair bond of materials.

3.3 APPLICATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.

B. Application may begin after the concrete bleed water has disappeared and as soon as the concrete surface is firm enough to tolerate foot traffic without damaging the substrate.

C. Application should be continuous. If rain should occur at any time during process; refer to manufacturer's written recommendations.

D. Coverage Rates: Total two-coat completed coverage rate is approximately 300 square feet per gallon for smooth-toweled concrete.
1. Apply the 1st coat of continuously in one direction (e.g., north to south), uniformly wetting the surface (600 sq ft per gal).
2. Verify the first coat has dried to the touch before beginning the 2nd coat.
3. Apply 2nd coat perpendicular to the 1st coat (e.g., east to west) to create a crosshatch pattern (600 sq ft per gal).

3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.

B. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by regulatory requirements.

3.5 CLEANING

A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS.
1. Clean soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.
3. In accordance with manufacturer's instructions and recommendations.

3.6 PROTECTION

A. Protection from weather:
   1. Protect newly installed work from freezing for twenty-four (24) hours after erection, installation or application.

B. Protection from traffic:
   1. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 042200 – CONCRETE MASONRY UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Concrete Masonry Unit (CMU) materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Section includes liquid water-repellent admixture added to the concrete masonry units at the time of manufacture

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 11 01 CONCRETE FORMWORK
   4. 03 15 14 DRILLED ANCHORS
   5. 03 20 00 REINFORCEMENT
   6. 03 30 00 CAST-IN-PLACE CONCRETE
   7. 05 12 00 STEEL AND FABRICATIONS
   8. 05 30 00 METAL DECK
   9. 06 10 00 ROUGH CARPENTRY
   10. 06 41 23 MODULAR CASEWORK
   11. 07 14 16 FLUID-APPLIED WATERPROOFING
   12. 07 21 00 INSULATION
   13. 07 40 00 METAL PANELS
   14. 07 51 13 BUILT-UP ROOFING
   15. 07 60 00 SHEET METAL
   16. 07 92 00 SEALANTS
   17. 08 11 00 METAL DOORS AND FRAMES
   18. 08 14 16 WOOD DOORS
   19. 08 33 00 COILING DOORS
   20. 08 41 00 STOREFRONTS
   21. 08 41 23 STOREFRONT TEMPERATURE RISE
   22. 08 91 00 LOUVERS
   23. 09 22 16 METAL FRAMING
   24. 09 24 00 CEMENT PLASTER
   25. 09 29 00 GYPSUM BOARD
   26. 09 30 13 TILE
   27. 09 50 00 ACOUSTICAL CEILINGS
   28. 09 64 66 RESILIENT WOOD FLOOR
   29. 09 65 10 RESILIENT BASE AND ACCESSORIES
   30. 09 91 00 PAINTING
   31. 10 11 00 VISUAL DISPLAY BOARDS
   32. 10 14 00 IDENTIFYING DEVICES
   33. 10 21 13 TOILET PARTITIONS
   34. 10 28 13 TOILET ACCESSORIES
   35. 10 44 00 FIRE PROTECTION SPECIALTIES
   36. 10 51 13 METAL LOCKERS
   37. 11 66 43 SCOREBOARDS

38. 12 66 13 TELESCOPING BLEACHERS
39. 31 20 00 EARTHWORK
40. 32 31 13 CHAIN LINK
41. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
42. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
1. In accordance with the following standards:
   a. ACI American Concrete Institute
   b. ASTM American Society of Testing Materials
   c. CMACN Concrete Masonry Association of California and Nevada
   d. NCMA National Concrete Masonry Association
      1) TEK Bulletins
   e. TMS The Masonry Society

1.3 DEFINITIONS

A. The following definitions occur within the CMU Industry:
1. Grout: The filler within the Cells of the Concrete Masonry Units.
2. Mortar: The joint material between the Concrete Masonry Units, both Top and Bottom and on the Ends.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data: For each type of product specified.
   a. Manufacturer's standard color range for selection by the Architect.
   b. All data regarding Concrete Masonry Unit, type, and aggregate to be provided.
   c. All data regarding mortar and grout materials, and mix designs to be provided.
   d. All data regarding accessories to be provided.
2. Shop Drawings: For the following.
   a. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
   b. Reinforcing Steel: Detail bending and placement of concrete masonry unit reinforcing bars.
3. Samples. For each type, texture and color selected.
   a. Provide 4" x 4" x 1" nominal size Concrete Masonry samples for texture, color, finish and dimension provided on this project as examples of the major CMU Units for the project.
      1) Provide other chips for all others.
   b. Pigmented Mortar: Make samples using the same sand and mortar ingredients to be used on this project.
      1) Label samples to indicate types and amount of pigments used.
4. Quality Assurance/Control Submittals:
   a. Test Reports:
      1) Concrete Masonry Units: Lineal Shrinkage and Compressive Strength per ASTM C 140 "Test Methods for Sampling and Testing Concrete Masonry Units and Related Units• and ASTM C 426 "Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units".

2) Mortar and Grout: Grout Compressive Strength and Mortar Properties per ASTM C 270 "Specification for Mortar for Unit Masonry."
3) Masonry Core test shall be in accordance with CBC Section 2105A.4.

b. Certificates:
1) Concrete Masonry Unit Manufacturers Certification per ASTM C 90 "Specification for Loadbearing Concrete Masonry Units."
2) Concrete Masonry Unit Accessory Material Suppliers Certification.
3) CMU producer shall be certified by the manufacturer of integral CMU water repellent admixture.
4) Installer Certification.
5) Contractors Certification.

5. Project Closeout Submittals:
a. Warranty.
b. Project Record Documents: In accordance with Specification Section – PROJECT CLOSEOUT.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Material:
a. Manufacturers certification that Concrete Masonry Units furnished meet or exceed the requirements of this Specification Section per ASTM C 90 "Specification for Loadbearing Concrete Masonry Units."
2. Suppliers certification for all grout and mortar materials (including aggregate, cement and admixtures) that items furnished meet or exceed the requirements of this Specification Section and per ASTM C 270 "Specification for Mortar for Unit Masonry" • and ASTM C 476 "Specification for Grout for Masonry".
a. Water Permeance of Masonry: ASTM E 514, "Standard Test Method for Water Penetration and Leakage through Masonry."
b. Compressive Strength of Masonry Prisms: ASTM C 1314, "Standard Test Method for Constructing and Testing Masonry Prisms Used to Determine Compliance with Specified Compressive Strength of Masonry."
c. Drying Shrinkage of CMU: ASTM C 426, "Standard Test Method for Drying Shrinkage of Concrete Masonry Units."
3. Installer:
a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
4. Manufacturer/Supplier:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
b. Manufacturer belonging to the CMACN.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Certificates:

1. Installer's certification that Concrete Masonry Units installation meets or exceeds the requirements of this Specification Section.
2. Contractor's certification that Concrete Masonry Unit materials and installation meets or exceeds the requirements of this Specification Section.

D. Mockups:
1. Provide a four (4) foot by six (6) foot mock-up wall showing all Concrete Masonry Unit finishes in conjunction with one another, and the mortar joints and tooling required for this Project. Mock-up, once approved, will be the basis for verifying the aesthetic and structural quality of the work for this Project. Protect during construction.

E. Meetings:
1. Pre-Installation: Schedule prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
   c. Include discussions on the integral water-repellent CMU admixture and water-repellent mortars.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress and properly tooled joints.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems, which may impede issuance of warranties or guaranties.
   b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:
1. Products shall be handled in such a manner as to assure that they are free from spalls, breakage and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original wrapped pallets with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and Protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation to prevent wetting prior to use.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
1. Rain: Work under this section shall not be started or maintained under threat of rain unless the work is protected from the rain.
2. Temperature: Ambient temperature to install products shall be forty (40) degrees Fahrenheit and rising.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.8 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES
a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified Concrete Masonry Unit product manufacturer:
a. BASALITE SELMA. Match installed color of previous phases.
2. Specified Integral Water Repellent Admixture for CMU Production:
a. "Rheopel" as manufactured by BASF, or
b. "RainBloc" as manufactured by ACM CHEMISTRIES, or
c. "Dry-Bloc II" as manufactured by W. R. GRACE and CO.
3. Specified Pre-Blended Mortar Mix product manufacturer:
a. "Amerimix" as supplied by BASALITE.
4. Specified Pre-Blended Water Repellent Admixture for Mortar:
a. "Rheopel Plus" as manufactured by BASF, or
b. "RainBlock" as manufactured by ACM CHEMISTRIES, or
c. "Dry-Bloc Integral Water Repellent" as manufactured by W. R. GRACE and CO.
5. Specified Pre-Blended Bag Grout product manufacturer:
a. "Amerimix" as supplied by BASALITE.
6. Specified Grout Admixture product manufacturer:
a. "Grout Aid" by SIKA.
7. Specified Joint Reinforcement, Ties and Anchors product manufacturer:

a. HOHMANN AND BARNARD, INC.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Block:
1. Hollow Load Bearing Units in accordance with CBC Section 2103A.1, and ASTM C 90 "Standard Specification for Loadbearing Concrete Masonry Units," (85 - 105 pcf of concrete or greater):
a. Primary Aggregate Lightweight Expanded Shale aggregate.
1) The aggregate used for all Precision Faced Units not visible on the exterior or the interior, can be Pumice aggregate.
b. All exposed Concrete Masonry Units shall have integral color from manufacturer per material standard ASTM C 979 "Specification for Pigments for Integrally Colored Concrete."
1) Including all colors to maximum dye content of 6 percent.
c. Maximum lineal shrinkage from saturated to over dry condition of not more than 0.065 percent.
d. Twenty-eight day compressive strength of 1,000 psi on gross area and 2,000 psi on net area.
e. Integral CMU Water-Repellent:
1) Integral liquid admixture mixed with concrete during production of CMUs.
2) Water Permeance of Masonry: Capable of achieving a Class E Rating when evaluated using ASTM E 514 "Test Method for Water Penetration and Leakage Through Masonry."
f. Compressive Strength of Masonry Prisms: No statistically lower compressive strength of prisms shall occur as a result of adding integral water-repellent CMU and mortar admixtures when compared to a control (containing no admixtures) CMU and mortar when tested according to ASTM C 1314 "Test Method for Compressive Strength of Masonry Prisms."
g. Drying Shrinkage of CMU: No statistically higher drying shrinkage of the CMU shall occur as a result of adding integral water-repellent CMU admixture when compared to a control (containing no admixtures) CMU when tested according to ASTM C 426 "Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units."
2. Nominal Face Dimensions and Finishes: See drawings for locations of Concrete Masonry Unit types and sizes.
a. CMU shall be:
1) Precision-Faced on both sides.

B. Joint Reinforcement, Ties and Anchors:
1. General: Comply with requirements below for basic materials, as well as requirements for each form of joint reinforcement, tie, and anchor for size and other characteristics.
2. Hot-Dip Galvanized Steel Wire: Uncoated wire in accordance with ASTM A 82 "Specification for Steel Wire, Plain, for Concrete Reinforcement", with zinc coating applied after prefabrication into units in accordance with ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products", 1.5 oz. per sq. ft, of wire surface.
3. Joint Reinforcement: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units.

a. Width: Approximately 2 inches less than nominal width of walls and partitions, providing mortar cover of not less than 5/8 inch on joint faces exposed to exterior and 1/2 inch elsewhere.
b. Wire Size, Side Rods: 0 gage, 0.15 inches.
c. Wire Size, Cross Rods: 9 gage, 0.15 inches.
d. Wire Size, Two-Piece Adjustable: 9 gage diameter in exterior walls.
e. Single-Wythe Configuration: Truss design, continuous diagonal cross rods spaced not more than 16 inches on center.
f. Multi-Wythe Configuration: Non-Aligned Bed Joints in Cavity or Composite masonry Walls:
   1) Adjustable wall tie pintle section fitting into eye section of rectangular box-type cross ties spaced not more than 16 inches on center.
   2) Truss type units with side rods spaced for embedment within each face shell of back-up wythe, ties extended to within 1 inch of exterior face of facing wythe.
g. Flexible Anchors: Masonry to Structural Framework: Two-piece anchors permitting vertical or horizontal differential movement between wall and framework parallel to, but resisting tension and compression forces perpendicular to, plane of wall.
   1) Anchorage to Steel Framework: Manufacturer's standard anchors with crimped 1/4 inch diameter wire anchor section for welding to steel 3/16", triangular-shaped wire tie section sized to extend within 1 inch of exterior face of facing wythe.
h. Unit Type Masonry Inserts in Concrete: Cast iron or malleable iron inserts of type and size indicated.
i. Dovetail Slots: Dovetail slots with filler strips, of slot size as required; 22 gage sheet metal.
j. Anchor Bolts: Steel bolts with hex nuts and flat washers, complying with ASTM A 307 "Specification for Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength", Grade A, hot dip galvanized complying with ASTM A 153 "Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware• ", Class C; sizes and configurations indicated.
k. Reinforcing Bars: In accordance with Specification Section - REINFORCEMENT, deformed steel, per ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement", Grade 60 for bars No. 3 to No. 18.

4. Miscellaneous Masonry Accessories:
   a. Non-Metallic Expansion Joint Strips: Premolded, flexible cellular neoprene rubber filler strips, complying with ASTM D 1056 "Specification for Flexible Cellular Materials – Sponge or Expanded Rubber", Grade RE41E1, capable of compression up to 35 percent; width and thickness as required.
   b. Weepholes: Pre-manufactured weeps.

C. Mortar and Grout:
1. In accordance with the following:
   a. Cement: In accordance with ASTM C 150 "Standard Specification for Portland Cement", Type II.
   b. Hydrated Lime: In accordance with ASTM C 207 "Standard Specification for Hydrated Lime for Masonry Purposes", Type S, unless otherwise noted.
   c. Quicklime: In accordance with ASTM C 5 "Standard Specification for Quicklime for Structural Purposes".
   d. Lime Putty: Made from hydrated lime or quicklime.

1) If made from quicklime, other than processed pulverized quicklime, slake lime and then screen through a No. 16 mesh sieve. Before using, store and protect slaked and screened lime putty for not less than 10 days.
2) Processed pulverized quicklime shall be slaked for not less than 48 hours, and shall be cool when used.
3) Lime putty prepared from hydrated lime may be used immediately after mixing.
4) Lime putty prepared from quicklime or pulverized quicklime shall have a plasticity figure, after slaking and screening, or not less than 200, and shall weigh not less than 83 lbs. per cubic foot. Lime putty prepared from hydrated lime shall conform to ASTM C 207 "Standard Specification for Hydrated Lime for Masonry Purposes", Type S.

e. Mortar Sand: In accordance with ASTM C 144 "Standard Specification for Aggregate for Masonry Mortar".
f. Modified Mortar Sand:
1) In accordance with ASTM C 144 "Standard Specification for Aggregate for Masonry Mortar" modified to not less than 3 percent shall pass the No. 100 sieve.
g. Grout Aggregate: 3/8 inch maximum size and in accordance with ASTM C 404 "Standard Specification for Aggregates for Masonry Grout".
h. Grout Admixture: SIKA "Grout Aid", Type II.
i. Water: Clean and free of harmful amounts of acid, salts, alkali's, or organic materials.

2.3 MIXES

A. Mortar:
1. In accordance with CBC Section 2103A.2 and ASTM C 270 "Specification for Mortar for Unit Masonry".
2. Pre-Blended Mortar Mix:
a. In accordance with ASTM C 270 "Specification for Mortar for Unit Masonry", Type S.
3. Compressive Strength:
a. See General Structural Drawings from the Structural Engineer.
b. Type S per ASTM C270.

B. Grout:
1. In accordance with CBC Section 2103A.3 and ASTM C 476 "Specification for Grout for Masonry".
2. Grout Mix:
a. Mix (by dry loose volume):
1) One part Cement, 2-1/4 to 3 parts fine aggregate and 1 to 2 parts course aggregate.
2) One pound SIKA "GROUT AID", Type II, to each 100 lbs of cementitious material (maximum 6 pounds of SIKA "GROUT AID" per cubic yard).
3) Water to make grout fluid enough to flow into all joints. Maximum water cement ratio shall be 7.3 gallons per sack of cement used, with a maximum slump of 11 inches.
3. Pre-Blended Bag Grout:
a. In accordance with ASTM C 476 "Specification for Grout for Masonry".
b. Fine Grout Mix unless otherwise noted.
4. Compressive Strength:
a. See General Structural Drawings from the Structural Engineer.

b. 2,000 psi at 28 days minimum.

2.4 SOURCE QUALITY CONTROL

A. Fabrication Tolerances:
1. All materials, equipment and placing operations shall be subject to inspection, tests and approval at all times. Agent shall have access to all places where Concrete Masonry Unit materials are proportioned, mixed, cured and stored.

B. Tests and Inspection:
1. All tests will be performed by the Owner's Testing laboratory Agency in accordance with the Specification Section – TESTING LABORATORY SERVICES.
2. Concrete Masonry Units shall be tested per ASTM C 140 "Test Methods for Sampling and Testing Concrete Masonry Units and Related Units• " and CBC Section 1705A.4.
   a. Lineal Shrinkage: In accordance with ASTM C 426 – "Standard Test method for Drying Shrinkage of Concrete Block."
   b. Compressive Strength: In accordance with ASTM C 140 – "Sampling and Testing of Concrete Masonry Units."
   c. Test three (3) samples of each type of the Concrete Masonry Unit prior to construction.
3. Mortar Tests: At the beginning of Masonry Work, at least 1 test sample each of mortar and grout shall be taken on 3 successive working days, then once per week with at least one sample taken for each 5,000 square feet of wall area, or fraction thereof.
   a. Test specimens for mortar shall be made in accordance with ASTM C 780 "Test method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry". Test specimens shall be continuously stored in moist air until tested.
   b. Mortar shall be type S per ASTM C270.
4. Grout Tests: At the beginning of Masonry Work, at least 1 test sample each of grout shall be taken on 3 successive working days, then once per week with at least one sample taken for each 5000 square feet of wall area, or fraction thereof.
   a. Test specimens for grout shall be made in accordance with ASTM C 476 "Specification for Grout for Masonry" • and CBC Section 1705A.4 Test specimens shall be continuously stored in moist air until tested.
   b. Grout shall show the required compressive strength within 28 days.

C. Verification of Performance:
1. A special inspector shall be employed during the placement of all units, placement of all reinforcing steel, during all grouting operations and during taking of all test specimens.
2. Reports:
   a. Special Inspector shall submit to Architect and to DSA two copies of each report showing results of tests and inspections.
   b. Report shall state that tests and inspections were made in accordance with specifications.
   c. Report shall state whether materials were in conformance with specifications.
3. Cost of testing and inspection will be paid by the Owner, unless otherwise specified. Contractor shall pay all costs of re-inspection and/or re-tests due to non-compliance with specifications as a reimbursement directly to the Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which, affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
   a. Installation of bolts, reinforcing, inserts, etc. as required.
   b. Check and be responsible for accuracy of dowel locations in concrete where dowels project into Concrete Masonry Unit work.
2. Control Joints:
   a. See drawings for type and location of control joints.
3. Bond Beams:
   a. Bond beams shall be located where shown and detailed on the drawings, and shall be reinforced as indicated and as here after specified.
4. Built-in Work:
   a. Miscellaneous Embedded Items: All items indicated to be embedded in masonry shall be carefully located and anchored to prevent movement during grouting operations. Avoid cutting and patching.
      1) Install all anchor bolts and anchors furnished under other sections.
5. Cutting or Patching:
   a. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of the surrounding environment, and other damage from work under this specification section.
2. Protect and cover the top of all Concrete Masonry Unit walls at the end of each day's work to minimize water intrusion, regardless of the time of year.
   a. Continue to temporarily cover the top of the walls until the final parapet cap is installed, and the sealer coats are applied.

C. Surface Preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3. Top surfaces of foundation or slab to receive Concrete Masonry Units shall be clean, rough, and free of laitance, as specified in Specification Section - CAST-IN-PLACE CONCRETE, PART 3. Roughness amplitude shall be a minimum of one-fourth inch.

3.3 INSTALLATION

A. General:
1. In accordance with Regulatory Requirements and TMS 602.
2. Set plumb, level, and square.
3. Provide temporary bracing during erection of masonry work. Maintain in place until masonry has set to provide permanent bracing.

B. Layout:
1. Lines shall be straight, true and built accurately to dimension.
2. Masonry lines and levels shall be placed to the following tolerances:
   a. Variation from unit to adjacent unit 1/8 inch maximum.
   b. Variation from plane of wall: 1/4 inch in 10 feet.

C. Reinforcement Bar installation:
1. Installation of Vertical Reinforcement Bars:
   a. Where possible, bars shall be one length and centered in open end of Concrete Masonry Units unless noted otherwise on drawings.
   b. Bar may be doweled at top of footing.
   c. Bars shall be accurately and positively held in place before setting Concrete Masonry Units by wiring to a 2 x 6 properly braced near top of bars and not over 8 feet above foundation or at last Grout pour.
   d. For Low Lift Grout, corner bars and other bars in closed cell units shall be lapped a minimum of 48 bar diameters, unless indicated otherwise.
   e. All vertical reinforcing steel shall be braced throughout its height in a manner that will retain the steel in proper position and provide the proper clearance at spacing not to exceed 192 bar diameters.
2. Installation of Horizontal Reinforcing Bars:
   a. Bars shall be laid in bond beam units directly on top of the cross walls of block webs.
   b. Lap splice bars a minimum of 48 bar diameters, unless indicated otherwise.
   c. Reinforcing steel shall be secured to all foundation dowels and held in place at spacing not to exceed 192 bar diameters.
3. Wire horizontal and vertical bars together.
4. Reinforcing steel shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the plans shall not be used. Heating of bars for bending will not be permitted.
5. Bars shall conform accurately to the sizes, shapes, lines and dimensions shown on drawings and with hooks and beds made as detailed. Bars shall be placed as indicated on the drawings and centered on grout space.
6. At the time grout is placed around it, reinforcing steel shall be clean of mill scale or other coatings that will destroy or reduce bond.

D. Setting of Concrete Masonry Units - In accordance with the following:
1. Bonds: Use Running Bond, or as shown on details.
   a. Place masonry to lines and levels indicated to the following tolerances:
      1) Variation from Unit to Adjacent Unit: 1/8-inch max.
      2) Variation from Plane of Wall: 1/4-inch in 10 feet.

b. Bond: Unless noted otherwise, lay concrete masonry units in bond pattern indicated with vertical joints located over score of unit in course below (and vice versa).
c. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
d. Preserve the vertical continuity of cells in concrete unit masonry. The minimum clear horizontal dimensions of vertical cores shall be 3" x 3" for 8-inch wide block.

2. Align vertical cells to maintain vertical continuity of cells to be filled. Open end or notched units may be used to facilitate installation around cells that contain vertical reinforcement. Minimum unobstructed vertical flue 3" x 3". Remove overhanging mortar or other obstructions or debris from inside of cells.
3. Provide bond beam units at cells containing horizontal reinforcement.
4. Integral Water-Repellent CMU:
   a. Installer shall use only mortar containing compatible integral liquid water-repellent mortar admixture at the manufacturer's recommended addition rate and mixed according to manufacturer's recommended instructions for construction of water repellent masonry exterior walls.
   b. Cover top of unfinished masonry work to protect it from the weather and to prevent accumulation of water in the cells of the CMU.
   c. Cleaning:
      1) Remove "primary" efflorescent from masonry walls exposed in the finished work in accordance with the manufacturer's recommendations and the NCMA TEK Bulletin #8-3A.
      2) Remove dirt or stains from masonry walls exposed in the finished work in accordance with the manufacturer's recommendations and the NCMA TEK Bulletin #8-2A.
      3) Promptly remove excess wet mortar and grout containing integral water-repellent mortar admixture from the face of the masonry as work progresses. Do not use strong acids, over-aggressive sandblasting or high-pressure cleaning methods.
      4) Comply with applicable environmental laws and restrictions.
5. Joints:
   a. Set Concrete Masonry Units in full shoveled bed of Mortar.
   b. Width of joint: 3/8 inch.
      1) Depth of joint: Equal to Face Shell Wall Thickness.
   c. Head joints shall be solidly filled.
   d. Mortar Joint Finish Method:
      1) All mortar joints shall be compressed and shaped by a specific designated tool throughout the project. Provide identical tools when more than one worker is scheduled to finish joints.
      2) At all exterior surfaces:
         a) Typical Vertical Joints: Compressed, Concaved and Tooled joints.
         b) Vertical Joints at Block color changes: Compressed, Raked and Tooled Joints.
         c) Typical Horizontal Joints: Compressed, Raked and Tooled joints.
      3) At all interior surfaces:
         a) Typical Vertical Joints: Compressed, Concaved and Tooled joints.
         b) Typical Horizontal Joints: Compressed, Concaved and Tooled joints.
      4) Provide compressed Flush Joints when other material is to be applied directly onto and over Concrete Masonry Units being covered (including areas covered by rubber base).
6. Vertical Control Joints:

a. Space joints at 25'-4" o.c. maximum, unless specifically noted otherwise. Joints shall be spaced symmetrically and uniformly and shall be subject to the Architect's approval.
b. All joints shall be through wall separations with horizontal reinforcing discontinuous.
c. All joints shall be sealed with backer rods and urethane sealant on both faces. Refer to Specification Section - SEALANTS for sealant requirements.

7. Prior to grouting, the grout space shall be clean so that all spaces to be filled with grout do not contain mortar projections greater than 1/4 inch, mortar droppings and other foreign material, per CBC Section 2104A.1.3.
8. Do not install cracked, broken, chipped or stained masonry units.
9. Lay only dry concrete masonry units.
10. Lay masonry in full bed of mortar, properly jointed with other work. Deep or excessive furrowing of mortar joints is not permitted.
    a. Block Cap: Lay with full mortar coverage on horizontal and vertical joints.
    b. Install grout cap where and as indicated.
11. Fully bond intersections and external and internal corners.
12. Do not shift or tap masonry units after mortar has taken initial set. Where adjustments must be made, remove mortar and replace.
13. Remove excess mortar.
14. Perform job-site cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.
15. Step back unfinished work for joining with new work. Do not use toothing.
16. Provide cleanouts as indicated in "installation of grout".

E. Installation of Grout:
1. General:
    a. All cells shall be grouted solid.
    b. Use low lift or high lift grouting at Contractor's option.
    c. Use grout pump, hopper or bucket to place grout.
    d. Place grout in final position within 1-1/2 hours after introduction of mixing water.
    e. Place grout and rod with a 3/4 inch flexible cable vibrator sufficiently to case it to flow into all voids between the cells and around the reinforcing steel. Slushing with mortar will not be permitted.
    f. Stop grout approximately 1-1/2 inches below top of last course, except at top course bring grout to top of wall.
2. Low Lift Grouting Procedure: In accordance with CBC Section 2104A.1.3.1.1.1.1, and to be used only if approved by the Architect.
    a. Set all vertical bars.
    b. Concrete Masonry Unit walls shall be built up 16 inches high uniformly around one complete building unit. No vertical construction joints will be allowed unless noted and detailed on the drawings.
    c. Lay Concrete Masonry Units no higher than 24" and clean cells of mortar.
    d. Set horizontal bars on bond beam unit crosswalls next to verticals.
    e. If course at top of lift contains horizontal reinforcement, grout all cells to a level 3/4" below the top of the Concrete Masonry Units. This will provide about 1-1/4" grout cover over the horizontal bar. Puddle grout in place using a No. 4 bar or a 1 x 2 stick, and repeat puddling in 30 to 60 minutes.
    f. Consolidate each lift twice. Once while placing grout and once more after initial absorption of water but before set.
    g. Repeat steps "c.", "d.", "e." and "f." above until the wall is completed.
3. High Lift Grouting Procedure (only upon prior approval of the Architect , Structural Engineer and DSA) shall be in accordance with CBC Section 2104A.1.3.1.2.3 and DSA IR 21-2:

a. Clean-outs must be provided at the bottom of each pour for each cell.
   1) Construct clean out courses with inverted open-bottom bond beam units involved to permit cleaning of all cells by flushing. Cleanouts shall not be less than 3x4 inch openings cut from one full shell. Do not plug cleanout holes until masonry work, reinforcement and final cleaning of the grout spaces have been completed and inspected.

b. The Contractor is cautioned that with the high lift method, the walls have very little lateral stability against winds or earthquake before grout has set and it shall be this Contractor's responsibility to adequately brace the walls until the roof sheathing is installed.

c. "Dur-O-Wall" reinforcing shall be provided in mortar joints at all wall corners, ends, jambs of openings and wall intersections.

d. Lay up walls subject to maximum height limitations of CBC Section 2104A.1.3.1.2.2 or 2104A.1.3.1.2.3.

e. Construction procedure shall be as follows:
   1) Set all full length vertical bars on center line of wall, centered in cells, and braced as noted above under typical reinforcing.
   2) Lay Concrete Masonry Units full height of walls, or 12 feet maximum including wiring horizontal bars to verticals, for one complete building unit. No vertical construction joints will be allowed unless noted and detailed on the drawings.
   3) Construct clean out courses with open-bottom bond beam units inverted to permit cleaning of all cells by flushing. Cleanouts shall not be less than 3 x 4 inch openings cut from one full shell. Do not plug cleanout holes until masonry work, reinforcement and final cleaning of the grout spaces have been completed and inspected.
   4) Clean all cells and top of foundation wall of mortar by hosing cells with suitable nozzle jet or sandblasting as soon as mortar has partially set. Final cleaning shall be inspected through clean-outs at each cell in base of wall. Remove all mortar fine protruding more than 1/2 inch into the grout space by dislodging the projections with a rod as the work progress or by washing the grout space at least twice a day during erection using a high pressure stream of water.
   5) Set vertical bars in closed cells where required; i.e., at wall corners, sides of openings, etc. Wire to horizontals at top and bottom. Use metal spacers at 48" o.c. maximum to hold bars in line.
   6) No grout shall be placed until mortar has set a minimum of 3 days in hot weather or 5 days in cold weather, and the top of foundation wall has been thoroughly cleaned and grout plugs have cured a minimum of 48 hours.
   7) Place grout in lifts not to exceed 4 feet in height, with a waiting period between lifts, dependent on weather and absorption rate of the masonry, in order to place the succeeding lift after the preceding lift becomes plastic but prior to initial set. The first lift shall be consolidated using mechanical vibrators. After the required waiting period, place the second lift and consolidate with the vibrator, reconsolidating the lift below to a depth of 12 to 18 inches. Repeat the waiting, placing and consolidating process until the top of the grout pour is reached. Reconsolidate the top lift after the required waiting period. The high-lift grouting of any section of wall between lateral flow barriers shall be completed to the top of a pour in one working day unless a new series of clean out holes is established and the resulting horizontal construction joint cleaned.
   8) Repeat items 1 - 7 until all cells are filled. The wall must be grouted to its full height during one working day. No horizontal construction joints will be allowed.

9) Above 12 feet level low lift grouting procedures shall be used.

F. Curing:
1. While Concrete Masonry Units are being laid and after, dampen both faces for a period of 3 days using a spray regulated to keep surface damp. After grouting, dampen for a period of 24 hours.

3.4 APPLICATION

A. Applied Finish:
1. Sealer (Coordinate with Specification Section – PAINTING):
   a. Apply sealer to all exterior and all interior surfaces (including all concealed areas such as the backs of parapet walls and in concealed exterior and interior soffits) to minimize efflorescence, and to prevent water intrusion into the interior of buildings from the exposed exterior surfaces.
   b. Apply sealer as directed by the manufacturer.
      1) Coverage and installation rates shall be as per manufacturer's written recommendations.
      2) Apply sealer in minimum two coats at the rates required.

3.5 REPAIR / RESTORATION

A. General:
1. Materials or Workmanship not conforming to appearance or strength specified will be deemed defective and shall be removed and replaced with no change to the contract in time or cost.
2. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units.
3. Pointing: During the tooling of joints, enlarge any voids or holes and completely fill with mortar.
4. Dry brush masonry surface after mortar has set, at the end of each day's work and after final pointing.
5. Leave work and surrounding surface clean and free of mortar sports and droppings.
6. Cleaning: Upon completion of masonry installation, repair all holes. Defective joints shall be cut out and rejointed. Exposed masonry surfaces shall be cleaned free of mortar, or grout stain and efflorescence.

B. Defective Mortar Or Grout:
1. Should the strength of mortar or grout fall below that specified, remainder of Work shall be adjusted to reach required strength. Work in place representing inferior grout and mortar and indicating a strength less than the minimum specified shall be tested by taking and testing core samples. Number and location of cores shall be determined by Structural Engineer.
2. Should compression tests of cores fail to meet required strength, masonry shall be deemed to be defective and shall be removed and replaced at no cost to Owner.
3. Costs relative to taking and testing of core samples shall be paid by the Owner and will be deducted from Contract Amount. Cost of patching core holes shall be borne by the Contractor.

3.6 FIELD QUALITY CONTROL

A. Site Tests:

1. Tests will be performed by the Owner's Testing Laboratory Agency in accordance with the Specification Section – TESTING LABORATORY SERVICES.
2. Mortar and Grout shall be tested per CBC Section 2105A.
   a. Samples shall be continuously stored in moist air until tested.
   b. Grout Compressive Strength: For each mix provided, in accordance with ASTM C 1019 "Standard Test Method for Sampling and Testing Grout".
   c. Mortar Property Specification: For each mix provided in accordance with ASTM C 780 "Standard Test method for Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry".
3. Masonry Core test shall be in accordance with CBC Section 2105A.4.
4. One set of tests for each 5,000 square feet of wall area or portion thereof.

B. Inspection:
1. Inspections will be performed by the Owner's Project Inspector in accordance with Specification Section – TESTING AND INSPECTION SERVICES.
   a. Special Project Inspector shall be employed during the placement of all units, placement of all reinforcing steel, during all grouting operations and during taking of all test specimens.
      1) Per CBC Section 1701A.4 for DSA/SSS.
2. Schedule inspections and notify the Architect, Project Inspector, Testing Agency and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the required inspections.

3.7 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. At the conclusion of the Concrete Masonry Unit work, the Contractor shall clean down all walls, remove all scaffolding and equipment, clean up all debris, refuse, any surplus materials and remove them from the premises.
2. Concrete Masonry Unit walls shall be brushed daily with a mason's soft hair brush to remove surplus mortar and splattering at scaffolding lines. This must be done immediately after initial, but before final set.
3. Grout or mortar spillage shall be removed by use of clean, plain water before it has a chance to set.
4. In areas not cleaned in accordance with the above, the Architect shall have the right to require sandblasting of the entire wall between concrete columns or piers, between control joints or entire wall unit that includes the affected areas.

B. Removal of Stains and Efflorescence:
1. Removal of Stains: In accordance with NCMA TEK Bulletin #8-2A "Removal of Stains from Concrete Masonry".
2. Removal of Efflorescence: In accordance with NCMA TEK Bulletin #8-3A "Control and Removal of Efflorescence".

3.8 PROTECTION

A. Protection from Weather:
1. Protect newly installed work from temperatures in accordance with CBC 2104A.
   a. Cold Weather: When ambient air temperature falls below 40 degrees F.
   b. Hot Weather: When ambient air temperature rises above 100 degrees F.
2. During installation, cover the top of unfinished masonry work to protect it from the weather and to prevent accumulation of water in the cores of the masonry units.

END OF SECTION

SECTION 051200 – STEEL AND FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Steel and Fabrications, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 11 01 CONCRETE FORMWORK
   4. 03 15 14 DRILLED ANCHORS
   5. 03 20 00 REINFORCEMENT
   6. 03 30 00 CAST-IN-PLACE CONCRETE (Grouting of Bearing Plate)
   7. 04 22 00 CONCRETE MASONRY UNITS
   8. 05 30 00 METAL DECK
   9. 05 52 00 RAILING SYSTEMS
   10. 06 10 00 ROUGH CARPENTRY
   11. 06 41 23 MODULAR CASEWORK
   12. 07 21 00 INSULATION
   13. 07 40 00 METAL PANELS
   14. 07 60 00 SHEET METAL
   15. 07 72 00 ROOF ACCESSORIES
   16. 07 81 16 FIREPROOFING
   17. 07 84 00 FIRESTOPPING
   18. 08 11 00 METAL DOORS AND FRAMES
   19. 08 14 16 WOOD DOORS
   20. 08 33 00 COILING DOORS
   21. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   22. 08 41 00 STOREFRONTS
   23. 08 41 23 STOREFRONT TEMPERATURE RISE
   24. 08 70 00 HARDWARE
   25. 09 22 16 METAL FRAMING
   26. 09 50 00 ACOUSTICAL CEILINGS
   27. 09 67 23 RESINOUS FLOORING
   28. 09 91 00 PAINTING
   29. 10 05 00 MISCELLANEOUS SPECIALTIES
   30. 10 11 00 VISUAL DISPLAY BOARDS
   31. 10 44 00 FIRE PROTECTION SPECIALTIES
   32. 14 24 23 HYDRAULIC ELEVATORS
   33. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   34. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:

1. In accordance with Specification Section – REGULATORY REQUIREMENTS and the following standards:

a. AISC: American Institute of Steel Construction "Specification for Design, Fabrication and Erection of Structural Steel buildings" and "Code of Standard Practice for Steel Buildings and Bridges" and "Recommended Procedure for Identification of High Strength Steels During Fabrication".

1) NOTE: All connections shall be designed by the Structural Engineer and approved by DSA/SSS.

2) NOTE: All connections shall be as shown in the Contract Document drawings.

3) AISC: "Architecturally Exposed Structural Steel" 2016 AISC "Code of Buildings and Bridges", Section 10.

4) AISC: "Specification for Structural Joists using ASTM A 325 or ASTM A 490 Bolts".

5) AISC: “Specification for Structural Steel Buildings" using the AISC 360-16.

6) AISC 341 Seismic Provisions.

b. ANSI: American National Standards Institute:

1) ANSI B18.22.1 "Plain Washers".

2) ANSI B18.22.1 "Beveled Washers".

c. ASTM: American Society for Testing and Materials.

1) ASTM A 123: Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

2) ASTM A 153: Standard Specification for Zinc (Hot-Dip) on Iron and Steel Hardware.

3) ASTM A 385: Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).

4) ASTM A 780: Standard Specification for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

d. AWS: American Welding Society "Structural Welding Code".

1) AWS D1.1 "Structural Welding Code".

2) AWS D1.8 "Structural Welding Code - Seismic Supplement".

3) AWS A2.0 "Welding Symbols".

e. EF: Engineering Foundation, "Specification for Structural Joints Using bolts from ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength".

f. ICC: International Code Council

g. NAAMM: National Association of Architectural Metal Manufacturers

1) Metal Stairs Manual

2) Pipe Rail Manual.

h. RCSC: Research Council on Structural Connections, “Specification for Structural Joints Using ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength".

i. SSPC: The Society for Protective Coatings.

1) SSPC-SP 1 "Solvent Cleaning".

2) SSPC-SP 2 "Hand Tool Cleaning".

3) SSPC-SP 3 "Power Tool Cleaning".
4) SSPC-SP 6 "Commercial Blast Cleaning".
5) SSPC-SP 7 "Brush-Off Blast Cleaning".

1.3 DEFINITIONS

A. AESS: Architecturally exposed structural steel.

B. Category AESS 4: Structural steel that is categorized by ANSI/AISC 303, Section 10, as AESS 4 and is designated as AESS 4 or Category AESS 4 in the Contract Documents.

C. Welding Definitions:
1. CVN Charpy V-Notch (Testing Procedure).
2. FCAW Flux Core Arc Welding.
3. FCAW-G Flux Core Arc Welding-Gas Shielded.
4. FCAW-SS Flux Core Arc Welding-Self Shielded.
5. G-MAW Gas Metal Arc Welding.
6. SMAW Shielded Metal Arc Welding.
7. SAW Submerged Arc Welding.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
1) Submit Load Indicating Device information as indicated in Part 3 of this Specification Section, and include Laboratory Test Reports and other data to show compliance with Specification (include Specified Standards).
2) Include certified copies of mill reports covering chemical and physical properties of each type of steel.
3) Submit primer paint system. Obtain certification from the project's Painting Contractor and Paint Manufacturer that primer paint system is compatible with proposed painting systems for this project.
2. Shop Drawings.
a. The Contract Drawings represent the spatial relationship as conceived by the Architect.
1) The production of the structural steel Shop Drawings may require the employment and utilization of a 3-dimensional structural steel fabrication layout program to achieve the exact relationship of all intersecting members.
2) Building sections and details represent interpretations of these relationships and the dimensions shown shall not be relied upon for accuracy and fit, but the Contractor / Structural Steel Fabricator shall verify them and double-check them for accuracy and fit.
3) Any significant variations shall be submitted to the Architect and Structural Engineer for review and approval, of which the conditions may or may not require DSA review and approval.
4) "Fit-Up" means and methods are the sole responsibility of the Contractor.
b. Provide all information necessary for the fabrication of component parts. Indicate size and weight of members, type and location of shop and field connections, size and extent of all welds, and welding sequence when required.
c. Include details of cuts, connections, camber, holes and other pertinent data. Include welds by Standard AWS Symbols, and show size, length and type of each weld.

d. Provide sections, drawings, templates and directions for installation of anchor bolts and other anchors.

e. Dimension requirements of structural steel for manufactured items, such as Mechanical Equipment, Dock Levelers, etc. All of these items shall be coordinated and provided by the General Contractor. The General Contractor shall also coordinate and provide dimensions to locate Structural Steel for Window Washing supports such as davits, tie-backs, etc.

B. AESS Shop Drawings: Show fabrication of AESS components.

1. Identify AESS category for each steel member and connection, including transitions between AESS categories and between AESS and non-AESS.
2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
3. Include embedment Drawings.
4. Indicate orientation of mill marks and HSS seams.
5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation and location of bolt heads.
7. Indicate exposed surfaces and edges and surface preparation being used.
8. Indicate special tolerances and erection requirements.
9. Indicate weep holes for HSS and vent holes for galvanized HSS.
10. Indicate surface preparation, primer, and coating requirements, including systems specified in other Sections.

C. Samples.

1. Provide material samples cut and machined for testing without charge to the Owner.

D. Quality Assurance/Control Submittals.

1. Test Reports:
   a. Submit mill analysis and test reports for each heat, in accordance with ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use", certifying conformity with the Specifications. Steel shall be identifiable in the fabricating shop.
   b. Submit test reports for each lot of high strength bolts in accordance with ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" and ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength" .
   c. Submit Welding Procedure Specification (WPS) to the Structural Engineer for review prior to use.
      1) For WPS's that have been qualified by test, the supporting Procedure Qualification Record (PQR) shall be submitted to the Structural Engineer for review prior to use.
   d. Submit to the Structural Engineer for approval, a step by step welding sequence for the field welding of each type of connection.
   e. Submit to the Structural Engineer a quality control plan that addresses all inspection issues, including in process and final inspection that are addressed in AWS D1.1.
2. Certificates:
   a. Submit current valid certificate issued by an independent testing agency for all welders, welding operators, and tack welders.

b. Certification of Welder's Qualifications: Welders that will make welds in restricted access, such as, but not limited to, the bottom flange-to-column welds through a cope hole or access hole in the beam web, shall be qualified by the Contractor using the same welding procedure as will be used for production and a mock-up assembly that simulates the construction configuration.

c. Provide Certified Mill Test Report Sheets in accordance with ASTM A123 “Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products", certified at the plant after galvanizing, but prior to shipment.

E. Closeout Submittals:

1. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:

a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

b. Welders shall be recently qualified by Test as prescribed in AWS "Structural Welding Code" for the type of welding to be performed.

1) All welders, welding operators, and tack welders shall be qualified with the largest diameter electrode(s) to be used on the work by test and hold a current valid certificate issued by an independent testing agency, to perform the type of welds required by the work; including the process, position, and thickness of materials used (AWS D1.1: Clauses 3 & 4 Sections).

2) In addition to meeting the requirements of AWS, welders that will make welds with restricted access, such as, but not limited to, the flange to column welds through a cope hole or access hole in the beam web, or where access to the bottom of a groove is restricted by the presence of a column flange, shall be qualified by the Contractor using the same welding procedure as will be used for production and a mock-up assembly that simulates the construction configuration.

3) All welders on the project shall be capable of understanding and following the requirements of the written WPS.

4) Each welder employed on the project shall understand all the requirements of this welding specification before welding on the project.

5) The written WPS shall be available to the welder, welding supervisor, and all inspectors.

6) Provide weld procedures for both pre-qualified welds and special welds to be submitted to the Owner's Testing laboratory and the Architect. Procedures shall be provided for both shop & field welds and shall be provided prior to commencing welding operations.

2. Manufacturer/Supplier Qualifications:

a. Structural Steel firm experienced in successfully producing/supply capacity to produce/supply required units without causing delay in the Work.

b. Provide documentation that the Hot-Dipped Galvanizer is a member in good association with the AGA (American Galvanizers Association).

3. Metal Stair Qualifications:

a. For all surfaces exposed to view, use materials, that are smooth and free of surface blemishes including pitting, seam marks, rolled trade names and roughness.

b. All loading conditions resulting in eccentricities or torsion to beams and/or columns shall be resolved by the Installation of stiffeners and diagonal struts designed, supplied, and installed buy the stair supplier.
c. Take field measurements prior to preparation of shop drawings and fabrication; do not delay job progress; allow for trimming and fitting where necessary.
d. Concrete for treads and landings shall attain a minimum strength of 3,000 psi in 28 days.
e. Metal stairs and intermediate landings:
1) Stair pans and risers shall be a minimum of 10 gage material. Actual gage as required by design.
2) Stringer and member sizes indicated on drawings shall be the minimum sizes allowed. Flat plate stringers are not acceptable substitutions.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Mockups:
1. Provide mockup prior to application of work and prior to installation of any materials.
2. Mockups shall be used for establishing construction sequence, installation requirements of materials, and shall be representative of the intended end-use configuration.
3. Mockup Assemblies:
a. Welded Connections: A typical mockup of welded connections shall be provided prior to shop fabrication.
b. Concrete Slab on Metal Deck Mockups shall be placement of metal deck and shall integrate all other related work, including, but not limited to, Specification Section - REINFORCEMENT and CAST-IN-PLACE CONCRETE.
4. Installation of Mockups:
a. The Project Inspector, the Architect, and Contractor's Superintendent shall observe the installation of materials and work.
b. Installation crew for the Mockups shall be the Cast-In-Place Concrete, Reinforcement and Metal Deck installers for this project and installers, as necessary, of other related work.
c. Unacceptable Mockups shall be removed and reinstalled until the work is deemed to be in compliance with the project requirements and is acceptable by the Owner, Architect and Project Inspector.
5. A typical mockup of welded connections shall be provided prior to shop fabrication.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Product Handling:
1. Store materials to permit easy access for inspection and identification. Keep steel members off the ground using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

1.7 SCHEDULING

A. Schedule the Work so that there will be no excessive inspection time. At all times that an inspector is required, sufficient work shall be laid out and adequate personnel supplied so that the Inspector's time will be used to full advantage. If inspection costs become excessive because of poor shop procedure, such excess costs will be paid for by the Owner, but deducted from the Contract Price. Poor procedures will be determined upon review of Inspection and/or Testing Reports. The rate for charging the excess costs will be as follows:
   1. Minimum of three (3) certified welders are used, Owner will pay 100 percent.
   2. Only two (2) certified welders are used, Contractor will be charged 1/3 of the Inspection cost.
   3. Only one (1) certified welder is used, the Contractor will be charged 2/3 of the inspection cost.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES
      a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified Perforated Panel, Canopy, product manufacturer, or approved equivalent:
      a. DIAMOND PERFORATED METALS
   2. Specified Plastic Steel Putty product manufacturer, or approved equivalent:
      a. DEVCON Plastic Steel Putty A.
   3. Specified primer paint product manufacturer, or approved equivalent:
      a. PPG PAINTS, INC.
   4. Specified galvanized repair paint product manufacturer, or approved equivalent:
      a. AERVOE INDUSTIRES, INC.
         1) Zinc Rich Galvanize #1141.
            a) ZRC Cold Galvanized Aerosol with 95% metallic zinc.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Perforated Panel, Canopy:
1. Style: Flat
2. Design: Custom
3. Material: Stainless steel.
4. Gage: 11.
5. Fasteners: As recommended by manufacturer.
6. Finish: Factory powder coat.
7. Custom graphics will be provided by Architect.

B. Steel:
1. Structural Shapes, Plates, and Bars: Shall be made in accordance with ASTM A 36, "Specifications for Carbon Structural Steel".
   a. ASTM A 572, "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel", Grade 50.
   b. ASTM A 992, "Standard Specification for Steel for Structural Shapes for use in Building Framing" Grade 50.
2. Pipe: Shall be in accordance with "Specifications for Welded and Seamless Steel Pipe", ASTM A 53 "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless", Grade B.
   a. Finish: Type E, for concealed conditions, Black, except where indicated on the drawings to be galvanized.
   b. Finish: Type S, for visually exposed conditions, Black, except where indicated on the drawings to be galvanized.
3. Structural Tubes:
   a. Cold-Formed tubing: Shall be in accordance with ASTM A 500 "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes", Grade B.
   b. Hot-Formed tubing: Shall be in accordance with ASTM A 501 "Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing".
   c. All HSS sections (round and square) shall have their material certifications reviewed by the special inspector.
      1) The special inspector shall verify that all seam welds are fused in accordance with ASTM A 500 "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes", Grade B.
      2) The special inspector shall, as a minimum, visually inspect the exterior of all seam welds.

C. Light Gage Cold Formed Shapes: In accordance with the following, unless otherwise noted on the Structural Engineer's Drawings:
1. ASTM A 653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process", such as "Zee" purlins, angles bent plated, etc.
2. ASTM A 1011 "Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability".

D. Plastic Steel Putty:
   1. Manufacturer: DEVCON.
   2. Material: Plastic Steel Putty "A".

2.3 COMPONENTS

A. Fasteners shall be in accordance with the following, unless otherwise noted on the Structural Engineer's Drawings:
   1. Anchor Bolts:
      a. All anchor bolts cast in concrete or masonry shall be headed bolts with cut threads conforming to:
         1) ASTM A 36 "Standard Specification for Carbon Structural Steel" or;
         2) ASTM A 572 "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel" Grade 50 as indicated on drawings, or;
         3) ASTM F 1554 "Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength".
   2. Machine Bolts:
      a. ASTM A 307 "Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength".
   3. Direct Tension Indicators:
      a. Provide in accordance with ASTM F 959 "Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners", type as required.
         1) Use on all bolts for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" and ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength".
   4. High Strength Bolts, Nuts and Washers: Install in accordance with requirements for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" and ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength" slip critical and snug tight conditions as indicated on drawings. Install high strength bolts with snug tight type connections with threads included in shear plane except as otherwise noted. Install hardened washers in conformance with AISC Specifications.
      a. Bolt Specifications: Bolts shall conform to the requirements of the current edition of the Specifications of the American Society for Testing and Materials for High-Strength Bolts for Structural Steel Joints, ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength", ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength" as indicated on drawings.
      b. Bolt Geometry: Bolt dimensions shall conform to the current requirements of the American National Standards Institute for Heavy Hex Structural Bolts, ANSI Standard B18.2.1. The length of bolts shall be such that the end of the bolt will be flush with or outside the face of the nut when properly installed.
      c. Provide hexagonal heads and nuts for all connections per ASTM A 563 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process", Appendix Table X1.1.

d. Nut Specifications: Nuts shall conform to the current chemical and mechanical requirements of the American Society for Testing and Materials Standard Specification for Carbon and Alloy Steel Nuts, ASTM A 563 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process", Appendix Table X1.1 Provide grade A Heavy Hex nuts for ASTM A 36 threaded rods. Use grade C, Heavy Hex nuts for ASTM A 572 "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel" Grade 50 and ASTM A 588 "Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 Mpa) Minimum Yield Point to 4-inc (100-mm) Thick" threaded rod.

e. Washers: Flat circular washers and square or rectangular beveled washers shall conform to the current requirements of the American Society for Testing and Materials Standard Specification for Hardened Steel Washers, ASTM F 436 "Standard Specification for Hardened Steel Washers".

f. Tension Control Fastener System:

1) LOHR, LEJEUNE, NUCOR FASTENER, CORDOVA BOLT, INC., or approved equivalent.

5. Stud-Type Shear Connectors: ASTM A 108 "Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality" Grade 1015 or 1020 Cold-finished carbon steel with dimensions complying with AISC Specifications.

6. Power Driven Fasteners: Tempered steel pins with special corrosive resistant plating or coating. Pins shall have guide washers to accurately control penetration. Fastening shall be accomplished by low-velocity piston-driven power activated tool. Pins and tool shall be as manufactured by Hilti Fastening Systems.

7. Filler Metal and Welding Flux in accordance with AWS D1.1 Clause 5 "Fabrication Section", and AISC 360, Section A3.5, and shall meet a CVN Impact Energy of 20 ft-lbs at minus 20 Degrees F.

a. FCAW A5.20 or A5.29 E7XT-X.

b. G-MAW A5.18 or A5.28 E70S-X.

c. SAW A5.17 or A5.23 E7X-EXXX.

d. SMAW A5.1 or A5.5 E70XX Low Carbon.

8. Turnbuckles:

a. ASTM F 1145, "Standard Specification for Turnbuckles, Swaged, Welded, Forged".

b. The supplier shall provide turnbuckles manufactured from the same production lot.

c. The manufacturer shall provide test reports indicating the safe load of the turnbuckles using a safety factor of 5.

d. Turnbuckles shall be in compliance with ASTM F 606 "Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets".

2.4 FABRICATION

A. Shop Assembly:

1. Fabricate in accordance with AISC Spec and AISC Code unless otherwise indicated on Drawings or Specifications.

a. Mechanically curve specific Structural members as indicated on the drawings in accordance with AISC requirements and tolerances.

2. Fabricate all structural steel members and fittings.

3. Fabricate all miscellaneous metal fabrications scheduled in Part 3 of this Specification Section.

4. Architecturally Exposed Structural Steel and "Exposed to View" Metal Fabrications:

a. Comply with AISC - "Architecturally Exposed Structural Steel" 2010 AISC "Code of Buildings and Bridges", Section 10.
b. At all exposed joints, continuous fill with Plastic Steel Putty. Sand smooth and uniform and ready to receive finishes.
   1) Clean all areas to have smooth seams with manufacturers recommended cleaner.
   2) Place Steel Putty and cure.
c. Also, refer to drawings.

B. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with the AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated to provide the flattest floor possible. The contractor shall coordinate member tolerances with finishes.
1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
3. Columns:
   a. All columns and beams shall adhere to Section M2.7 of the referenced "Specification for Structural Steel for Buildings" which states that completed members shall be free of twists, bends, and open joints.

C. Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections or other connections are indicated.

D. Unless noted otherwise, make holes 1/16 inches larger than the nominal bolt diameter.
1. For anchor bolts, the hole diameter may not exceed the sizes indicated in CBC Section 2204A.4, nor what is specified on the drawings.

E. Welding, Shop and Field: Weld by shielded arc method, submerged arc method, flux cored arc method, or other method approved by AWS. Perform welding in accordance with AWS Code. All welders, both manual and automatic, shall be certified in accordance with AWS "Standard Qualification Procedure" for the Work to be performed. See paragraph "welding" herein, for detailed requirements. If sizes of fillet welds are not shown on drawings, use AWS minimum weld size but not less than 3/16 inch fillet welds.

F. Bolt Holes for Other Work: Provide holes required for securing other work to structural steel framing.
1. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.
2. Cut, drill or punch holes perpendicular to metal surfaces and remove all burrs. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

G. AISC Heavy Section shapes and built up members shall meet the requirements for joints in AISC Sections J1.5, J1.6, J2.7 and M2.2.

H. High Strength Bolts:
1. Installation and Tightening:
   a. Handling and Storage of Fasteners: Fasteners shall be protected from dirt and moisture at the job site.
      1) Only as many fasteners as are anticipated to be installed and tightened during a work shift shall be taken from protective storage.

2) Fasteners not used shall be returned to protected storage at the end of the shift.
3) Fasteners shall not be cleaned of lubricant that is present in as-delivered condition.

b. Tension Calibrator: A tension measuring device shall be required at all job sites where bolts in slip-critical joints are being installed and tightened.
1) The tension measuring device shall be used to confirm:
a) The suitability to satisfy the requirements of AISC for the complete fastener assembly, including lubrication if required to be used in the work,
b) Calibration of wrenches, if applicable, and
c) The understanding and proper use by the bolting crew of the method to be used.
2) The frequency of confirmation testing, the number of tests to be performed and the test procedure shall be as specified in 1.d. below, as applicable.
a) The accuracy of the tension-measuring device shall be confirmed through calibration by an approved testing agency at least annually.

c. Joint Assembly and Tightening of Shear/Bearing Connections: Bolts in connections not within the slip-critical category shall be installed in properly aligned holes, but need only be tightened to the snug tight condition.
1) The snug tight condition is defined as the tightness that exists when all plies in a joint are in firm contact.
2) This may be attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.
3) If a slotted hole occurs in an outer ply, a flat hardened washer or common plate washer shall be installed over the slot.

d. Joint Assembly and Tightening of Connections Requiring Full Pre-tensioning. Slip-critical connections shall be installed in properly aligned holes and tightened by one of the following methods.
1) Turn-of-nut Tightening: When turn-of-nut tightening is used, hardened washers are not required except as specified in the AISC.
a) A representative sample of not less than three bolts and nuts of each diameter, length and grade to be used in the work shall be checked at the start of work in a device capable of indicating bolt tension.
b) The test shall demonstrate that the method of estimating the snug-tight condition and controlling turns from snug tight to be used by the bolting crews develops a tension not less than five percent greater than the tension required for slip-critical connections.
2) Installation of Alternate Design Bolts: A representative sample of not less than three bolts of each diameter, length and grade shall be checked at the jot site in a device capable of indicating bolt tension.
a) The test assembly shall include flat-hardened washers, if required in the actual connection, arranged as in the actual connections to be tensioned.
b) The calibration test shall demonstrate that each bolt develops a tension not less than five percent greater than the tension required by AISC.
c) Manufacturer's installation procedure shall be followed for installation of bolts in the calibration device and in all connections.
d) When alternate design features of the fasteners involve an irreversible mechanism such as yield or twist-off of an element, bolts shall be installed in all holes of the connection and initially brought to a snug tight condition.

e) All fasteners shall then be tightened, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tightened fasteners prior to final twist-off or yielding of the control or indicator element of the individual fasteners.

f) In some cases, proper tensioning of the bolts may require more than a single cycle of systematic tightening.

e. Mark bolts that have been completely tightened with an identifying symbol.

1) Final tightening of high strength bolts in webs of beam to column moment connections shall be performed after completion of flange welding.

I. Welding - General:

1. General: Quality of materials and design and fabrication of all welded connections shall conform to AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Building", "AWS Code for Welding in Building Construction", and requirements of this section.
   a. Location and type of all welds shall be as shown. Make no other welded splices, except those shown on drawings, without prior approval of the architect.
2. Automatic Welding: Use electrode wire and flux for automatic and semi-automatic welding acceptable to Architect. All methods, sequences, qualification and procedures, including preheating, and post heating if necessary, shall be detailed in writing and submitted to the architect for review.
3. Qualification of Welders:
   a. Structural steel welding: Manual and automatic welds for structural steel construction shall be made only by operators who have been previously qualified by tests, as prescribed in AWS D1.1 to perform type of work required.
   b. Welders shall be checked by the welding inspector. Those not doing satisfactory work may be removed, and may be required to pass qualification tests again. All qualification testing shall be at the Contractor's expense.
   c. Only welders whose weld procedures and pre-qualification by testing that have passed shall be considered qualified for such welds.
4. Control cooling process after weld is completed by either step down post heat or thermal blankets as determined by procedures and prequalification.
5. Box columns and built-up members shall have ultrasonic testing before and after welding.
6. Flame cut surfaces shall be ground to remove contaminated steel layer to provide welds proper fusion without impurities.
7. Preparation of surface: Surfaces to be welded shall be free of loose scale, slag, rust, grease, paint and any other foreign material.
8. Welding equipment: Welding equipment to be used in each case shall be acceptable to welding inspector. Use equipment with suitable devices to regulate speed and manually adjust operating amperage and voltage. The amperage capacity shall be sufficient to overcome line drop, and to give adequate welding heat.
9. Remove runoff tabs and grind surfaces smooth where the tabs would interfere with fireproofing and architectural finishes.
10. End-welded studs:
    a. Automatic end-welded studs: Automatically end-weld in accordance with the manufacturer's written recommendations in such a manner as to provide complete fusion between the end of the stud and the plates. There shall be no porosity or evidence of lack of fusion between the welded end of the stud and the plate. The stud shall decrease in length during welding approximately 1/8 inch for 5/8 inch, and 3/16 inch for 3/4 inch diameter. Stud sizes indicated on drawings represent the finish stud height.

b. Fillet-end welded studs: Studs may be welded using prequalified FCAW, GMAW, or SMAW processes provided the requirements of the AWS D1.1 Clause 7 "Stud Welding" are met as well as any other pertinent requirements of D1.1.

11. Provide mill camber as shown on the construction documents within AISC tolerance. Place mill tolerance upward for all beams specified no camber.

J. Architecturally Exposed Structural Steel, Category AESS 4:

1. Comply with overall profile dimensions of AWS D1.1/D1.1M for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
4. Make intermittent welds appear continuous, using filler or additional welding.
5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.
6. Limit butt and plug weld projections to 1/16 inch.
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.
11. Remove backing and runoff tabs, and grind welds smooth.
12. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
13. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
14. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1/D1.1M.
15. Conceal fabrication and erection markings from view in the completed structure.
16. Make welds uniform and smooth.
17. Cut out mill marks from mill material or hide these markings from view in the completed structure. Where neither method is possible, remove mill marks by grinding and filling surfaces as approved by Architect.
18. Grind butt and plug welds smooth or fill, removing weld splatter exposed to view.
19. Orient HSS seams as indicated or away from view.
20. Align and match abutting member cross sections.
21. At visible open joints of copes, miters, and cuts, maintain uniform clear gaps of 1/8 inch. At closed joints, maintain uniform contact within 1/16 inch.
22. Fabricate with exposed surfaces smooth, square, and of surface quality approved by Architect.
23. Treat HSS seams to appear seamless.
24. Contour and blend welds and weld transitions between members, removing splatter exposed to view.
25. Fill surface imperfections with filler and sand smooth to achieve surface quality approved by Architect.
26. Minimize weld show-through and distortion on the opposite side of exposed connections by grinding to a smooth profile aligned with adjacent material.

K. Railing Systems (Guard Rails, Hand Rails, Stair Rails and Queuing Rails): Assemble railing systems in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation. Use connections that maintain structural value of joined pieces.

1. Form changes in direction of railing members as follows:
   a. By bending (unless otherwise indicated by the contract documents).
2. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
3. Welded Connections: Fabricate railing systems and handrails for connecting members by welding. For connections made during fabrication, weld corners and seams continuously to comply with the following:
   a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   b. Obtain fusion without undercut or overlap.
   c. Remove welding flux immediately.
   d. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
4. Nonwelded Connections: Fabricate railing systems and handrails by connecting members with railing manufacturer's standard concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
   a. Fabricate splice joints for field connection using epoxy structural adhesive where this represents manufacturer's standard splicing method.
5. Brackets, Flanges, Fittings, and Anchors: Provide manufacturer's standard hand rail brackets, miscellaneous brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.
6. Provide inserts and other anchorage devices to connect handrails and railing systems to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.
7. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, and steel plate forming bottom closure.
8. For removable railing posts, fabricate slip-fit sockets from steel tube whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist being dislodged.
   a. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
9. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
10. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing work.
11. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
12. Provide weep holes or another means to drain entrapped water in hollow sections of railing members that are exposed to exterior or to moisture from condensation or other sources.
13. Fabricate joints that will be exposed to weather in a watertight manner.
14. Close exposed ends of handrail and railing members with prefabricated end fittings.
15. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of the railing and wall is 1/4 inch or less.
16. Toe Boards: Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

17. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thickness. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

2.5 FINISHES

A. Shop Cleaning:
1. Clean all surfaces of steel. Remove all rust, mill scale, deposits of splatter, slag or flux, oil, dirt, and all other materials.
   a. Use hand tool, power tool, sandblasting, chemical cleaning, and any other method necessary to provide a smooth, sound surface.
2. Clean contact surfaces of high strength bolt of all burrs and material, which might prevent solid seating of the parts. Steel to receive bolts shall be primer painted except beneath the contact area of slip-critical bolts.

B. Shop Priming:
1. General:
   a. "Painting of structural steel shall comply with the requirements contained in AISC 360. Painting of open-web steel joist girders shall comply with the requirements of SJI CJ-1.0, SJI JG-1.1, SJI K-1.1 and SJI LH/DLH-1.1. Individual structural members and assembled panels of cold-formed steel construction shall be protected against corrosion in accordance with the requirements contained in AISI S100. Protection of cold-formed steel light-frame construction shall also comply with the requirements contained in AISI S200", per CBC Section 2203A.1.
   b. Shop prime all steel except the following:
      1) Surfaces embedded in concrete, or mortar. Extend priming of partially embedded members to a depth of 2 inches.
      2) Contact surfaces for slip-critical (sc) high strength bolts.
      3) Surfaces within 2 inches of field welds.
      4) Top of structural support members when metal deck is welded to supports.
         a) Primer is required when metal deck is mechanically attached to structural support members.
      5) Surfaces to receive sprayed-fire-resistive materials (applied fireproofing).
      6) Surfaces to be galvanized.
2. Priming:
   a. Immediately after surface preparation, apply primer according to manufacturer’s written instructions and at a rate recommended by SSPC to provide minimum film thickness. Use priming methods that results in full coverage of joints, corners, edges and exposed surfaces.
      1) Strip paint corners, crevices, bolts, welds and sharp edges.
      2) Apply two shop prime coats to areas, which will be inaccessible after assembly or erection.
   b. Provide PPG PAINTS field primers; or approved equivalent, in accordance with Specification Section - SUBSTITUTION PROCEDURES. Should the Contractor substitute another paint company other than "PPG PAINTS" in Specification Section - PAINTING, then coordination of steel primers with finish coats specified in Specification Section - PAINTING is the Contractor's responsibility.
   c. Use the following shop painting systems on all normal environment interior steelwork:
      1) Surface Preparation: SSPC-SP2 "Hand Tool Cleaning" or SSPC-SP3 "Power Tool Cleaning".
      2) Application: Follow coating manufacturer’s printed directions.

3) Material: PPG PAINTS MULTI-PRIME 94-258 Primer.
4) Number of Coats: One.
5) Dry Film Thickness: 2.0 mils minimum.
6) Volume Solids: 51.0 +/- 1.0% minimum.
7) Generic Description: Modified Alkyd Resin Universal Primer.

d. Use the following shop painting systems on all exterior steelwork and interior steelwork subjected to wet conditions or fumes.
1) Surface Preparation: SSPC-SP6 "Commercial Blast Cleaning".
2) Application: Follow coating manufacturer's printed directions.
3) Material: PPG PAINTS AMERCOAT 68HS Primer.
4) Number of Coats: One.
5) Dry Film Thickness: 5.0 mils minimum.
6) Volume Solids: 78% +/-2%
7) Generic Description: Reinforced Inorganic Zinc-Rich Urethane.

C. Hot-Dip Galvanizing:
1. Zinc coatings on iron and steel products in accordance with ASTM A 123 "Standard Specification for Zinc (Hot-Dip Galvanzied) Coatings on Iron and Steel Products".
a. Minimum thickness required shall be 3.9 mils.
b. All items that will be exposed to view (i.e. security fence, handrails, guard rails, awnings, canopies and shade structures left exposed to view), shall be Hot-Dipped Galvanized in accordance with ASTM A 385, "Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)".
2. Zinc coatings on iron and steel hardware shall be in accordance with ASTM A 153 "Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware".
3. Galvanized repair paint: High-Zinc-Dust-Content, in accordance with SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight paint for re-galvanizing welds and repair painting galvanized steel.

D. Stainless Steel Finishes:
1. Remove tool and die marks and stretch lines or blend into finish.
2. Grind and polish to produce uniform, directionally textured, polished surfaces without cross-scratches. Run grain with long dimension of each piece.
3. Bright Directional Satin Finish No.4, unless otherwise shown on drawings.
4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.6 SOURCE QUALITY CONTROL

A. Tests, Inspection:
1. In accordance with Specification Section – TESTING LABORATORY SERVICES and the following:
a. Materials shall be certified, identified and tested in conformance with CBC Table 1705A.2.1. Commercial stock steel shall be identified in accordance with CBC Table 1705A.2.1.
b. Complete four-sided inspection of all steel shall be made when required by Architect.
c. Tests and inspection of Shop and field welding in accordance with CBC Table1705A.2.1. Perform shop and field welding only under supervision of welding inspector.
1) Welds shall be in accordance with CBC Table 1705A.2.1.
2) Inspection:

a) Welding inspector shall be an AWS Certified Welding Inspector (CWI).

d. Tests & Inspection for High Strength Bolts in accordance with CBC Table 1705A.2.1.

2. Testing Laboratory:
   a. An inspection and testing laboratory will be selected by the Owner for testing and inspection as required by the Contract Documents. The selected laboratory shall conform to the requirements of ASTM E 329 "Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction". Documentary evidence of such conformance shall be submitted to the Owner and the Governing Agency.
   b. All materials, work, methods and equipment shall be subject to inspection at the mill, fabricating plant and at the building site. Material or workmanship not complying fully with the Contract Documents will not be accepted. The Contractor shall give the Testing Laboratory reasonable notice when ready for inspection and shall supply samples and test pieces and all facilities for inspection without extra charge. The Owner will assume the expense of making the tests and inspection except as otherwise specified in Division 1.
3. Cost of Testing and Inspection: Costs of testing and inspection of structural steel, except as specified hereunder and in Division 1, will be paid for by the Owner.
   a. All transportation costs and per diem living costs for inspection at fabricator's plant further than 75 miles from the job site will be back-charged to the Contractor.
   b. It is assumed that all fabrication will take place in one shop location only. All additional inspection costs will be back-charged to the Contractor.
   c. All mill tests and costs or re-test of plain materials shall be at the expense of the Contractor.
   d. Costs of tests required due to Contractor's failure to provide steel identifiable in accordance with the indicated ASTM designation shall be at the expense of the Contractor.
4. Structural Steel Testing and Inspection:
   a. If structural steel tests are indicated as required on the structural drawings, one tension and one bend test shall be made for each size of structural shape, plate and for each tube and pipe size. Tests to be made in accordance with requirements of appropriate ASTM designations.
   b. If structural steel tests are not indicated as required on the structural drawings, then for shapes, plates, bars, pipe and tubing, manufacturer's certified mill test reports and analysis for each heat will be acceptable for steel identifiable in accordance with indicated ASTM designation. Mill test reports shall indicate the physical and chemical properties of all structural steel used. Correlate individual heat numbers with each specified structural section.
   c. Unidentifiable Steel:
      1) For Fy less than or equal to 36.0 ksi: Provide one tension and elongation test and one bend for each 5 tons or fraction thereof for each size.
      2) For Fy greater than 36.0 ksi: Provide one tension and elongation test and one bend or flattening for each piece.
   d. Costs of re-tests and additional testing required by the use of unidentifiable steels shall be the Contractor's responsibility. Additional costs of testing incurred by the Owner shall be deducted from the Contract Final Payment.
5. Expansion Anchors: Load test as indicated on the drawings.
6. Welding Inspection:

a. If shop or field welding inspection is indicated on the structural drawings, all shop and field welded operations shall be inspected by a qualified welding inspector employed by the Testing Laboratory. Such Inspector shall be a person trained and thoroughly experienced in inspection of welds. The inspector's ability to distinguish between sound and unsound welding will be reliably established.

b. The Welding Inspector shall make a systematic record of all welds. This record shall include:
   1) Identification marks of welders.
   2) List of defective welds.
   3) Manner of correction of defects.

c. The welding inspector shall check the material, equipment and procedure, as well as the welds. He/she shall also check the ability of the welder. He/she shall furnish the Architect with a report, duly verified by him/her that the welding which is required to be inspected is proper, and has been done in conformity with the Contract Documents, and that he/she has used all means to determine the quality of the welds.

d. All full penetration groove welds shall be subject to ultrasonic testing, as per AWS D1.1, Clause 6 "Inspection, Part "C", Ultrasonic Testing of Groove Welds". All defective welds shall be repaired and re-tested with ultrasonic equipment at the Contractor's expense.

e. Column Flanges: An area extending 6 inches above and below point where girder flanges area attached shall be inspected. Column flange edges shall be inspected visually, and entire area ultrasonically for lamination, plate discontinuities, and non-metallic inclusions.

f. All partial penetration groove welds shall be tested by ultrasonic testing.

g. When ultrasonic indications arising from the weld root be interpreted as either a weld defect or the backing strip itself, the Engineer shall be notified. The Engineer may require the removal of backing strip. The backing strip shall be removed at the expense of the Contractor, and if no root defects are visible the weld shall be re-tested. If no defect is indicated on this re-test, and no significant amount of base and weld metal have been removed, no further repair of welding is necessary. If a defect is indicated, it shall be repaired and re-tested at the Contractor's expense.

h. The ultrasonic instrumentation will be calibrated by the technician to evaluate the quality of the welds in accordance with AWS D1.1.

i. Other methods of inspection, for example, X-ray, gamma ray, magnetic particle, or dye penetrant, may be used on welds if felt necessary by the inspection laboratory, and with the approval of the Engineer.

j. Base metal thicker than 1-1/2 inches, when subjected to through thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities directly behind such weld before and after joint completion.

k. End-welded studs shall be sampled, tested, and inspected per the requirements of the Structural Welding Code – Steel D1.1, published by the American Welding Society.

l. At the discretion of the Owner's testing agency, the ultrasonic testing frequency may be reduced but may not be less than the following:
   1) Initially, all welds requiring ultrasonic testing will be tested at the rate of 100 percent in order to establish the qualifications of each individual welder. If the reject rate is demonstrated to be less than 5 percent of the welds tested for each welder, then the frequency of testing for that welder may be reduced to 25 percent. If the reject rate increases to 5 percent or more, 100 percent testing will be re-established until the rate is reduced to less than 5 percent. The percentage of rejects will be calculated for each welder independently.

m. A sampling of at least 40 completed welds will be made for such reduction evaluation. Reject rate is defined as the number of welds containing rejected defects divided by the number of welds completed. For evaluating the reject rate of continuous welds over 3' in length, each 12 linear inch increment of welds, 1 inch or less in thickness, will be considered as one weld. For evaluating the reject rate of continuous welds greater than 1 inch thickness, each 6 linear inches will be considered one weld.

7. High Strength Bolting Tests and Inspection:
   a. Furnish certified test reports for each lot of bolts in accordance with Section 9 of ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength". Install bolts under the supervision of a qualified inspector in accordance with Section 9, Research Council "Specifications for Structural Joints using bolts for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength".
   b. If high strength bolting inspection is indicated or required on the structural drawings, the testing laboratory will visually inspect all high strength bolts.
   c. While the work is in progress, the Project Inspector shall determine that the requirements of this Specification are met in the work. The Project Inspector shall observe the calibration procedures and shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is properly used to tighten all bolts.
      1) In addition to the requirement of the foregoing paragraph, for all connections specified to be slip critical (SC), the Project Inspector shall assure that the specified procedure was followed to achieve the pretension specified in the AISC. The pre-tension shall be verified by the Project Inspector for these bolts.
      2) Bolts in connections identified as not being slip-critical nor subject to direct tension need not be inspected for bolt tension other than to ensure that the piles of the connected elements have been brought into snug contact.

B. Verification of Performance:
   1. Testing Agent shall be a qualified person or Testing Laboratory listed and approved by DSA/SSS and selected by the Architect, and the Owner.
   2. Testing Agent shall make Test and Inspection Reports certifying materials and workmanship to conform with Drawings and Specifications.
      a. Cost of Testing and Inspection will be paid by Owner unless otherwise specified.
      b. Cost of cutting and machining test samples shall be paid by Contractor.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
   1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Employ a licensed land surveyor for accurate erection of structural steel.
   1. Check elevations of bearing surfaces (concrete or masonry), and locations of anchor bolts and similar devices, before erection work proceeds.
   2. Report discrepancies to Architect.
   3. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with the Architect.

B. Erect all Structural Steel frame work in accordance with AISC Specifications "Specification for the Design, Fabrication and Erection of Structural Steel for Building", latest edition, and AISC Code unless otherwise indicated on Drawings or Specification.
   1. Framing: Carry up framing true and plumb. Provide temporary bracing wherever necessary to support all loads to which the structure may be subjected, including erection equipment and its operation. Leave bracing in place as long as may be required for safety. As erection progresses securely connect the work to take care of all dead load, wind and erection stresses.
   2. Connections:
      a. Machine Bolts shall be installed with cut washer under nut.
      b. High Strength Bolts shall be used to assemble structural joints in accordance with AISC "Specification for Structural Joints using bolts for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength", unless otherwise indicated on the drawings.
         1) Tighten nuts for Bolts in accordance with CBC Sections 1705A.2.1. Load Indicating Devices shall be pre-approved by the DSA/SSS, and certification by an independent testing laboratory stating that the devices meet AISC Specifications shall be submitted to Project Engineer and DSA/SSS.
         2) Manufacturer shall also submit installation procedures prior to incorporation into the work for approval by the Project Engineer.
         3) Once approved, manufacturer's installation instructions shall be followed for all conditions. Mark bolts that have been completely tightened with an identifying symbol.
         4) Connections shall be slip-critical (SC) type.
            a) Slip-critical connections, surfaces shall be in accordance with AISC "Specification for Structural Joints Using bolts for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength".
         5) Contacting surfaces shall be painted, except for friction-type (SC) connections.

6) Provide washers in accordance with ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength".

c. Welding: The details of all joints, the technique of welding employed, the appearance and quality of welds made, and the methods used in correcting defective work shall conform to "AISC Specs", "AWS Code", Table 1705A.2.1.

1) All "exposed-to-view" welds will be smooth and flush with no voids showing and still be in conformance with standards referenced herein.

2) All exposed to view butt welds shall be flush as connected members will allow. Minor defects and transitions in metal surfaces shall be filled and sanded out with an approved metal filler prior to painting.

3) Exposed fillet welds are acceptable "as is" provided the surface chevrons are shallow and have no abrupt protrusions.

3. Cutting Holes: The use of a cutting torch is permissible only if the metal being cut is not carrying stress during the operation and only with the prior approval of the Architect and DSA/SSS for each specific condition.

4. Setting Plates: Set column base plates and leveling plates to correct elevations and temporarily support on steel wedges or shims until the supported members have been plumbed, locked in place and grouted.

C. Erection Sequence: Erect steel in accordance with special erection sequences where special erection sequences are indicated on the contract documents.

D. Before and during erection, keep all structural steel clean. Ship, handle and store steel in a manner to avoid injury to members. Steel members showing evidence to rough handling or injury will be rejected.

E. Mark each member with erection identification corresponding to mark shown on erection drawings. Carefully plan erection of structural steel so that no cutting and removal of material will be necessary. Do not torch burn in the field, unless specifically permitted by Engineer.

F. Provide sufficient bracing, shoring and guys to effect safe and satisfactory erection. Provide bracing and shoring capable of holding steel work plumb and properly aligned while field connections are being made, and until lateral force resisting elements are deemed by the Architect to be capable of bracing structure. Temporary bracing shall be adequate to resist lateral forces from wind or seismic prior to the completion of the lateral resisting system.

G. Set bearing and base plates with extreme care. Bring level, to line and grade with leveling plates or by leveling nuts and bolts. Grout solid under plates with a flowable non-shrink grout per Specification Section – CAST-IN-PLACE CONCRETE prior to applying vertical load.

H. Field Assembly: Set structural framing accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces which will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Shimming or other adjustments not indicated on drawings shall be approved by the Engineer prior to installation. Level and plumb individual members of the structure within specified AISC tolerances except as noted herein. Column shimming shall be 1/4 inch.

I. All welds shall be full and clean, and conform to AISC and AWS Specifications.

J. Erection Tolerances: Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
   1. Individual pieces shall be erected so that the deviation from plumb, level and alignment shall not exceed 1 to 500 plus:
   2. The maximum displacement of the center-line of columns adjacent to elevator shafts, from the established column line, shall not be more than 1 inch at any point from the established column line in the first 20 stories.
   3. In order to provide a true, flat plane for the exterior elevations, install all steel framing at the exterior walls of the building, so that the center lines of such framing does not vary by more than 1 inch for the length of the building.
      a. Also, install each vertical member on such grids so that its vertical center-line does not vary by more than 1/2 inch from a vertical line for each story and 1 inch for its full height.
   4. Take special care that column base plates are parallel and perpendicular to faces of columns and that bolt holes are accurately placed.

K. Temporary Flooring:
   1. Provide planking and scaffolding necessary in connection with erection of structural steel, support of erection machinery, and construction materials. Temporary floors and use of steel shall be as required by applicable Regulatory Requirements.
   2. If steel decking is used as a working platform, it shall be temporarily tack-welded to supports to extent necessary for such use in accordance with applicable Regulatory Requirements. The concentrated loading from welding machines and other heavy machinery required for steel erection shall be distributed by planking or other approved means. Metal decking that becomes damaged as a result of being used as a working platform shall be replaced at no additional cost to the Owner.

L. Hoisting And Bracing:
   1. Provide all hoisting and erecting equipment and power.
   2. Provide and maintain any and all safety railings, toe boards, etc., required for the erection of steel framing and metal decking.
   3. Brace the erected frame in a manner which will assure safety and proper alignment to receive the metal decking and until the concrete slabs have been poured and have set.
   4. Erect building frame true and level. Erect columns in a manner to allow for movement due to welding shrinkage and thermal expansion and contraction of framing. Check for plumb after erection of each level. Maintain structural stability of frame during erection. Provide temporary bracing where necessary to maintain frame stability and to support required loads, including equipment and its operation.

3.4 ERECTION OF AESS

A. Take special care during erection to avoid marking or distorting the AESS and to minimize damage to shop painting. Set AESS accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.
   1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Take care to avoid any blemishes, holes, or unsightly surfaces resulting from the use or removal of temporary elements.
   2. Grind tack welds smooth.
   3. Remove backing and runoff tabs, and grind welds smooth.
   4. Orient bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
   5. Remove erection bolts in Category AESS 4 AESS, fill holes with weld metal or filler, and grind or sand smooth to achieve surface quality approved by Architect.

6. Fill weld access holes in Category AESS 4 AESS with weld metal or filler and grind, or sand smooth to achieve surface quality as approved by Architect.
7. Conceal fabrication and erection markings from view in the completed structure.

B. In addition to ANSI/AISC 303, Section 10 requirements, comply with the following.
1. Erection of Category AESS 4:
   a. Erect AESS to the standard frame tolerances specified in ANSI/AISC 303 for non-AESS.
   b. Comply with AWS D1.1/D1.1M. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
   c. Remove weld spatter, slivers, and similar surface discontinuities.
   d. Grind off butt and plug weld projections larger than 1/16 inch.
   e. Continuous welds are to be of uniform size and profile.
   f. Ream holes that must be enlarged. Use of drift pins or burning is not permitted. Replace misaligned connection plates where holes cannot be aligned with acceptable appearance.
   g. Splice members only where indicated on Drawings.
   h. No torch cutting or field fabrication is permitted.
   i. Weld profiles, quality, and finish are be as approved by Architect.
   j. Make joint welds, including tack welds, appear continuous by filling intermittent welds.
   k. Grind welds smooth.
   l. Minimize weld show-through and distortion on the opposite side of exposed connections by grinding to a smooth profile aligned with adjacent material.
   m. Oversize welds where ground, contoured, or blended, and grind to provide a smooth transition, matching profile approved by Architect.

3.5 REPAIR / RESTORATION

A. Defective Work shall be immediately replaced with proper work. Such replaced Work and the Testing and Inspection for it shall be at the expense of the Contractor. If defects or damages cannot be corrected in the field, the material shall be returned to the shop or new parts furnished, as the Architect directs, and the Contractor shall pay all costs therefor.
1. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780 "Practice for Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings".
2. Primer Coat - On all hot-dip iron or steel that needs repair, provide one primer coat of the following:
   a. Zinc Rich Galvanize No. 1141 by AERVOE INDUSTRIES, INC., or approved equivalent.
   b. Provide a smooth-flowing, high-solids compound that provides a fast-drying coating that protects ferrous metals in highly corrosive environments. Coating shall be 97% pure zinc metallic flake, which leaves 94% zinc in the dry film.
   c. Overall Dry Film Thickness: 2.0 mil.
3. Finish Coat - On all hot-dip iron or steel that needs repair, provide one finish coat over a properly cured primer coat of the following:
   a. Zinc Rich Galvanize No. 1141 by AERVOE INDUSTRIES, INC., or approved equivalent.
   b. Provide a smooth-flowing, high-solids compound that provides a fast-drying coating that protects ferrous metals in highly corrosive environments. Coating shall be 97% pure zinc metallic flake, which leaves 94% zinc in the dry film.
   c. Overall Dry Film Thickness: 2.0 mil.

B. Touch-up Primer Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop priming to comply with SSPC-PA1 "Touching Up Shop-Painted Surfaces".
   1. Clean and prepare surfaces by SSPC-SP 2 "Hand-Tool Cleaning" or SSPC-SP 3 "Power-Tool Cleaning".

3.6 FIELD QUALITY CONTROL

A. Site Tests:
   1. As required by Regulatory Requirements.

B. Tests, inspection:
   1. As required by Regulatory Requirements.
   2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
   3. No work shall be without the inspections required by Regulatory Requirements.
   4. Tests and inspection of field welding in accordance with CBC Table 1705A.2.1. Perform field welding only under supervision of welding inspector.
      a. Welds shall be in accordance with CBC Table 1705A.2.1.
      b. Inspection shall be in accordance with CBC Table 1705A.2.1.
         1) Welding inspector shall be an AWS Certified Welding Inspector (CWI).

C. Verification of Performance:
   1. Certification:
      a. The Contractor shall engage and pay for a registered Civil Engineer or Licensed Land Surveyor to check the alignment, plumbness, elevation, and overall accuracy of the erected framing at appropriate stages during construction and at completion of erection.
      b. Civil Engineer or Licensed Land Surveyor shall submit written verification and certification that the entire installation is in accordance with the Contract Documents.

3.7 SCHEDULES

A. Metal Fabrication Schedule should be used as a guide only and is not considered as a complete list. Refer to Drawings for location and details:
   1. Miscellaneous backing members, brackets, and supports for work installed by other trades.
   2. Countertop Bracket
   3. Gates and Frames
   4. Roof Access Ladder
   5. Guard Rail
   6. Hand Rail
   7. Handrail Bracket
   8. Stair Rail
   9. Queuing Rail
   10. Stairs
   11. Fixed Bollard
   12. Removable Bollard

END OF SECTION

SECTION 05 12 25 - BUCKLING-RESTRAINED BRACES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Requirements of Division 1 apply to all Work of this Section.

1.2 SCOPE

A. Work Includes:
1. Furnishing Buckling-Restrained Braces (BRB's).
2. Engineering design of BRB's.
3. Qualification of BRB's by uniaxial and subassemblage cyclic testing.

1.3 RELATED WORK

A. Structural Steel-Section 05 12 00: For installation of BRB's and furnishing of connection hardware for BRB's, including loose plates and fasteners.

1.4 QUALITY ASSURANCE

A. Standards and References: (Latest Edition unless otherwise noted.)
1. California Building Code (CBC)
2. American Institute of Steel Construction (AISC):
   a. AISC Specification – "Specification for Structural Steel Buildings", as prepared by American Institute of Steel Construction
   b. AISC Code of Standard Practice – "Code of Standard Practice for Steel Buildings and Bridges", as prepared by American Institute of Steel Construction with current supplements.
   c. AISC Seismic Provisions – "Seismic Provisions for Structural Steel Buildings", by American Institute of Steel Construction with current supplements.
3. American Institute of Steel Construction and Structural Engineers Association of California (AISC/SEAOC) "Committee on Buckling Restrained Brace Frames."
   a. Recommended Provisions – "Recommended Provisions for Buckling-Restrained Braced Frames"
4. American Welding Society (AWS):
   a. AWS D1.1 – "Structural Welding Code – Steel", by American Welding Society
   b. AWS D1.8 – "Structural Welding Code – Seismic Supplement", by American Welding Society
5. American Society for Testing and Materials (ASTM):
   a. A6 – Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use.
   b. A36 – Specification for Steel.
   c. A500 – Specification for Cold-Formed Welded and Seamless Carbon Steel

Structural Tubing.

6. Research Council on Structural Connections (RCSC):
   a. RCSC Specification – "Specifications for Structural Joints using ASTM A325 or A490 Bolts", as prepared by Research Council on Structural Connections (RCSC Committee 15) with current supplements.
7. Steel Structures Painting Council (SSPC):
   a. SSPC Painting Manual – "Steel Structures Painting Manual, Volume 1 – Good Practice Painting" and "Steel Structures Painting Manual, Volume 2 – Systems and Specifications" by Steel Structures Painting Council SSPC: The Society for Protective Coatings

B. Definitions:
1. Buckling-Restrained Brace (BRB): Specialty structural brace element consisting of an axial force resisting steel core encased by a system that prevents buckling of the steel core.
2. Quality Assurance (QA) Agency: Independent testing and inspection organization employed by the Owner to perform verification inspection and testing as defined by AWS and these specifications for shop fabrication and field erection of Bucking-Restrained Braces as shown on the Structural Drawings.
3. Design Story Drift: Difference in lateral deflections of the top and bottom of a story under consideration as defined on the drawings (1% minimum and 2% maximum).

C. Submittals:
1. Submit the following in accordance with requirements of Division 1.
   a. All submittals shall be furnished in English language.
   b. All submittals should be made to the Owner, Engineer of Record, and Building Official.
2. Brace Qualification Testing Report: Within 30 days of the contract award, the Brace Manufacturer shall submit a report that clearly describes how their brace meets or exceeds the testing and performance requirements of this specification. Brace qualification tests conducted by the manufacturer shall cover the range of brace sizes used on this project. The brace qualification test report shall be reviewed by the Owner's Quality Assurance Agency.
   a. The design of braces shall be based on qualifying cyclic tests in accordance with AISC 341-16 Section F4.5b(3) and Section K3.
3. Brace Manufacturer's Quality Control Plan: Brace Manufacturer shall submit Quality Control Plan, which shall include all the functions performed by the Manufacturer to ensure that the material and workmanship of meets the project specifications and applicable standards. Quality Control Plan shall address all testing and inspection issues, including fabrication/erection testing and inspection per AWS D1.1. This Quality Control Plan will be reviewed by the Owner's Quality Assurance Agency. The plan shall include the following elements:
   a. Indicate how the product is to be identified, such that it can be traced back to production quality assurance records.
   b. Include a flow chart of the process by which the product is manufactured, including description of production methods.
   c. List tests for materials, including the applicable recognized standard for each test and the qualifications of testing agency and/or personnel.
   d. Identify manufacturing tolerances for each production process.
   e. In-process quality control, including all points of internal inspection for control and

monitoring of the fabrication and assembly process.
1) Include copies of forms and checklists used to document inspections.
2) Include required qualifications of personnel performing each inspection.
3) Identify how inspection reports are reviewed and approved.

f. Plan shall also include manufacturer furnished quality assurance for erection, including, at a minimum, attendance at pre-erection conference and a minimum of one visit thereafter to observe installation of braces.

g. An authorized representative of the manufacturer shall certify the validity of the Plan by signing and dating.

4. Brace Manufacturer's Qualifications: Submit evidence that brace manufacturer had successfully tested and supplied BRB braces of a similar size and quantity for 3 projects within the last 3 years.

5. Brace Structural Designs: Contractor shall engage a structural engineer, licensed in the State that the project resides in, to design braces to achieve the performance criteria. Design shall be based on detailed examination and understanding of the results of qualifying tests and interpolation of results to project conditions. Submit the following brace design drawings and calculations stamped and signed by a structural engineer:

a. Design drawings that show the size and configuration of core plates for full length of braces. Indicate casing size, thickness, and length.

b. Structural Calculations that show the braces meet the project performance criteria. Calculations shall include but not be limited to the following:
1) Brace components outside of the casing including the bolted connection to gusset, the splice plates, and the brace transition areas Design for the strength to resist the adjusted brace strength in compression and tension as required by AISC 341. Adjusted brace strengths shall be based on the maximum yield stress permitted by this Specification. Consider the effect of the brace end rotations corresponding to 2.0 times the design story drift.
2) Brace Casing – Structural calculations to show that all of the brace casings have the overall buckling strength to resist the upper bound brace compressive force.
3) Gusset Plates- Submit structural calculations that show the gusset plates and their connections to the columns and beams provide the strength to resist the adjusted brace strength in compression and tension as required by AISC 341. Adjusted brace strengths shall be based on the maximum yield stress permitted by this Specification

c. Interpolation of test results for different member sizes shall be justified by rational analysis that demonstrates stress distributions and magnitudes of internal strains that are consistent with or less severe than the tested assemblies.

d. Preliminary Design: Make an initial submittal of the items listed above, based on assumed material properties, prior to delivery of materials to be employed in work.

e. Final Design: Submit final drawings, calculations and certifications that include the final dimensions of steel core plates based on results of mill certificates and coupon testing of steel to be employed in Work.
1) Submittal shall be accompanied by mill certificates and the results of coupon testing.

6. Brace Shop Drawings: Submit coordinated and checked shop drawings for all braces for review prior to fabrication. Shop drawings shall include brace location, core plate size, profile, lengths, casing dimensions, connections plates, welds, bolted connection information, surface preparation, etc. If braces are AESS then indicate welds to be ground smooth. Give complete information necessary for fabrication of elements of structural steel frame to receive braces and fabrication of connection plates. Show

methods of assembly, including type and size of bolts, hole diameter, and preparation and finish of faying surfaces. Identify tolerances for fabrication and erection.

7. Material Certification: Submit Steel Manufacturer's Mill Certificates that show steel meets the specification requirements. These will be reviewed by the Owner's Quality Assurance Agency.
   a. All steel: Tension tests and chemical analysis. Include trace elements for steel core plates.
   b. Steel Core Plates:
      1) Coupon test results for core plate material showing initial yield, yield at 2 percent offset, tensile strength, and elongation.
      2) Each BRB shall have the tension tests for the material that will form its core clearly identified.
   c. Charpy V-Notch testing for plates 2 inches (50mm) and thicker.
   d. Welding Electrodes: Include tensile, elongation, and CVN toughness tests. Identify diffusible hydrogen.
8. Welder Certification: Welder qualifications shall be submitted in accordance with AWS D1.1 for all welders performing shop welding on the braces.
9. Manufacturer's Certification: Brace Manufacturer shall submit Certification letter stating that the brace meets all of the material, fabrication, and performance requirements of the specification.
10. Brace Schedule: Manufacturer shall submit schedule for the manufacturing and delivery of the BRB's on this project. Contractor shall coordinate the delivery of the BRB's on this project with the steel fabrication and erection schedule.

D. Quality Assurance & Quality Control
   1. Provide special inspections and testing as described in the "Statement of Structural Special Inspections and Testing" within the structural drawings and as required by this section.
   2. The Owner shall employ a Quality Assurance Agency to supply verification inspection and testing as defined by AWS and these specifications for shop fabrication and field erection of all steel shown on the Structural Drawings.
   3. Qualification Tests: The design of braces shall be based on results from qualifying cyclic tests in accordance with AISC 341.. Tests shall consist of at least two successful cyclic tests: one is required to be a test of a brace subassemblage that includes brace connection imposed rotations and the other may be either a uniaxial or subassemblage test.
   a. Qualification Tests shall conform to requirements of AISC 341, current edition.
   4. Extrapolation of Qualification Testing: All deviations from materials, details of fabrication, and quality assurance controls used for the fabrication of tested prototype braces shall be identified by manufacturer and reviewed by Design Engineer to ensure that production braces meet or exceed the level of quality used in fabrication of prototype braces. Include the following items:
      a. Weld filler material, including CVN toughness.
      b. Welding procedures and details, including weld terminations.
      c. Shape and finish of plate edges at transitions.
      d. Finish of plate edges, including roughness and treatment of occasional notches.
      e. Tolerances for flatness and straightness of plates.
      f. Details of isolation between plates and core at transitions, to accommodate lengthening and shortening.
      g. Type and thickness of coating materials.

5. Coupon Testing of Core Plate Material:
   a. Sample and test in accordance with ASTM A6, ASTM A370, and ASTM E8. Report initial yield, yield at two percent (2%) offset, tensile strength, and elongation.
   b. Take samples from plates at point of brace manufacture.
      1) The axis of the test specimens shall be parallel to the axis of the brace core plates; no transverse testing is required.
      2) The centerline of the test specimen shall be at the center of bar stock whenever possible, within the middle third of the plate width at the furthest.
   c. Take a minimum of 3 specimens for each plate thickness, spaced sufficiently to be representative of the plate employed in the work.
      1) Take a minimum of 3 specimens from each heat of steel, where more than one heat is employed.
      2) Test additional samples where individual tests vary by more than 5 percent from average of 3 specimen tests.
   d. Report average yield at two percent offset for each set of test specimens. Result shall serve as basis for final design of braces.
6. Pre-Erection Conference: Contractor shall schedule meeting with Owner's Representative, BRB-manufacturer, and the steel erector's personnel supervising installation of buckling restrained braces to review installation procedures including handling, fit-up and fastening.

PART 2 – PRODUCTS

2.1 BUCKLING-RESTRAINED BRACES

A. Buckling Restrained Brace (BRB): CoreBrace™ as manufactured by CoreBrace, LLC or approved equal. BRB core plate areas and casing sizes and shapes shall be as shown on the drawings.

B. Performance Criteria:
   1. "BRB" core area shall be as indicated on Drawings, within the tolerances specified.
   2. B Braces shall provide for stable cyclic displacement (lengthening and shortening) corresponding to a story drift of at least 2% of the story height or two times the design story drift indicated on the Drawings, whichever is larger. Brace deformations resulting from deformation of the frame due to gravity loading shall be included. Assume brace end rotations, equal to interstory drift at the prescribed brace deformation, occur in combination with lengthening and shortening.
      a. Hysteretic behavior in the non-linear range shall show no sign of degradation or loss of strength.
      b. Graphs of test results shall show no signs of pinched hysteretic behavior.
   3. The portion of the steel core that projects beyond the casing shall provide for stable cyclic loading at the adjusted brace compressive and tensile strength without initiation of fracture.
   4. Tension and compression shall be resisted entirely by the steel core. The buckling restraining system shall prevent brace buckling and control plate buckling without restraining the steel core from transverse expansion and longitudinal shortening for deformations corresponding to the drifts and deformations noted.

2.2 MATERIALS

A. Core plate steel shall meet the requirements for ASTM A36 or equivalent. In addition, the steel shall have the following properties:
   1. Minimum and maximum yield stress: $F_{y\text{-}min}$ = 38.0 ksi; $F_{y\text{-}max}$ = 46.0 ksi. (measured at 2% offset)
   2. Minimum ultimate stress: $F_{u\text{-}min}$ = 58.0 ksi.
   3. Plates 2 inches (50 mm) and thicker shall be supplied with Charpy V-Notch testing in accordance with ASTM A6 Supplementary Requirement S5, or approved equal. The impact test shall meet a minimum average value of 20 ft-lbs absorbed energy at +70 degrees F and shall be conducted in accordance with AISC Specification, or approved equal.

B. Tube steel casing: ASTM A500 Grade B or equivalent.

C. High Strength Bolts: ASTM A490 (with threads to be excluded form shear plan)

D. Welding Material: Conformance with the welding material requirements of Specifications Section 05 12 00. Charpy V-Notch toughness of 20 ft-lbs at minus 0 degrees F and 40 ft-lb at 70 degrees F using the test procedures prescribed in AWS D1.8. Meet or exceed CVN toughness and elongation of material used for fabrication of tested assemblies.

E. Grout Fill Material: Manufacturer’s standard cementitious grout demonstrated as suitable to function as a confining in-fill material qualifications testing. Minimum compressive strength of 3000 psi.

F. Debonding Agent: Manufacturer’s standard; demonstrated suitable to maintain separation of steel core and grout encasement when subjected to a minimum of 30 cycles of inelastic yielding at 150% of the design story drift; resistant to aging effects for a life cycle of 50 years.

G. Shop Primer: In accordance with the primer paint requirements of Specification Section 05 12 00. Do not shop prime surfaces in contact with grout and high-strength and bolted connection surfaces.
   1. Faying surfaces of slip-critical bolted connections shall be prepared to meet requirements of the RCSC (Research Council on Structural Connections) for a Class A coating.

2.3 FABRICATION

A. Fabricate steel in accordance with Section 05 12 00, “Structural Steel.”
   1. Cut core plates to profile shown on Design Drawings. Conform to tolerances of Quality Assurance Manual, except tolerance on plate width shall not exceed plus or minus 0.2 inches (5 mm).
   2. Splices in the steel core are not acceptable.
   3. Roughness: After cutting, edges of core plates shall have roughness less than 500 micro-inches (12 microns).
   4. Gouges and Notches: Occasional gouges and notches less than 0.2 inches (5 mm) deep in edges of core plates may be repaired by grinding to a smooth transition. The length of transition shall be a minimum of 10 times the depth of gouge. The area shall be inspected by MT after grinding to ensure the entire depth of gouge has been removed. Deeper gouges shall be cause for rejection of piece.

5. All connection bolts holes shall be drilled (not punched).
6. Faying surfaces of high-strength bolted connections shall have a finish surface of SSPC SP-3 and shall not be shop primed.

B. The maximum dimensions of the casing of the buckling restrained brace shall be as indicated on the Drawings.

C. Welding: Continuously weld joints, using procedures intended to minimize distortion.
1. Where cruciform plates are terminated in core, pay particular attention to the detailing and finishing of weld termination; meet or exceed qualification tested assembly as minimum standard.

D. Assembly: Assemble components of the Buckling Restrained Brace in a manner to ensure proper performance of the brace.
1. Examine steel core areas for straightness prior to coating with debonding agent.
2. Provide end-confining plates to ensure confinement of the fill material while allowing for non-restricting movement of the steel core.

E. Prepare and shop prime metal surfaces as follows:
1. Commercial Blast (SSPC-6) clean as minimum surface preparation.
2. Apply paint primer at a minimum dry film thickness of 2 mils (75 microns), except at faying surfaces of high strength bolted connections.
3. Blast clean and paint faying surfaces of high strength bolted connections as required to achieve Class A faying surface in accordance with RCSC.

2.4 SHIPPING AND STORAGE

A. Manufacturer shall provide protection for all structural components to ensure against damage during shipping and storage.

2.5 SOURCE QUALITY CONTROL

A. Testing Laboratory will:
1. Review Manufacturer’s Quality Assurance Plan, mill certificates and results of coupon testing.
2. Review Manufacturer’s quality assurance test and inspection reports.
3. Observe fabrication and assembly as requested by Owner’s Representative.

B. Contractor shall:
1. Notify Owner’s Representative no less than 30 days before the start of fabrication of the buckling restrained braces, to allow Owner’s Representative to observe fabrication and assembly process.
2. Perform testing and inspection in accordance with approved Quality Assurance Plan and requirements of Contract Documents.

PART 3 – EXECUTION

3.1 ERECTION

A. Braces are erected under Section 05 12 00, “Structural Steel.”

B. Prior to erection, clean faying surfaces of brace to be in contact with bolted connections to remove temporary coatings applied for transport and surface contaminants.

C. Buckling restrained braces shall not be field cut or altered. Alterations to structural steel components to receive Buckling Restrained Braces shall be as permitted by Section 05 12 00.

D. No field welding to buckling restrained brace members will be permitted, including attachment of nonstructural components.

END OF SECTION

SECTION 051516 – STEEL CABLE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Steel Cable System Handrail and Railing materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 05 12 00 STEEL AND FABRICATIONS

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ASTM American Society of Testing Materials

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
   2. Shop Drawings.
   3. Samples.
      a. For connections and terminations to be used, provide one full sized sample of each.
         1) For type of cable to be used, 12 inch long sample, representing actual product.
   4. Quality Assurance/Control Submittals:
      a. Manufacturer's Written Instructions:
         1) Submit manufacturer's written instructions.
   5. Closeout Submittals in accordance with the following:
      a. Warranty in accordance with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted at final inspection.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.6 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES
      a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer, or approved equivalent:
      a. SECO SOUTH, INC. (727) 536-1924.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Stainless Steel Products:
1. Wire:
   a. ASTM A 492 "Specification for Stainless Steel Rope Wire," Type 316.
2. Rods:
   a. ASTM A 555 "Specification for General Requirements for Stainless Steel Wire and Wire Rods," Type 316.
3. Fittings:
   a. ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar," Type 316.
4. Tubing:
   a. ASTM A 554 "Specification for Welded Stainless Steel Mechanical Tubing," Type 316.
5. Strips, Plates and Flat Bars:
   a. ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar," Type 316.

B. Cable and Cable Assemblies:
1. Cables:
   a. Cable Strand 1 x 19:
      1) 3/16 inch diameter, 3,960.

C. Turnbuckles

D. Cable Fitting Attachments:
1. Attach cable fittings as follows:
   a. Swage: Machine swagged with cold-forming press.

E. Stainless Steel Cable Assemblies:
1. Cable assembly shall be sized to fit the cable.
   a. Cable Assembly System #2105: Threaded studs are placed at each end of the cable, with in-line turnbuckle.
      1) Threaded Studs #554 Swage Stud.
      2) Threaded Rod Turnbuckles #550 Turnbuckle.

2.3 FABRICATION

A. Shop Assembly:
1. Fit and shop assemble components in largest practical sizes for delivery to site.
2. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
3. Provide anchors and plates required for connecting railings to structure.
4. Exposed Mechanical Fastenings: Provide flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
5. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved shop drawings.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.

B. Layout:
   1. Lines shall be straight and true.

C. Installation:
   1. Install in accordance with manufacturer's written instructions.
   2. Install components plumb and level, accurately fitted, free from distortion or defects.
   3. Anchor railings securely to structure.
   4. Conceal bolts and screws whenever possible.
      a. Where not concealed, use flush countersunk fastenings.
   5. Tension cables as recommended by cable fittings manufacturer.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
   1. As required by Regulatory Requirements.

B. Inspection:
   1. As required by Regulatory Requirements.
   2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
   3. No work shall be without the inspections required by Regulatory Requirements.

C. Installation Tolerances:
   1. Maximum Variation from Plumb: 1/4 inch per floor level, non-cumulative.
   2. Maximum Offset From True Alignment: 1/4 inch.
   3. Maximum Out-of-Position: 1/4 inch.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. In accordance with manufacturer's written instructions and recommendations.

3.6 PROTECTION

A. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.
   2. Immediately after cleaning, neatly apply four (4) mil thick, minimum, polyethylene film over finished surfaces at traffic areas. Fasten film firmly to surface.

END OF SECTION

SECTION 053000 – METAL DECK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Metal Deck materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 15 14 DRILLED ANCHORS
   4. 03 30 00 CAST-IN-PLACE CONCRETE
   5. 04 22 00 CONCRETE MASONRY UNITS
   6. 05 12 00 STEEL AND FABRICATIONS
   7. 06 10 00 ROUGH CARPENTRY
   8. 07 14 16 FLUID-APPLIED WATERPROOFING
   9. 07 21 00 INSULATION
   10. 07 40 00 METAL PANELS (Factory Finished Metal Roof and Wall Panels)
   11. 07 51 13 BUILT-UP ROOFING
   12. 07 53 29 ELASTOMERIC MEMBRANE ROOFING
   13. 07 60 00 SHEET METAL
   14. 07 72 00 ROOF ACCESSORIES
   15. 07 81 16 FIREPROOFING
   16. 07 84 00 FIRESTOPPING
   17. 07 92 00 SEALANTS
   18. 09 22 16 METAL FRAMING
   19. 09 50 00 ACOUSTICAL CEILINGS
   20. 09 91 00 PAINTING
   21. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   22. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with Specification Section – REGULATORY REQUIREMENTS and the following standards:
      a. AISC American Institute of Steel Construction.
      b. AISI American Iron and Steel Institute.
      c. ASTM American Society for Testing and Materials.
      d. AWS American Welding Society "Structural Welding Code".
      e. DOD Department of Defense
      f. ICC International Code Council
      g. SDI Steel Deck Institute.
      h. SSPC The Society for Protective Coatings

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Include all accessories such as Metal Trim, Flute Closure Trim, Neoprene Closure Tape, Joint Covers, and Sound Insulation Batts (sized to fit flute profile).
   2. Shop Drawings:
      a. Indicate deck sheet layout and all installation details. Contract documents may not be used as shop drawings.
      b. Manufacturer's specifications for each Deck Type.
      c. Certification: Provide affidavits from the manufacturer listing mill test certificates by number for each size and type of decking.
      d. Manufacturer shall provide affidavits of approval by the International Code Council (ICC) for the metal decking shapes proposed.
   3. Quality Assurance/Control Submittals:
      a. Design Data.
         1) Submit manufacturer's design data indicating Metal Panel Section Properties (including gage, weight in pounds per ft^2, I+ and I-(in^4/ft), S+ and S-(in^3/ft), and profile dimensions).
      b. Test Reports:
         1) Submit Steel Mill Test Reports for each heat establishing conformity with these Specifications in accordance with CBC Section 2202A.
         2) Submit five (5) copies of Shop and Field Welding Tests and Inspection Reports.
   4. Closeout Submittals in accordance with Specification Sections in Division One:
      a. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. Materials shall be identified and tested in conformance with CBC Section 2202A.
   2. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
   3. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.

b. Tests and Inspection of Shop and field welding shall be in accordance with CBC Sections 1705A.2, 2204A.1 and 2213A.2.
   1) Perform shop and field welding only under supervision of an AWS/CWI inspector, by welders recently qualified by Test as prescribed in AWS "Standard Qualifications Procedure", and per CBC Section 2205A and 2213A.

c. When Metal Decking is part of a "listed" deck assembly as indicated on the drawings, provide Metal Decking units listed in Underwriter's Laboratories (UL) "Fire Resistive Directory", or other approved "Fire Resistive Directory", with each deck unit bearing the fire resistive label and marking for specific system detailed.

C. Certificates:
   1. Provide a letter on Contractor's Letterhead certifying Work provided, meets or exceeds, the requirements of this Section.

1.5 SCHEDULING

A. Schedule the Work so that there will be no excessive inspection time. At all times that an inspector is required, sufficient work shall be laid out and adequate personnel supplied so that the Inspector's time will be used to full advantage. If inspection costs become excessive because of poor shop procedure, such excess costs will be paid for by the Owner, but deducted from the Contract Price. Poor procedures will be determined upon review of Inspection and/or Testing Reports. The rate for charging the excess costs will be as follows:
   1. Minimum of three (3) certified welders are used, Owner will pay 100 percent.
   2. Only two (2) certified welders are used, Contractor will be charged 1/3 of the Inspection cost.
   3. Only one (1) certified welder is used, the Contractor will be charged 2/3 of the inspection cost.

1.6 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES
      a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer:
      a. VERCO MANUFACTURING COMPANY.
      b. EPIC Metals Epicore
      c. Acceptable alternative manufacturers:
         1) ASC PROFILES

B. Acceptable alternative manufacturerProducts from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Structural:
   1. Steel for galvanized Metal Deck Units shall be in accordance with ASTM A 653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process", grade as indicated on the drawings and in compliance with SDI specifications. The steel sheets shall have received, before being formed, a metal protective coating of Zinc conforming to ASTM A653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process" Class G60 coating.
   2. Provide deck sections, type and gage as indicated on the drawings. Other manufacturers producing deck complying with these Specifications, and having equivalent properties and dimensions will be subject to the Architect's review upon submission of substantiating data, and may be used only if equivalent to deck sections specified, in the Architect's opinion.
   3. All deck units shall have an International Code Council (ICC) Evaluation Services Report.
      a. Diaphragm shear capacities shall be comparable (within 5%) to those listed on the drawings for the deck, welding, and spans indicated.
   4. Units shall be in lengths to span over three or more supports. Where steel layout does not permit two-span minimums, notify the Structural Engineer prior to fabrication.
   5. For limitations of loads to metal decking see calculations.
   6. All deck units shall have male and female interlocking side joints. All deck units with concrete or insulating concrete shall be vented to provide 1% open area.
   7. Prior to covering or filling metal decking, verify and coordinate installation requirements of suspended metal framing, suspended acoustical ceiling systems, mechanical and electrical work or other items as required. Provide inserts, clips, anchors or fasteners as indicated or as otherwise required to provide for the complete and proper installation of suspended items from the metal deck.
      a. Coordinate with Specification Section - ACOUSTICAL CEILINGS.

b. Verify and coordinate locations, patterns, spacing, etc. of suspension members and connectors required by other Sections of the Specifications.
c. Where suspension or hanger wires are required under other Sections, verify and coordinate locations, patterns, spacing, etc. with the appropriate trade. No loading other than suspended ceilings may be suspended from metal deck without concrete fill. Suspend all piping, ducting, conduit and equipment from steel beams.

8. Structural Properties: Deck shall have minimum structural properties as indicated on Structural Drawings.
9. Acoustical Properties: When Acoustical Decks are required, provide acoustical deck with the following properties:
   a. Vertical webs (except at side joint) shall be perforated with 5/32" diameter holes on staggered 7/16" centers to provide 0.85 Noise Reduction Coefficient (NRC). NRC of completed assembly shall be as determined by tests in accordance with ASTM C 423 "Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method".

2.3 ACCESSORIES

A. Miscellaneous Steel Shapes:
   1. Provide in accordance with Specification Section – STEEL AND FABRICATIONS, and ASTM A 36.

B. Shear Connectors:
   1. Headed stud type, in accordance with ASTM A 108 "Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality", Grade 1015 or 1020, cold-finished carbon steel, with dimensions complying with AISC specifications.
      a. Tensile Strength: 60,000 psi.
      b. Elongation in 2 Inches: 20 percent.
      c. Reduction of Area: 50 percent.

C. Fabricated Sheet Metal:
   1. Provide in accordance with Specification Section - SHEET METAL and ASTM A 653, commercial quality, galvanized.
      a. Cell closures where shown on Drawings.
      b. Light gage plate fillers attached to deck to provide an uninterrupted roof plane.
      c. Drain sumps and/or roof drain mounting plates as detailed.
      d. Cell end closures column flashing and miscellaneous closures to prevent concrete leakage.
      e. Miscellaneous accessories incidental to erection of deck.

D. Acoustical Insulation: Glass fiber type, 1-1/2" thick, in accordance with ASTM C 665 "Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing", Type I, Class A, sized to fit the appropriate flute profile.

E. Welding Rods: E70XX minimum.

2.4 FABRICATION

A. Shop Assembly:
   1. Form metal deck units in lengths to span three or more supports, with flush, telescoped, or nested 2-inch laps at ends and interlocking or nested side laps, of metal thickness, depth, and width as indicated.

a. Roof Deck Units:
1) Provide deck configurations that comply with SDI "Specifications and Commentary for Steel Roof Deck".

2. Accessories:
a. Metal Cover Plates:
1) Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness as decking.
2) Form to match contour of deck units and approximately 6-inches wide.
b. Metal Closure Strips:
1) Fabricate metal closure strips, for cell raceways and openings between decking and other construction, of not less than 0.045-inch (18 gage) sheet steel.
2) Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.
3) Continuous closures parallel and over beam flanges are not allowed.
4) Fabricate Profiled Metal Closure Strips for exposed "top of wall" connections and similar conditions where flutes are to be closed to view on underside of deck.
c. Roof Sump Pans:
1) Fabricate from single piece of 0.071-inch (14 gage) minimum galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain.
2) Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3-inches wide.
3) Recess pans not less than 1-1/2 inches below roof deck surface unless otherwise shown or required by deck configuration.
4) Holes for drains shall be cut in the field.

2.5 FINISHES

A. Hot-Dip Galvanizing (both sides of metal deck):
1. Zinc coatings on iron and steel products in accordance with ASTM A 123 "Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products".
2. Zinc coatings on iron and steel hardware shall be in accordance with ASTM A 153 "Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware".
3. Galvanized repair paint: High-Zinc-Dust-Content, in accordance with SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight paint for re-galvanizing welds and repair painting galvanized steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:
1. Prior to the execution of the Work under this specification section, inspect the installed Work executed under other specification sections of this Project Manual which affect the execution of Work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin Work until unacceptable conditions have been corrected.
3. Execution of Work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate Work under this specification section with Work specified under other specification sections to ensure proper and adequate interface of Metal Decking Work specified under this specification section.
2. Prepare shop drawing in conjunction with trade contractors for all opening on metal deck. See Structural Drawings for opening details. Coordinate all opening locations with Mechanical for duct risers, Electrical and Plumbing for conduit / pipe risers.
3. Prepare edge of deck shop drawings. Coordinate the edge of deck with the installed edge of concrete slab on grade and determine if the concrete edges have been placed and align with planned edge of metal deck. Adjust and align metal deck closures with slab on grade, and other floor levels.
   a. Edge of deck closure plates shall be shop welded after coordination efforts have occured.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, welding burns, and other damage from Work under this specification section.

C. Surface preparation:
1. Prepare surface of metal decking for any additional finish as indicated on the drawings in accordance with manufacturer's written instructions and recommendations.

3.3 INSTALLATION

A. General:
1. In accordance with Regulatory Requirements.
2. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
3. In accordance with approved shop drawings.
4. Set plumb, level, and square to supports.

B. Layout:
1. Lines shall be straight and true without deformations, creases, wrinkles or noticeable defects.
2. Provide one deck unit continuous over three (3) supports, minimum, unless noted otherwise.
3. Abut end joints neatly at centerline of support.
4. Bend decking to conform to slopes and warps as required for solid contact to framing that allows proper welding.
5. Shoring for metal decking shall be provided by the contractor as required and as indicated in the corresponding ICC Evaluation Services Report. Coordinate shoring requirements for construction live load (and concrete placement) with the manufacturer.
6. All deck units shall break over beams.
7. Provide low ribs at all beams parallel to deck. As an alternate, the deck may be broken and in-filled with a flat pan to provide deck welding to parallel beams.
8. Butt deck units tight over steel beams.
9. Provide 3/4" clear concrete cover around all welded studs.

C. Minimum Fastening Requirements:

1. Fasten in accordance with the structural drawings and/or manufacturer's written recommendations whichever is most restrictive by use of 15/16" visible diameter (1/2" effective diameter) fusion welds.
2. Roof Deck units shall be fastened to resist gross uplift loading in accordance with CBC Section 1609A with a minimum of 45 lbs./ft2 at eave overhang, and 30 lbs./ft2 for other roof areas.
3. The metal deck shall be fastened to all structural members both parallel and perpendicular. Spread deck and modify layout where structural members are parallel to the metal deck ribs.

D. Cutting and Fitting:
1. Cut and neatly fit deck units and accessories around other Work projecting through or adjacent to the decking, and support of other Work shown.
2. Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other Work shown.
3. Provide DSA/SSS approved hanger slots or clips between cells of flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers, or lighting fixtures.
   a. Hanger clips designed to clip over male side lap joints of floor deck units that are approved by DSA/SSS may be used instead of hanger slots.
   b. Local slots or clips at no more than 14-inches o.c. in both directions, not over 8-inches form walls at ends, and not more than 8-inches form walls at sides, unless otherwise indicated on the drawings.
   c. Provide manufacturer's standard hanger attachment devices provided they are in accordance with IR 25-2.13 or IR 25-3, and approved by DSA/SSS.

E. Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.

F. Provide roof sump pans over openings provided in roof decking and weld to top decking surface. Space welds not more than 12-inches o.c. with at least one weld at each corner.

G. Weld shear connectors to supports through decking units as shown on the structural drawings.
1. Do not weld shear connectors through two layers (lapped ends) of decking units.
2. Weld only on clean, dry deck surfaces.

H. Provide metal closure strips at open uncovered ends and edges of roof decking and in voids between decking and other construction.
1. Weld into position to provide a complete decking installation.
2. Continuous closure perpendicular to flutes not allowed.

3.4 REPAIR / RESTORATION

A. After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.
1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's written instructions.
2. Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.
3. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.
4. Clean surfaces of installed deck by effective means to receive sprayed-on fireproofing or finish painting as indicated.

3.5 FIELD QUALITY CONTROL

A. Site Tests:
   1. As required by Regulatory Requirements.
      a. Inspection of installation as per Specification Section – TESTING LABORATORY SERVICES.

B. Inspection:
   1. As required by Regulatory Requirements.
   2. Schedule inspections and notify the Architect, Owner's Inspector and any regulatory agencies of the time at least 48 hours prior to the inspection.
   3. No Work shall be without the inspections required by Regulatory Requirements.
   4. All materials, methods and equipment shall be subject to inspections by the Testing Laboratory at any time.
   5. Welding Inspection: Welding of metal deck shall be performed under the inspection of the Testing Laboratory. Inspection shall conform to CBC Section 2213A.
   6. Examine areas to receive work specified. Do not begin work until underlying work is complete, all required inspections have been made, and all conditions, which might prevent proper installation or impair performance of work have been corrected.
   7. Beginning installation means accepting conditions of underlying work.
   8. If supporting steel work is not properly aligned or sufficiently level to permit proper bearing of metal decking, such deficiency shall be corrected by the Contractor before placing units.

C. Defective Deck:
   1. Units of decking that become deformed or damaged to such extent that they are weakened or unsuitable for use shall be removed and replaced at no cost to the Owner.

3.6 CLEANING

A. Cleaning:
   1. Clean in accordance with Specification - PROJECT CLOSEOUT.
      a. Clean all surfaces of Metal Deck to receive concrete fill as required to assure adequate bond in accordance with manufacturers requirements.
      b. Clean all surfaces of Metal Deck prior to painting.

END OF SECTION

SECTION 055200 – RAILING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Wall Mounted Handrails.
      b. Guardrail, Mounted Handrails.
      c. Free Standing Handrails.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 05 12 00 STEEL AND FABRICATIONS
   4. 06 10 00 ROUGH CARPENTRY
   5. 09 22 16 METAL FRAMING
   6. 09 91 00 PAINTING
   7. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   8. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards
   1. In accordance with the following standards:
      a. AA Aluminum Association "Specifications for Aluminum Structures."
      b. AISC Cold-Formed Structural Steel: AISI "Specification for the Design of Cold-Formed Steel Structural Members."
      c. ASCE American Society of Civil Engineers "Minimum Design Loads for Buildings and Other Structures".

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: It is the intention of this specification section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.
   1. Design Performance of Handrails and Railing Systems: Engineer, fabricate, and install handrails and railing systems to withstand the following loads without exceeding the allowable design working stress of the materials for handrails, railing systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems.
      a. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
         1) Concentrated load of 200 lbf applied at any point and in any direction.

2) Uniform load of 50 lbf per linear foot applied horizontally and concurrently with uniform load of 100lbf per liner foot applied vertically downward.
3) Concentrated and uniform loads above need not be assumed to act concurrently.

b. Anchors: Cast-in-Place or Post Installed Anchors of type indicated, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete.
1) As determined by testing per ASTM E 488 "Test methods for Strength of Anchors in Concrete and Masonry Elements", conducted by a qualified independent testing agency.

2. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in engineering, fabricating, and installing handrails and railing systems to prevent buckling, opening of joints, over stressing of components and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.
a. Temperature Change (Range): 120 deg F, lambent; 180 deg F, material surfaces.

3. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
2. Shop Drawings.
a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
3. Quality Assurance/Control Submittals:
a. Test Reports:
1) Cast-In-Place or Post Installed Anchors.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
2. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.6 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES
      a. Warranty Period One (1) Year.
      b.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer for Steel Pipe Railing and Handrail Systems:
      a. JULIUS BLUM & CO., INC.
   2. Specified product manufacturer for Floor Sleeves and Cover Plate System:
      a. JULIUS BLUM & CO., INC.

B. Products from other manufacturers not listed must submit in accordance with Specification Section – SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General: Provide metal free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discoloration, or other imperfections on finished units are not acceptable.
   1. Stainless Steel: Grade and type designated below for each form required:
      a. Tubing: ASTM A 554 "Specification for Welded Stainless Steel Mechanical Tubing", grade as follows:
         1) Grade MT 304.
      b. Pipe (1.900" O.D.): ASTM A 312 "Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes", grade as follows:
         1) Grade Type 304.
      c. Castings: ASTM A 743 "Specifications for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application", Grade CF 8 or CF 20.
      d. Brackets: ASTM A 167 "Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip", type as follows:

1) Grade Type 304.

2.3 ACCESSORIES

A. Fasteners: For Anchoring Railings to Other Construction, select fasteners of the type, grade, and class required to produce connections that are suitable for anchoring railing to other types of construction indicated and capable of withstanding design loading.
   1. For stainless steel railings, provide fasteners fabricated from Type 304 stainless steel.
   2. For steel railings and fittings, use plated fasteners complying with ASTM B 633 “Specification for Electro deposited Coatings of Zinc on Iron and Steel”, Class Fe/Zn 25 for electro-deposited zinc coating.
   3. Fasteners for Interconnecting Railing Components: Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
      a. Provide concealed fasteners form interconnecting handrail and railing components and for attaching them to other work, except where exposed fasteners are unavoidable or are the standard fastening method for handrail and railing system indicated.

B. Anchors: Cast-in-Place or Post Installed Anchors of type indicated, fabricated from corrosion-resistant materials.

C. Floor Sleeve Cover Plates:
   1. Stainless Steel 4.5 inch diameter x 7/8 inch high cover flange.

2.4 FABRICATION

A. General: Fabricate handrails and railing systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of hollow members, post spacing, and anchorage, but not less than that required to support structural loads.

B. Assemble railing systems in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation. Use connections that maintain structural value of joined pieces.
   1. Form changes in direction of railing members as follows:
      a. By bending (unless otherwise indicated by the contract documents).
   2. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
   3. Welded Connections: Fabricate railing systems and handrails for connecting members by welding. For connections made during fabrication, weld corners and seams continuously to comply with the following:
      a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
      b. Obtain fusion without undercut or overlap.
      c. Remove welding flux immediately.
      d. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

4. Non welded Connections: Fabricate railing systems and handrails by connecting members with railing manufacturer's standard concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
   a. Fabricate splice joints for field connection using epoxy structural adhesive where this represents manufacturer's standard splicing method.
5. Brackets, Flanges, Fittings, and Anchors: Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.
   a. Fabricate mount anchorage assembly consisting of steel sleeves, angles and bolts for support of platform handrails.
6. Provide inserts and other anchorage devices to connect handrails and railing systems to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.
7. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, and steel plate forming bottom closure.
8. For removable railing posts, fabricate slip-fit sockets from steel tube whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist being dislodged.
   a. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from the same metal as railings.
9. Shear and punch metal cleanly and accurately. Remove burrs form exposed cut edges.
10. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing work.
11. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
12. Provide weep holes or another means to drain entrapped water in hollow sections of railing members that are exposed to exterior or to moisture from condensation or other sources.
13. Fabricate joints that will be exposed to weather in a watertight manner.
14. Close exposed ends of handrail and railing members with prefabricated end fittings.
15. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of the railing and wall is 1/4 inch or less.
16. Toe Boards: Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.
17. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and over stressing of substrate.

2.5 FINISHES

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
   1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering prior to shipment.

2. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and they are assembled or installed to minimize contrast.

B. Stainless Steel Finishes:
1. Remove or blend tool and die marks and stretch lines into finish.
2. Grind and polish surface to produce uniform directional, textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
   a. Bright, Directional Polish: Match AISI No. 4 finish.

2.6 SOURCE QUALITY CONTROL

A. Fabrication and Installation shall be in accordance with approved manufacturers fabrication and installation details and recommendations.

B. Fabrication and Installation shall conform to following general requirements:
1. All cuts must be free of burns, nicks and sharp edges. Deburr with care so as not to chamfer exposed edges of cuts. All cuts shall be square and accurate for minimum joint gap.
2. Pre-drill 15/64 inch diameter weep holes in all posts set in concrete or otherwise closed at the bottom, and in all bends and elbows at low points to allow for drainage of the railing system. Weep holes shall be located at the lowest possible elevations and in the plane of the railing membranes. (1/2 to 3/4 inch above post-collar acceptable).
3. Whenever possible, top rails shall be of a continuous, single un-spliced length and attached to a minimum of three posts, or brackets. Top rail splices and expansion joints must be located within 8 inches of a post support.
4. Bottom rails shall be of continuous un-spliced lengths between posts.
5. Posts shall be one continuous length from mounting surface to top rail.
6. To protect from temperature induced stresses, the pipe railing system shall be provided with proper expansion joints in accordance with approved manufacturers recommendations.
7. All holes shall be drilled and countersunk the proper size required for a tight flush fit of all fastening devices.
8. All railing surfaces that come in contact with other materials that could generate dissimilar material electrolysis shall be painted with a protective coat of asphaltic paint. Care shall be taken to prevent any of the protection form being visible on the finished installation.
9. All trim, accessories, and related items which are required for a complete, finished installation of the Pipe Railing System shall be installed in accordance with approved manufacturers recommendations and details.
10. All fabrication and assembly fastenings on components shall be on the bottom surfaces. No visible mechanical fasteners will be allowed except for mounting bolts at terminal connections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work specified under this specification section.
2. Coordinate setting drawings, diagrams, templates, instructions, and directions for installing anchorages, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors, that are to be embedded in concrete as masonry construction. Coordinate delivery of such items to Project site.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Fit exposed connections accurately together to form tight, hairline joints.
6. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required to installing handrails and railing. Set handrails and railings accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.
   a. Do not weld, cut, or abrade surfaces of handrails and railing components that have been coated or finished after fabrication and are intended for field connection by mechanical or other means without further cutting or fitting.
   b. Set posts plumb within a tolerance of 1/4 inch in 12 feet.
   c. Align rails so that variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
7. Field Welding: Comply with the following requirements:
   a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   b. Obtain fusion without undercut or overlap.
   c. Remove welding flux immediately.

d. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

8. Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated but not less than that required by structural loads.
9. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings systems and for properly transferring loads to in-place construction.

B. Layout:
1. Lines shall be straight and true.

C. Railing Connections:
1. Non welded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic filler, cement colored to match finish of handrails and railing systems.
2. Welded Connections: Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact, or use fittings designed for this purpose.
3. Expansion Joints: Install expansion joints at locations indicated but not further apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches of post.

D. Anchoring Posts:
1. Anchor posts in concrete with pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, solidly fill annular space between posts and sleeve with the following anchoring materials, mixed and placed to comply with anchoring material manufacturer's written directions.
2. Anchor posts in concrete by forming or core-drilling holes not less than 5 inches deep and 3/4 inch greater than outside diameter of post. Clean holes of all loose material, insert posts, and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written directions.
   a. Non shrink, nonmetallic grout.
3. Cover anchorage joint with a round flange of same metal as post, attached to post as follows:
   a. Welded to post after placement of anchoring material.
4. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8-inch buildup, sloped away form post.
5. Anchor steel posts to steel with oval flanges, angle type, or floor type as required by conditions, welded to posts and bolted to metal supporting members.
6. Anchor posts to metal surfaces with oval flanges, angle type or floor type as required by conditions, connected to posts and to metal supporting members as follows:
   a. For stainless-steel railings, weld flanges to post and bolt to metal supporting surfaces.

E. Anchoring Rail Ends:
1. Anchor rail ends into concrete and masonry with round flanges connected to rail ends and anchored into wall construction with post-installed anchors and bolts.
2. Anchor rail ends to metal surfaces with oval or round flanges.
   a. Weld flanges to rail ends.

b. Connect flanges to rail ends using non-welded connections.
c. Bolt flanges to metal surfaces.

3. Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.

F. Attaching Handrails to Walls:

1. Attach handrails to wall with wall brackets and end fittings. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
3. Secure wall brackets and wall return fittings to building construction as follows:
   a. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
   b. Use type of bracket with predrilled hole for exposed bolt anchorage.
   c. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bot, as applicable.
   d. For hollow masonry anchorage, use toggle bolts with square heads.
   e. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with stud installations to accurately locate backing members.
   f. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support the structural loads.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's field services:

1. Provide the services of a factory-authorized service representative to supervise the field assembly of components and installation of products or systems and related connections specified within this section, and to report the results in writing to the Architect.

B. Inspection:

1. Test Cast-in-Place or Post Installed Anchors of type indicated, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete.
   a. As determined by testing per ASTM E 488 "Test Methods for Strength of Anchors in Concrete and Masonry Elements" conducted by a qualified independent testing agency.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Clean any soiled surfaces immediately.
2. Clean the following metal by washing thoroughly with clean water and soap, followed by rinsing with clean water.
   a. Stainless steel.

END OF SECTION

SECTION 061000 – ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to complete all rough carpentry, accessories and other related items necessary to complete the Project as indicated by the Construction Documents unless specifically excluded.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 11 01 CONCRETE FORMWORK
   4. 03 15 14 DRILLED ANCHORS
   5. 03 30 00 CAST-IN-PLACE CONCRETE
   6. 04 22 00 CONCRETE MASONRY UNITS
   7. 05 12 00 STEEL AND FABRICATIONS
   8. 05 30 00 METAL DECK
   9. 05 52 00 RAILING SYSTEMS
   10. 06 22 00 MILLWORK
   11. 06 41 23 MODULAR CASEWORK
   12. 07 21 00 INSULATION
   13. 07 40 00 METAL PANELS
   14. 07 51 13 BUILT-UP ROOFING
   15. 07 53 29 ELASTOMERIC MEMBRANE ROOFING
   16. 07 60 00 SHEET METAL
   17. 07 72 00 ROOF ACCESSORIES
   18. 07 84 00 FIRESTOPPING
   19. 07 92 00 SEALANTS
   20. 08 11 00 METAL DOORS AND FRAMES
   21. 08 31 13 ACCESS DOORS AND FRAMES
   22. 08 33 00 COILING DOORS
   23. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   24. 08 41 00 STOREFRONTS
   25. 08 41 23 STOREFRONT TEMPERATURE RISE
   26. 08 70 00 HARDWARE
   27. 08 91 00 LOUVERS
   28. 09 22 16 METAL FRAMING
   29. 09 24 00 CEMENT PLASTER
   30. 09 29 00 GYPSUM BOARD
   31. 09 30 00 TILE
   32. 09 50 00 ACOUSTICAL CEILINGS
   33. 09 65 10 RESILIENT BASE AND ACCESSORIES
   34. 09 65 19 RESILIENT TILE
   35. 09 68 40 CARPET
   36. 10 05 00 MISCELLANEOUS SPECIALTIES
   37. 10 11 00 VISUAL DISPLAY BOARDS
   38. 10 14 00 IDENTIFYING DEVICES
   39. 10 21 13 TOILET PARTITIONS
   40. 10 28 13 TOILET ACCESSORIES

41. 10 44 00 FIRE PROTECTION SPECIALTIES
42. 10 51 13 METAL LOCKERS
43. 11 62 00 MUSIC EQUIPMENT
44. 12 66 13 TELESCOPING BLEACHERS
45. 14 24 23 HYDRAULIC ELEVATORS
46. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
47. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
1. In accordance with the following standards:
   a. ALSC American Lumber Standards Committee
   b. ANSI American National Standards Institute
   c. APA The Engineered Wood Association (Formerly the American Plywood Association)
   d. ASME American Society of Mechanical Engineers International
   e. AWPA American Wood Protection Association
   f. CABO Council of American Building Officials
   g. FS Federal Specification
   h. ICC International Code Council
   i. NDS National Design Specification for Wood Construction
   j. NIST National Institute of Standards and Technology
   k. PS Product Standards of the U.S. Department of Commerce
   l. RIS Redwood Inspection Service
   m. WCLIB West Coast Lumber Inspection Bureau
   n. WWPA Western Wood Products Association

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data:
   a. Submit manufacturer's data for Wood-Preservative Treatment.
   b. Submit manufacturer's data for Fire-Retardant Treatment.
   c. Submit manufacturer's data for power driven fasteners, metal-framing connectors, and metal framing anchors.
2. Quality Assurance/Control Submittals:
   a. Material Certificates: Submit Material Certificates of Compliance to Standards and Regulatory Requirements.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
   a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver undamaged products to project site in manufacturer's sealed containers or bundles with tags and labels intact.

B. Storage and Protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
2. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:
1. Dust Control: Perform work in a manner as to minimize the spread of dust and flying particles.
2. Burning: No burning will be allowed on-site.
3. Rain: Work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.7 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES
      a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Power Driven Fastener specified product manufacturer:
      a. HILTI FASTENING SYSTEMS.
   2. Metal Framing Anchor specified product manufacturer:
      a. SIMPSON STRONG-TIE COMPANY.
      b. Acceptable alternative manufacturers:
         1) Manufacturers of Alternative Metal Framing Anchors shall have Model Code Research Evaluation Reports and Published allowable design loads that are determined from empirical data, or by rational engineering analysis, that are demonstrated by comprehensive testing performed by a qualified testing agency acceptable by the Architect or its Designated Design Consultant, and DSA.
   3. Metal Timber Framing Connector specified product manufacturer:
      a. SIMPSON STRONG-TIE COMPANY.
      b. Acceptable alternative manufacturers:
         1) Do not substitute connectors manufactured by others than SIMPSON STRONG-TIE COMPANY without prior written review by the Architect or its Designated Design Consultant, and DSA.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Wood:
   1. Douglas Fir - Larch:
      a. Standards and Requirements: In accordance with WCLIB "Standard Grading and Dressing Rules" No. 17, latest edition, and WWPA “Western Lumber Grading Rules• ,latest edition.
         1) All wood shall be "DRY" and having a moisture content of less than 19 percent at the time of installation, in accordance with WWPA.
         2) Provide wood of S4S unless otherwise noted.

3) Factory mark each piece of wood with the grade stamp of the grading agency.

b. Grading and Use Requirements:

Item	Sizes	Grade	Maximum Moisture Content at Initial Use (Installation)
Studs	2x	No. 1	19%
Studs	3x, 4x, 6x	No. 1	19%
Sills & Plates	2x	No. 1	19%
Sills & Plates	3x, 4x, 6x	No. 1	19%
Beams	4x, 6x	No. 1	19%
Joists	2x	No. 1	19%
Posts	4x, 6x, 8x	No. 1	19%
Ledgers	2x	No. 1	19%
Ledgers	3x, 4x, 6x	No. 1	19%
Blocking	2x, 3x, 4x, 6x	Construction	19%
Sheathing and Stripping	Up to 1-1/2” thick 2” width and wider	Construction	19%
Stripping	2x, 3x, 4x, 6x	Construction	19%
Nailers & Grounds	2x, 3x, 4x, 6x	Construction	19%
Furring	2x, 3x, 4x, 6x	Construction	19%
T & G Decking	2x	Select Dex	15%

1) Initial use shall be that point at which screws or other fasteners or the holes for said fasteners are installed into the wood.
2) The Contractor shall use whatever means necessary, including site drying to ensure that the moisture contents listed above are not exceeded.

B. Plywood:

1. Soft Plywood:

a. Standards and Requirements: In accordance with PS1-09, Group 1 Douglas-Fir and PS2-10.

1) Factory mark each piece of plywood with the APA Grade Stamp.
2) Maximum Moisture Content at Initial Use (Installation) shall be 15 percent.

b. Grading and Use Requirements:

1) Wall, Roof, and Parapet Sheathing:
a) APA Rated Sheathing - Structural 1.
b) Span Rating as required to suit stud or joist spacing.
c) Exposure Durability Classification - Exposure 1.
d) Species Group 1.
e) Grade C-C 3 ply for 1/4 inch thickness and C-D 5 ply for 1/2 and 5/8 inch thickness.

2) Subflooring, Floor Sheathing as underlayment, Equipment Platform Sheathing:
a) APA Rated "Sturdi-Floor".
b) Span Rating as required to suit joist spacing.
c) Exposure Durability Classification - Exposure 1.
d) Species Group 1.
e) Grade C-C plugged.

3) Backing panels for Electrical Equipment.
a) APA Rated Sheathing - Structural 2.
b) Exposure Durability Classification - Exterior.
c) Species Group 1.

d) Grade C-C.
e) Shall be 3/4 inch minimum thickness.

4) Backing panels for Telecommunication Equipment:
a) APA Rated Sheathing - Structural 2.
b) Exposure Durability Classification - Exterior.
c) Species Group 1.
d) Grade A-B.
e) Shall be 3/4 inch minimum thickness.

2.3 FINISHES

A. Preservative Treatment:
1. Pressure Treat Wood and Plywood, with CARB Complying, EPA Registered, preservatives in accordance with AWPA Standards "U", "T", and "P".
   a. Do not use material that does not comply with the requirements for untreated material.
   b. After treatment, kiln-dry wood to a maximum moisture content of 19 percent.
   c. After treatment, dry plywood to a maximum moisture content of 15 percent.
   d. Factory mark each treated item with the treatment quality mark of an Independent Inspection Agency approved by the ALSC Treated Wood Program.
2. Non-pressure treat Wood and Plywood, with CARB Complying, EPA Registered preservatives in accordance with AWPA Standards "U• ","T","P" • and "N".

B. Fire Retardant Treatment:
1. Fire Retardant Treat Wood and Plywood with pressure treatment materials that comply with performance requirements of CBC 2303.2.
   a. Use Exterior Type.
   b. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures when tested by a qualified independent testing agency and is acceptable to Fire and Life Safety authorities.
   c. Use treatment that does not promote corrosion of metal fasteners.
   d. After treatment, kiln-dry wood to a maximum moisture content of 19 percent.
   e. After treatment, dry plywood to a maximum moisture content of 15 percent.
   f. Factory mark each treated item with the treatment quality mark of an Independent Inspection Agency.

2.4 ACCESSORIES

A. Fasteners: All types shall comply with standards and dimensions of the latest edition of NDS. All types of fasteners exposed to wet or exterior conditions, in-ground contact, in pressure or preservative treated woods, in concrete or masonry, or in an area of high relative humidity shall be hot-dipped galvanized in accordance with ASTM A 153 "Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware".
1. Nails: Common wire nails or spikes complying with ASTM F 1667 "Specification for Driven Fasteners: Nails, Spikes, and Staples", and CBC Section 2304.10. Box nails and sinker nails are not permitted. Vinyl coating is permitted on common nails.
2. Bolts: Steel bolts complying with ASTM A 307 "Specification for Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength", Grade A, hex head.
   a. Provide hex head nuts complying with ASTM A 307 "Specification for Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength", and standard flat washers complying with ANSI/ASME B18.22.1, Type A, Wide pattern.
3. Lag Bolts: Shall comply with ANSI/ASME B18.2.1, hex head.

a. Provide standard flat washers complying with ANSI/ASME B18.22.1, Type A, Wide pattern.

4. Wood Screws: Shall comply with ANSI/ASME B18.6.1.
   a. Screws for fastening wood to Metal Framing shall comply with ASTM C 954 "Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness".
5. Power Driven Fasteners: Tempered Steel pins with corrosive resistant plating or coating complying with ICC ESR-1539.

B. Metal Framing Anchors: All anchors shall comply with ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process", G90 Coating Designation for hot-dipped zinc-coated steel sheet. Provide structural, commercial, or lock-forming quality as standard with manufacturer for type of anchor indicated.
   1. Metal Framing Anchors for preservative-treated wood or fire-retardant treated wood shall conform to ASTM A653, Type G185 zinc-coated galvanized steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.
   4. Verify that work under this Section may be performed in strict accordance with the original design and all pertinent codes and regulations.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all materials from damage occurring from work called for under this specification section.

C. Preservative Treatment:
   1. Members requiring pressure treatment:
      a. Sills, Plates, Ledgers, Studs, Joists, Blocking, Nailers and Furring attached or resting on or against concrete or masonry construction.
      b. Pressure treated members cut in the field shall have the cut ends painted with preservative until the wood or plywood absorbs no more preservative.
   2. Members requiring field treatment:
      a. All wood and plywood members at exterior walls within two feet of the ground surface.

b. Treat all surfaces of the member.
c. Treat by dipping the required portion of the member into preservative for 15 minutes or paint until the wood or plywood absorbs no more preservative. Wait a minimum of two hours after dipping or painting is complete to incorporate member into project.
d. Test treat items for compatibility where additional finish coats (stain or paint) may occur.

D. Fire Retardant Treatment:
1. All wood and plywood members as indicated.
2. All plywood panels for Telecommunication Equipment.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Selection of wood and plywood pieces:
a. Carefully select all members.
b. Select individual pieces so that knots and obvious defects will not interfere with placing bolts, proper nailing, and making proper connections.
c. Cut out and discard all defects which will render a piece unable to serve its intended function.
d. Wood and plywood may be rejected by the Architect or its Designated Design Consultant, and DSA whether or not it has been installed for excessive warp, twist, bow, crook, mildew, fungus, or mold as well as for improper cutting, fitting and treatment when required.
5. All wood and plywood shall be accurately cut to lengths required.
6. All work shall produce joints true, tight, level, plumb, and all members are securely anchored.
a. Do not shim any framing member.

B. Layout:
1. Lines shall be straight and true.

C. Fastening:
1. Nails:
a. All nailing shall be as required by CBC Table 2304.10.1 "Fastening Schedule".
b. Machine nailing may be approved subject to the approval of the Architect or its Designated Design Consultant, and DSA.
1) The use of machine nailing is subject to a satisfactory job site demonstration for each project. The approval is subject to continued satisfactory performance.
2) In plywood, if the nail heads penetrate beyond flush with the surface of the sheathing, or if minimum allowable edge distances are not maintained, the performance will be deemed unsatisfactory.
3) Machine nailing will not be accepted in 5/16" plywood.
c. Penetration of nails or spikes shall be one-half the length of the nail or spike into the piece receiving the point.
d. 16d nails shall be used to connect pieces 2" in thickness unless otherwise indicated.
e. Clinch nails protruding through members.

f. Bore holes for nails where necessary to prevent splitting.
g. Use Finish or Casing Nails for finish work.

2. Lag Bolts:
   a. Lag Bolts shall be screwed into place. No driving is allowed.
   b. For the Shank portion, holes shall be bored the same depth and diameter as the shank. For threaded portion, holes shall be between 60% and 75% of the shank diameter.
   c. Malleable Iron or Steel plate washers shall be used where bolt heads bear on wood or plywood. Washers shall have an area equal to 16 times the area of the bolt.
      1) Steel plate washers shall have a thickness not less than 1/10 the length of the washer's longest side.
      2) Malleable Iron washers shall have a bearing surface for the head equal in diameter to not less that the long diameter of the head.
   d. Tighten all bolts and screws prior to concealing within structure.
3. Bolts:
   a. Holes shall be 1/16" larger than bolt diameter.
   b. Malleable Iron or Steel plate washers shall be used where bolt head and nuts bear on wood or plywood. Washers shall have an area equal to 16 times the area of the bolt.
      1) Steel plate washers shall have a thickness not less than 1/10 the length of the washer's longest side.
      2) Malleable Iron washers shall have a bearing surface for the head or nut equal in diameter to not less that the long diameter of the head or nut.
   c. Tighten all bolts prior to concealing within structure.
4. Power Driven Anchors
   a. Fastening shall be accomplished by low-velocity piston-driven power activated tool.
   b. Pins shall have guide washers to accurately control penetration.
5. Expansion Anchors (Post-Installed Concrete Anchors):
   a. Refer to Specification Section - DRILLED ANCHORS.
6. Metal Framing Anchors
   a. Use half-length nails where required or indicated.

D. Sills:
   1. Shall be in long lengths of sizes as indicated.
   2. Fasten with a minimum of two (2) anchor bolts per piece and bolt within 9", but not nearer than 6", from the end of piece.
   3. Malleable iron or steel plate washers shall be placed under anchor bolt nuts bearing on wood.
   4. Set Sill level and true.

E. Studs and Posts:
   1. Shall be full length.
   2. Cut members to provide full bearing at ends.

F. Plates:
   1. Shall be in long lengths and spliced as indicated.

G. Joists and Beams:
   1. Shall be in long lengths and spliced over bearings unless otherwise indicated. Do not overcut.
   2. Install with crown side up.
   3. Beams or headers indicated to be built-up of two or more joists shall be constructed on the project site using full length members.

H. Blocking:
1. Blocking shall be same thickness and width of studs or joists unless otherwise indicated.
2. Install blocking at all wall, floor, or roof penetrations.
   a. Blocking shall provide surface for fastening applied interior or exterior flashings or flanges.
3. Install blocking at all plywood joints.
   a. Install blocking at plywood edges including crickets and parapet wall bracing.
4. Shall be provided for all fixtures, equipment, casework, toilet partitions, toilet accessories, handrails, visual display boards, identifying devices, finish hardware, flashing, wall and ceiling finishes, and other items as indicated. See also Specification Section - OWNER FURNISHED ITEMS for listing of N.I.C. items that will require blocking coordination.
   a. Coordinate placement of blocking and supports with manufacturer or supplier of items.
5. Fireblocking shall be provided to cut off all horizontal and vertical concealed draft openings in accordance with CBC Section 718.2.
   a. Horizontal Fireblocking in walls shall be typically placed at 4'-0" above finished floor, at 8'-0" above finished floor, at mezzanine floor plane unless otherwise indicated, and at ceiling line plane.
6. Bridging shall be installed in all joist members deeper than 8 inches unless otherwise indicated.
   a. Bridging shall extend the full depth of the joists.
   b. Drill bridging within attics to provide ventilation as indicated.

I. Plywood Sheathing Panels:
1. For panels with different veneer face grades, the exposed face shall always be the higher grade.
2. Space panels 1/8 inch at all edge and end joints, and in accordance with APA.
3. Panels shall be applied with the long dimension (or strength axis) across the framing.
4. Fasten from the field of the panel first and then to the ends and edges to reduce stressing of the panel surfaces.
5. Center all joints over bearing supports.
6. Wall panels shall continue uninterrupted by ceilings or soffits from floor to floor or roof unless otherwise indicated.

J. Sheathing:
1. Shall be in accordance with the following:

a.	Wall Sheathing:	CBC Section 2304.6 and Table 2304.6 and Table 2304.6.1.
b.	Floor and Roof Sheathing:	CBC Section 2304.8.
c.	Structural Floor Sheathing:	CBC Section 2304.8.1.
d.	Structural Roof Sheathing:	CBC Section 2304.8.2.
e.	Lumber Decking:	CBC Section 2304.9.

K. Nailers and Grounds:
1. Shall be installed as indicated and where required for attaching other work.
2. Form to shapes indicated.
3. Coordinate locations with other work involved.
4. Provide nailers at all flashing and edge terminations when required by roofing manufacturer for metal and concrete roof decks. When the roof system is required to be Class A use fire-retardant treated wood.

5. Provide permanent Grounds of dressed, pressure-preservative-treated, Key-beveled wood and of thickness required to bring face of ground to exact finish thickness of finish material. Remove temporary grounds when no longer required.

L. Furring and Stripping
1. Shall be installed as indicated and where required to provide fastening material or space for the passage of pipes, conduits, etc. not accommodated including ceiling stripping.

M. Sealant:
1. When indicated, Primer shall be in accordance with sealant manufacturer recommendations.
2. When indicated, Joint Sealer shall be in accordance with Specification Section - SEALANTS.

3.4 CONSTRUCTION

A. Draftstopping:
1. Shall be provided in floor, attic, and ceiling areas in accordance with CBC Section 718.3 and 718.4.

B. Pipes:
1. Frame to avoid cutting or drilling for passage of pipes, ducts, and conduit.
2. Follow criteria as indicated for cutting or drilling. Unusual edge distances and awkward spacing and sizes shall be brought to the Architects attention for remedy.

C. Cant Strips and Crickets:
1. Shape to sizes indicated.
2. Rigidly fasten to construction.
3. Block all joints of plywood panel construction.
4. Form neat and mitered corners.

D. Temporary Enclosures:
1. Provide and maintain all barricades and enclosures required to protect the work in progress.

E. Shoring or Bracing:
1. Shore or brace for temporary support of all work as required during the construction period except any shoring and bracing specified and included under other sections of this Project Manual.

3.5 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.
2. Project Inspector shall verify by means of a handheld moisture content meter that all wood and plywood supplied at the time of incorporation into structure(s) has met applicable moisture content requirements.
3. Project Inspector shall test all stud cavity walls to ensure that studs are a maximum of 19 percent moisture content prior to any other construction that encloses the wall cavity.

B. Inspection:
1. As required by Regulatory Requirements.

2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.6 CLEANING

A. Removal of Debris:
   1. Remove all Wood, including form lumber, chips, shavings and sawdust in or on the ground from the areas inside buildings. Do not bury debris in fill.

END OF SECTION

SECTION 062200 – MILLWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Furnish all material, labor, equipment and services necessary to furnish Millwork, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 11 01 CONCRETE FORMWORK
   4. 03 30 00 CAST-IN-PLACE CONCRETE
   5. 06 10 00 ROUGH CARPENTRY
   6. 06 41 13 MODULAR CASEWORK
   7. 08 70 00 HARDWARE
   8. 08 80 00 GLASS
   9. 09 65 10 RESILIENT BASE AND ACCESSORIES
   10. 09 65 19 RESILIENT TILE
   11. 09 67 23 RESINOUS FLOORING
   12. 09 91 00 PAINTING
   13. 10 05 00 MISCELLANEOUS SPECIALTIES
   14. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. AWS "Architectural Woodwork Standards", Latest Edition, including latest amendments, by the Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada, and the Woodwork Institute.
      b. DOC U.S. Department of Commerce
      c. ICC International Code Council
      d. NIST National Institute of Standards and Technology
      e. NWMA "Industrial Standard" National Woodwork Manufacturer's Association.
      f. PS Product Standard (as issued by the DOC)
      g. WI Woodwork Institute.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Shop Drawings.
      a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
   2. Samples.
      a. Provide 6 inch square sample of each color and pattern selected.

1.4 QUALITY ASSURANCE

A. In accordance with Specification Section - REGULATORY REQUIREMENTS.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection:
   1. Millwork shall not be delivered to the Project until the Work is sufficiently complete to properly accept, store and protect Millwork.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
   2. Burning: No burning will be allowed on-site.
   3. Temperature: Maintain ambient temperature in space to receive products between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit for seven (7) days prior, during, and seven (7) days minimum following installation. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn over of the building or facility to the Owner.
   4. Humidity: Maintain relative humidity in space to receive products between 45 percent and 65 percent at 60 degrees to 90 degrees F, and EMC (Equilibrium Moisture Content) conditions between 8 percent and 12 percent for 72 hours minimum prior, during, and following installation in accordance with manufacturer's written recommendations.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.7 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES
      a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood:
1. Use new, kiln-dried, clean stock lumber of the species and grades as scheduled or specified. Moisture content from time of Manufacture until time of installation shall be a minimum of 5 percent and shall not exceed 10 percent up to 2" nominal thickness and shall not exceed 19 percent for pieces thicker than 2" up to 9" nominal thickness.
2. Trim:
   a. Standing and Running Trim for transparent finish: Provide species, sizes and patterns shown on the drawings; complying with the following grade requirements of referenced woodworking standard, for quality of materials and manufacture:
   b. Quality of work Custom.
   c. Species:
      1) Clear, kiln-dried hardwoods as described below:
         a) Species and Cut: Plain-sliced, clear, kiln-dried American Beech White Sapwood selected for compatible grain and color (see drawings for locations).
      2) Texture: Surfaced (smooth).
      3) Lumber for Transparent Finish (Stained or Clear): Solid lumber stock.

B. Hardwood Panels:
1. Provide manufacturer's stock hardwood plywood panels complying with applicable requirements of DOC PS-51 for species and grade of face veneers and backing, adhesive, construction, thickness, panel size and finish.
   a. Face Veneer Species: Plain-sliced American Beech White Sapwood.
   b. Backing Veneer Species: Any hardwood compatible with face species.
   c. Construction: Veneer core.
      1) Number of plies: 7.
   d. Thickness:
      1) 3/4" Engineered Core, unless noted otherwise on the Drawings.
   e. Panel Size: As shown on drawings.
   f. Plywood Type (Water resistance capability): Type II (Interior).
   g. Face Veneer Matching (Panel - to - Panel):
      1) Sequence matched (Book Matched) from one or similar flinches as required by quantity of panels.
   h. Finish: Premium per AWS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.

2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.
4. Job Measurement:
   a. Take field measurements as required and be responsible for verification of space available. Report any discrepancy between Drawings and field dimensions to the Architect.

3.2 PREPARATION

A. Coordination:
   1. Cooperate with Work performed under other sections as required to produce a satisfactory installation conforming to the full intent of the Drawings, Specifications, and the referenced standards.

3.3 INSTALLATION

A. Installation shall be in accordance with WI Custom standards.

END OF SECTION

SECTION 064123 – MODULAR CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Modular Casework materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Plastic laminate-faced casework.
      b. Adjustable shelf supports:Metal Shelf StandardsPlastic Laminate countertops.
      c. Solid-Surface countertops.
      d. Solid-stave wood countertops.
      e. Solid-surface fabrications.
   2. Version: Clovis Unified School District Standards 2018.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 15 14 DRILLED ANCHORS
   4. 03 30 00 CAST-IN-PLACE CONCRETE
   5. 04 22 00 CONCRETE MASONRY UNITS
   6. 05 12 00 STEEL AND FABRICATIONS (Steel supports for modular casework)
   7. 06 10 00 ROUGH CARPENTRY
   8. 06 22 00 MILLWORK
   9. 07 60 00 SHEET METAL
   10. 08 70 00 HARDWARE
   11. 09 22 16 METAL FRAMING
   12. 09 29 00 GYPSUM BOARD
   13. 09 65 10 RESILIENT BASE AND ACCESSORIES
   14. 09 65 16 RESILIENT SHEET
   15. 09 65 19 RESILIENT TILE
   16. 09 68 40 CARPET
   17. 09 72 00 WALL COVERINGS
   18. 09 91 00 PAINTING
   19. 10 05 00 MISCELLANEOUS SPECIALTIES
   20. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. BHMA BHMA stands for Builders Hardware Manufacturers Associates, Inc.
      b. NAAWS "North American Architectural Woodwork Standards", Latest Edition, including latest amendments, by the Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada, and the Woodwork Institute.
      c. NEMA National Electrical Manufacturers' Associates, Publication Number LD3, latest-edition
      d. NIST National Institute of Standards and Technology

e. NWMA "Industrial Standard" National Woodwork Manufacturer's Association.
f. PS Product Standard of the U. S. Department of Commerce
g. WI Woodwork Institute

1.3 DEFINITIONS

A. Refer to NAAWS.

B. Exposed Portions:
1. Face members and edges of cabinets (cabinet fronts), such as face plates, drawer fronts, door fronts, front edge of shelves.
2. Interior faces of cabinet doors.
3. Underside of bottoms of upper cabinets, 48" above finished floor.
4. Cabinet tops:
a. Under 72" above finish floor.
b. Visible from upper building level.
5. Interior surfaces (including top, bottom, and front of shelves) of open cabinets or cabinets with glass doors.
6. All surfaces of exposed shelves.
7. All surfaces exposed to view.

C. Semi-Exposed Portions:
1. Cabinet divisions, shelves, insides of drawers, and any other cabinet members which cannot be seen when door or drawers are closed.

D. Concealed Portions:
1. Cabinet framing that cannot be seen, such as web frame members, sleepers, dust panels, toe strips covered with resilient base.

E. Shelving:
1. Top and bottom surfaces. Face surfaces are the front and rear edges.
a. Ends are the left/right edges as you face the cabinet.
2. The bottom surface material of all Upper Cabinets attached to walls shall be considered a shelf and manufactured as a shelf.

F. Quality Assurance Options:
1. Certified Compliance Program (CCP):
a. The CCP is an established discipline of quality control, for use in conjunction with the NAAWS, which provides a non-biased means of confirming conformance to a project's drawings and specifications.
b. Contractor to provide field inspection by WI Director, additional to CCP requirements.
c. The Woodwork Manufacturer shall have no less than 5 years of production experience, similar to this project, whose qualifications indicate the ability to comply with the requirements of this Section.
d. The Woodwork Manufacturer must have at least one project in the past 5 years where the value of the woodwork was within 20 percent of the cost of woodwork for this Project.
2. Monitored Compliance Program (MCP):
a. The MCP is an established discipline of quality control, for use in conjunction with the NAAWS, which provides a non-biased means of confirming conformance to a project's drawings and specifications,

b. Includes ongoing review/inspections of the project from its start to certification at completion.

c. The Woodwork Manufacturer shall have no less than 5 years of production experience, similar to this project, whose qualifications indicate the ability to comply with the requirements of this Section.

d. The Woodwork Manufacturer must have at least one project in the past 5 years where the value of the woodwork was within 20 percent of the cost of woodwork for this Project.

1.4 SYSTEM DESCRIPTION

A. Performance Requirements: It is the intention of this specification section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.

1. All shelving must be manufactured according to NAAWS for Schools, Hospitals and Library or Book Shelving. 50 lbs./SF.

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Product Data.
   a. Submit manufacturer's full color range (including any standard and premium colors) for selection by the Architect.
   b. Submit 2 copies of Manufacturer's current specifications for Modular Casework including all types of cabinets and accessories included in this section to the Architect for approval prior to fabrication.
2. Shop Drawings.
   a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, seam locations, components, and location and size of each field connection.
   b. Shop Drawing format in accordance with NAAWS Section 1, Submittals and WI's Certified Compliance Program.
      1) The shop drawings for the modular casework shall comply with and bear the WI CERTIFIED COMPLIANCE LABEL.
      2) Each elevation of casework, each laminated plastic top, and each solid surface top shall bear a WI CERTIFIED COMPLIANCE LABEL.
      3) Indicate spacing of all hardware accessories for Architect's review of layout.
      4) On casework and countertop elevations show the location of backing required for attachment within walls.
      5) Before delivery to the jobsite the woodwork supplier shall provide a WI CERTIFIED COMPLIANCE CERTIFICATE indicating the millwork products being supplied and Certifying that these products fully meet the requirements of the Grade or Grades specified.
      6) At completion of installation the woodwork installer shall provide a WI CERTIFIED COMPLIANCE CERTIFICATE indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
      7) All fees charged by the Woodwork Institute for their Certified Compliance Program are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid
3. Samples.

a. Provide nominal 2" x 3" sample chains of manufacturer's non-premium and premium laminate color selection lines.
   1) Submit color samples of Manufacturer's full color and pattern range (including wood grains) of non-premium and premium priced High Pressure Decorative Laminate to the Architect for color selection prior to fabrication.
      a) See drawings for high pressure decorative laminate color selection.
   2) Submit color samples of high density overlay thermal-fused melamine for color selection by the Architect.
      a) Samples shall be equivalent to SELPLY products, from their full color range selection chain of colors.
   3) Provide finish color selection samples of Pilaster Standard. Specified colors subject to change.
b. Mock-up as described elsewhere in this section.

4. Quality Assurance/Control Submittals:
   a. Certificates:
      1) Submit three (3) copies of the following:
         a) Before delivery to the jobsite, the modular cabinetwork supplier shall issue a WI CERTIFIED COMPLIANCE CERTIFICATE indicating the modular cabinetwork products and/or fabrication of products to be furnished for this project shall meet fully all the requirements of the grade or grades specified.
         b) Upon completion of inspection of installation by WI Inspector, a WI CERTIFIED COMPLIANCE CERTIFICATE shall be furnished for the installation.
      2) Submit three (3) copies of a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.
   b. Labels:
      1) Each plastic laminate countertop supplied shall bear the WI CERTIFIED COMPLIANCE LABEL.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. Grades as indicated on the drawings in accordance with the specifications, rules and details or casework of the NAAWS Sections 5 "Finishing", 10 "Casework", and 11 "Countertops", unless the drawings and these specification modify said standards.
         1) See Appendix "A" for "Cabinet Design Series" (CDS) Number System used on Modular Casework Schedule.
      b. Laminated Plastic Countertops, Splashes, and Wall Paneling in accordance with NAAWS Section 11 "Countertops".
   2. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   3. Manufacturer/Supplier Qualifications:
      a. Firm(s) experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
      b. All modular Cabinet Work must be done by a Single Source WI licensed manufacturer and be able to provide a WI Certified Compliance Certificate.
      c. Participation in Woodwork Institute Quality Assurance Program:

1) If supplier is WI Member Licensee in good standing:
   a) Comply with WI CERTIFIED COMPLIANCE PROGRAM (CCP).
   b) Provide WI Director to inspect installation on-site.
2) If supplier is not WI Member Licensee in good standing:
   a) Comply with WI MONITORED COMPLIANCE PROGRAM (MCP).

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
   b. CBC All hardware for casework shall meet CBC Section 11B-309.4 and 11B-811.4.

C. Mockups:
1. Prior to fabricating or installing Modular Cabinet Work, construct a mockup to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Provide one lower cabinet with drawer, and one upper cabinet, with all examples of hardware for both lower and upper cabinets.
2. Provide mock-up of exposed and interior cabinet surfaces with Pilaster Shelf Standard for review and comment prior to fabrication. Color selection of Pilaster may be subject to change.

D. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with all other related work
   b. identify potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
   c. Review the locations of backing required for casework installation as shown on the casework shop drawings and the Contract Documents.
   d. Review the method of attachment of the backing to the wall system as shown on the Contract Documents.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. WI Inspector, Project Inspector, and the Architect shall inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

1. Hardware products (not already applied) must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Casework products must be free from scratches, gouges, or any other marring or discoloration.
3. Damaged products will not be accepted.

C. Storage and Protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units, in compliance with PROJECT CONDITIONS below.
   a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:
1. Humidity and Temperature: Maintain humidity and temperature in the space to receive products between 45 percent to 65 percent at a temperature of 60 degrees to 90 degrees F. Equilibrium Moisture Content of the wood product conditions shall be maintained between 8 percent and 12 percent. Maintain these requirements for four (4) days minimum prior, during, and following installation in accordance with manufacturer's written recommendations. Inform the Owner of humidity requirements for products installed and maintain until Substantial Completion and the turn-over of the building or facility to the Owner.

1.9 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period (laminate) One (1) Year.
   b. Fabrication Warranty Period: One (1) Year.
   c. Clovis Unified Warranty Period Two (2) Years.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES
   a. Warranty Period One (1) Year.
   b. Clovis Unified Warranty Period Two (2) Years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturers:
      a. High Pressure Decorative Laminate: WILSONART.
         1) Cabinet Liner Series Type CLS.
      b. Low Pressure Thermal-fused:
         1) AMERICAN LAMINATE, PANELAM, or ROSEBURG FOREST PRODUCTS.
      c. Solid Surfacing: E.I.DuPONT.
      d. Solid Stave Wood: BROADHEAD GARRETT or JOHN BOOS.
      e. Cabinetry Hardware: See Cabinet Hardware Schedule.
      f. Accessories: FRY REGLET
      g. Countertop Support Brackets RAKKS.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 CABINET MATERIALS

A. Exposed Materials:
   1. General:
      a. In accordance with NAAWS Section 4 - Sheet Products.
      b. Minimize seams.
   2. Laminate Systems:
      a. Decorative Laminate:
         1) Horizontal Surfaces: Post-formed Grade HGP (0.042").
         2) Vertical Surfaces: Grade VGP (0.027").
            a) Pattern direction: Vertical, unless otherwise noted.
      b. Edgebanding:
         1) Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 0.5 mm thick elsewhere. Color to match adjacent material.
   3. Solid Surface:
      a. Decorative synthetic marble of solid (mineral and acrylic filled) Methyl Methacrylate.
   4. Solid-Stave Wood "Butcher Block":

B. Semi-Exposed Materials:
   1. Cabinet Liner:
      a. Complying with requirements of NEMA LD-3, Grade CLS.

2. Edgebanding:
   a. Rigid PVC extrusions, through color with satin finish.
      1) Typical: 0.5 mm thick.
      2) Front edge of shelves and all edges of drawers: 3 mm.

C. Concealed Materials:
   1. Particleboard: ANSI A208.1, Grade M-2.
      a. 44-50 lb Industrial Grade core.
      b. Thickness Swell max: 5.5 percent.
   2. Veneer Core Hardwood Plywood (VCHP):
      a. No internal voids.
      b. MDF cross bands to limit telegraphing of core grain is acceptable.

D. Fasteners:
   1. Per NAAWS.
   2. Corrosion resistant fasteners throughout the assembly of modular casework.

2.3 ACCESSORIES

A. Fasteners:
   1. Per NAAWS.
   2. Corrosion resistant fasteners throughout the assembly of modular casework.
   3. Confirmat screws.

B. Reveals/Channels:
   1. Lighted "U" Channel
      a. As manufactured by FRY REGLET, Model # LED-MWU 5050.
      b. Description: Provides a continuous band of light.
      c. Material: Extruded aluminum, LED, Frosted Lens.
      d. Color Temperature: 3,000Kelvin. Adjustable color temperature preferred.
      e. LED's/ft: 32.
      f. Dimming
      g. Return Key: None.
      h. Finish: Clear Anodized Aluminum.
      i. Electrical Performance:
         1) Input voltage: 24v.
         2) Power Consumption: 3.84Watts per foot.
         3) Input Current: 0.02 amps per segment.
         4) Luminous Flux: 550lm/ft.
      j. Power Supply Unit:
         1) As manufactured by FRY REGLET, Model # LED-PWM-90-24.
            a) DC Voltage: 24v.
            b) Rated Current: 3.7A.
            c) Rated Power: 90W.
            d) Dimming Range: 0-100%.
            e) PWM Frequency: 300Hz.
            f) Voltage Tolerance: +/- 3%.
            g) Max Number of PSU's on 16A Circuit Breaker: 3 units (circuit breaker type B) / 6 units (Circuit Breaker type C) at 230VAC.
         2) Provide manufacturers recommended lighting control module in area not exposed to view.
            a) Dimmer Output: 1-10 volt.

3) Provide manufacturers recommended lighting control with 1-10 v dimming capability in employee-accessible area as shown on drawings.

k. Provide all accessories required for an operable system including but not limited to connectors, power feed, etc

2.4 FABRICATION

A. General:

1. In accordance with NAAWS Section 10 - Casework, Custom Grade, as amended by the Contract Documents.
2. Interface Style, Frameless: Flush Overlay.
3. Attachment method: Confirmat screws.
4. Seismic Force Requirements - The types of construction approved by WI that meet CBC Title 24 seismic force requirements are: Lock Joint, Dowled, Dowled / Screwed Construction, Rabbeted Construction, Confirmat Screws, Fully Plowed-in Back, and Backs Screwed on in rabbeted ends, tops, and bottoms. The exact method for seismic force construction is available from WI.
5. Construct openings and backing as required for work done under Division 22 PLUMBING (sinks, plumbing, etc.) and Division 26 ELECTRICAL (outlets, switches, wiring, etc).
   a. Exposed Edges: All exposed edges shall be sealed; including sink cut-outs & bottom edges of front edges.
6. Cabinets ganged together or attached to the wall shall be attached with countersunk screws to prevent binding of shelves when provided later.
7. Any vertical or horizontal plane surface less than four (4) foot wide and twelve (12) foot long shall be faced with one continuous sheet with the intent to minimize the number of seams throughout the work, in compliance with NAAWS Section 8 "Wall Surfacing".
8. Exposed ends, panels, and back panels shall flush out with face of doors and drawer fronts.

B. Cabinets:

1. Cabinet box:
   a. Bottoms and Ends of Cabinets: 3/4-inch particleboard.
   b. Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard.
   c. Backs of Cabinets: Particleboard.
      1) Concealed Backs: 1/4" minimum.
      2) Concealed Backs: 1/2" minimum.
      3) Exposed Backs: 1/2" minimum.
2. Filler Strips:
   a. Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.
3. Shelving System:
   a. Shelf Support System:
      1) Metal Shelf Standards:
         a) Surface mounted on vertical faces of cabinet.
         b) Shelves shall be full widths of openings, flush with inside face of cabinet doors, and dadoed around shelf standards to prevent movement during seismic events.
      2) Bored Hole Shelf Rest Systems:
      3) Provide four clips for each shelf.
   b. Shelves: Veneer Core Hardwood Plywood.
      1) Span less than 25-inches: 3/4-inch.

2) Span greater than 25-inches: 1-inch.
3) Library shelves of any span: 1-inch thick.

4. Doors:
   a. Core material: Particleboard.
   b. Doors 48 inches high or less: 3/4 inch thick.
   c. Doors more than 48 inches high: 1-1/8 inches thick.
   d. Doors more than 80 inches high: 4 hinges, minimum.
   e. Stiles and Rails of Glazed Doors: 3/4 inch thick.
   f. Let in 1/8" reveals for institutional hinges.
5. Drawers:
   a. Drawer Fronts: 3/4-inch Particleboard.
   b. Drawer Sides and Backs: 1/2-inch Veneer-Core Hardwood Plywood.
      1) Joined using Confirmat Screws in lieu of dowels.
   c. Drawer Bottoms: 1/2-inch Veneer-Core Hardwood Plywood glued and dadoed into front, back, and sides of drawers.
   d. File Drawers / Lateral File Drawers:
      1) Sides: 3/4-inch Veneer-Core Hardwood Plywood.
      2) Bottoms: 5/8 inch Veneer-Core Hardwood Plywood.
      3) Sides and bottoms shall be secured using 2-inch Confirmat screws.
      4) Accessories: COMPX "Timberline" frames.
   e. Security Panels: 1/2-inch Veneer-Core Hardwood Plywood.
      1) Provide Security Panels above and below all locking drawers.
6. All drawers and doors shall be locked, keyed alike in each room and with building masters and grand master.
   a. Each room shall be keyed alike:
      1) Provide 4 keys per lock.
      2) Provide 6 master keys.

C. Countertops:
1. General: In accordance with NAAWS Section 11 -- Countertops, as amended by the Contract Documents.
2. Laminate Countertops:
   a. Standard: In accordance NEMA standard LD-3.
   b. Strength: 3/16 inch maximum deflection with 150 pound load at midspan.
   c. Surface Material: Plastic Laminate.
   d. Backing Material: Cabinet Liner.
   e. Core: 3/4-inch Particleboard.
   f. Front Edge: Self-edge build-up with drip groove edge, unless otherwise indicated on the drawings.
   g. Front Edge: Seamless waterfall with drip groove edge.
   h. Back Splash: 6 inch integral cove splash, unless otherwise indicated on the drawings.
   i. End Splash: 6 inch butt end splash, unless otherwise indicated on the drawings.
   j. Top of Splash: Square Edge.
   k. Exposed Edges: All exposed edges shall be sealed; including sink cut-outs & bottom edges of front edges.
3. Solid Surface:
   a. Solid Surface thickness: 1/2 inch at counter and back splash, unless otherwise indicated on the drawings.
   b. Core: Veneer-Core Plywood - see drawings for thickness required.
   c. Front Edge: Build up with drip groove edge, unless otherwise indicated on the drawings.

d. Front Edge: Quarter-inch radius edge with drip groove edge.

4. Wood-Stave "Butcher Block" Countertops:
   a. Thickness: 1-3/4 inch.
   b. Edge: Rounded.
   c. Splashes: 6 inch butt splash.

D. Fabrications:
1. Solid Surface:
   a. Various locations: Thickness as noted on drawings.
   b. Wall cladding: 1/4 inch thick unless otherwise noted.

E. Hardware:
1. See schedule at the end of this section for typical cabinet hardware.
2. Hardware shall be furnished and installed as required to provide a complete casework installation for overlay construction, unless noted otherwise.
3. Provide metal strike at locks.
4. Finish: BHMA 626 (26D), unless otherwise noted.

F. Countertop Supports
1. Steel Support Angle and Base Plate:
   a. Single-piece construction: All welded ground smooth, flush and level.
   b. Finish: Galvanized.
   c. Angle material to be A36 (Fy=36ksi).
   d. Plate material to be A36 (Fy=36ksi).
   e. All welding to conform to NAAWS and shall be done by certified welders.
   f. All work shall conform to the latest edition of the American Institute of Steel Construction.
2. RAKKS (EH Series Counter Support Brackets):
   a. EH-1818 for counter depths up to 25"; suitable for surface mounted conditions.
   b. EH-1824 for counter depths up to 30"; suitable for surface mounted conditions.
   c. EH-1818FM for counter depths up to 25"; suitable for flush mounted conditions.
   d. EH-1824FM for counter depths up to 30"; suitable for flush mounted conditions.

G. Reveals/Channels:
1. Make custom miters and intersections with welded corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual, which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work specified under this specification section.
2. Ensure electrical requirements are met for electrified accessories.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   a. Provide experienced, factory trained craftspeople under manufacturers direct supervision.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. The entire installation shall present a first class, workmanlike appearance, without open joints, tool marks or other blemishes, and subject to the Architect's approval.
5. Edges of cutouts, subject to excessive moisture, shall be sealed with a color-toned (for verification), water-resistant sealer before trim or sink rims are installed.

B. Layout:
1. Set plumb, level, and to true lines as shown on the drawings.
2. Filler panels and scribe strips or moldings, as required, shall be properly scribed to adjacent work and securely attached to cabinets as indicated on the drawings.

C. Anchorage:
1. The backs of the cabinets shall be secured to the wall backing.
2. Refer to the Drawings for the backing and anchorage details.
3. As a minimum, each cabinet shall be secured to the backing with a total of four #14 screws.

D. Cabinet Bases:
1. Toe Kick: Cabinet base shall be set back from the face of the cabinet 3-inches, or as indicated. Provide 2x pressure treated shaped toe base.
2. Cabinet sides: Cabinet shall be set 3/8-inch back from the face of the cabinet.

3.4 FIELD QUALITY CONTROL

A. Inspection:
1. Schedule WI inspection with a minimum of 7 days notice of planned installation.
2. Schedule inspections and notify the Architect, Owner's Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 ADJUSTING

A. Test and adjust carpentry hardware. Replace damaged or malfunctioning controls and equipment.

3.6 CLEANING

A. Clean in accordance with Specification - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. In accordance with manufacturer's written instructions and recommendations.
   3. Finish shall be clean and ready for the application of any additional finishes.

3.7 PROTECTION

A. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.8 SCHEDULES

A. Standard Cabinetry Hardware specified, or approved equivalent:
   1. Hinges: Institutional Hinges for Overlay doors, 2-3/4" five knuckle with hospital tips and 2-5/8" extended side panel wing:
      a. ROCKFORD PROCESS:
         1) #374 for 3/4" x 3/4" thicknesses.
         2) #376 for 3/4" x 13/16" thicknesses.
   2. Pulls (3/8" Square profile - 4-3/16" long, 3-25/32" centers, 1-9/32" Projection from face of drawer or door):
      a. MOCKETT: DP105C/4.
         1) Satin Nickel (17S).
   3. Locks (Hinged Doors and Drawers for Overlay Construction):
      a. COMP X NATIONAL: #C8053.
      b. Approved equivalent manufacturer:
         1) OLYMPUS LOCK, INC. #DCN as required.
      c. Provide compatible strike.
      d. OLYMPUS LOCK, INC. #DCN as required.
      e. Approved equivalent manufacturer:
         1) COMP X NATIONAL: #C8053.
      f. Provide compatible strike.
   4. Locks (Sliding Doors):
      a. COMP X NATIONAL: #C8142 (3/4").
      b. Approved equivalent manufacturer:
         1) KNAPE AND VOGT.: #KV984.
      c. Provide compatible strike.
   5. Drawer Slides up to 24 inches Wide:
      a. Pencil Drawers:
         1) 65 lb capacity, full extension, lever disconnect:
            a) ACCURIDE 2632.

2) Approved equivalent manufacturer:
a) KNAPE AND VOGT: 4400.

b. General Purpose Drawers:
1) 100 lb capacity, full extension, rail mount disconnect:
a) ACCURIDE 7432.
2) Approved equivalent manufacturer:
a) KNAPE AND VOGT: 8400.

c. File Drawers:
1) 150 lb capacity, full extension, rail mount disconnect:
a) ACCURIDE 4032.
2) Approved equivalent manufacturer:
a) KNAPE AND VOGT: 8500.

6. Drawer Slides over 24 inches Wide:
a. Pencil Drawers:
1) 100 lb capacity, full extension, push latch disconnect:
a) ACCURIDE 3732.
2) Approved equivalent manufacturer:
a) KNAPE AND VOGT: 8400.

b. General Purpose Drawers:
1) 150 lb capacity, full extension, rail mount disconnect:
a) ACCURIDE 3641.
2) Approved equivalent manufacturer:
a) KNAPE AND VOGT: 8500.

c. File Drawers:
1) 200 lb capacity, full extension, rail mount disconnect:
a) ACCURIDE 3642.
2) Approved equivalent manufacturer:
a) KNAPE AND VOGT: 8800.

7. File Frames for File Drawers & Lateral File Drawers.
a. COMPX TIMBERLINE File Frame System.

8. Adjustable Shelf Supports (zinc die-cast nickel plated supports) for glass shelves:
a. HETTICH: #1 010 564.

9. Adjustable Shelf Pilaster Standard and Shelf Supports:
a. Pilaster Standard shall be KNAPE & VOGT #255, 19-gage x 5/8" wide x 3/16" high.
1) #255-WH (Epoxy-Coated White) at interior cabinet surface locations.
2) #255-BRN (Brown) at exposed cabinet surface locations.

b. Shelf Supports shall be KNAPE & VOGT #239 ZC (Zinc Coated).

10. Magnetic Catcher:
a. AMEROCK: #CM9783-AL.
b. Approved equivalent manufacturer:
1) KNAPE AND VOGT: #918-AL.

11. Wardrobe Clothes Pole:
a. KNAPE AND VOGT, Pole, 1-1/16"O.D., I.D. 29/32" SS tubing : #KV660.
b. KNAPE AND VOGT Wall Supports per tube length : #KV734 and #KV735.

12. Exposed Fasteners: When exposed fasteners are used, provide zinc chromate coated oval head, self-tapping phillips screws with grommet finishing washers, same finish as screws.

13. Tote Trays: High impact polystyrene with cardholder, 4-1/4 x 12-3/4 x 18-3/4 inch size.

14. Casters: All swivel, 2 non-braking and 2 braking, with non-marking 5 inch diameter rubber wheels, manufacturer's standard finish.
a. FAULTLESS: #BP421-5 and #BP421-5RB.

15. Joint Closure:
    a. PEMKO: #313AN.
16. Coat Hooks (Cast aluminum wardrobe hook):
    a. IVES: #E IVSP581A3.
17. Exposed Fasteners: When exposed fasteners are used, provide zinc chromate coated oval head, self-tapping phillips screws with grommet finishing washers, same finish as screws.
18. Cabinet Catch (only when indicated on the drawings)
    a. STANLEY #CD34.
19. Label Plate:
    a. HAFELE #168.02.761.
20. Grommets, Cable Managers and Cabinet Vents:
    a. Provide grommets, cable managers and cabinet vents in various sizes, finishes and shapes, as indicated on the drawings and as otherwise required for a complete installation.
    b. Provide type S/S-3 Grommet for all conditions not noted. Grommets & Air Vents by DOUG MOCKETT & COMPANY, INC., or approved equivalent.
    c. A partial listing is provided below (for other listings, see the drawings):
        1) Wire Manager: #WN-2A.
        2) Hair Dryer Holder at Printer Counter: #HD-1.
21. Miscellaneous Hardware Items:
    a. DEMCO, INC.:
        1) Maple Newspaper Sticks: #EP148-7821.
        2) Keyboard Drawer: #P148-0061.
    b. HAFELE:
        1) Bow Handles: #102.49.402.
        2) Compact Disk Rails: #810.58.335.
        3) Video Cassette Rails: #810.58.326.
        4) Metal Label Frames: E168.02.789 (nickel-plated).
        5) Miscellaneous: Dished Sleeves, screws, washers, nuts, threaded pins, screw-in sleeves, shelf supports with locking screws, connecting fittings, & capped bolts.
    c. REV-A-SHELF:
        1) Cutlery / Utility Trays: CT4.
    d. CHARLES McMURRAY:
        1) 2" Plate Casters: #MC660-44-273.

END OF SECTION

AD2-SP01 Refer to Specification Section 064123 MODULAR CASEWORK.

1. Refer to Article 3.8 SCHEDULES and add the following item:

22. Pop-Up Power Grommet:
    Mocket PCS43C/USB-90M (black) Power and Dual USB charger.
    Cabinet Group Q-201 a: 7 locations
    Cabinet Group Q-202 a: 4 locations

SECTION 071416 – FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all fluid applied waterproofing system materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 21 00 BRICK MASONRY UNITS
   5. 04 22 00 CONCRETE MASONRY UNITS
   6. 05 30 00 METAL DECK
   7. 07 60 00 SHEET METAL
   8. 07 92 00 SEALANTS
   9. 31 20 00 EARTHWORK
   10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   11. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data: Materials list, manufacturer's catalog sheets and other product information.
   2. Quality Assurance/Control Submittals:
      a. Manufacturer's Written Instructions:
   3. Closeout Submittals in accordance with Specification Sections in Division One:
      a. Warranty in accordance with Specification Section - WARRANTIES.

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. All products of the membrane system shall meet the requirements of the Air Quality Control Standards in effect at the Project Site and at the time of application.
   2. Installer Qualifications:
      a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
      b. Applicator shall have a copy of this Section of the Specifications and a copy of the Manufacturer's approved Specifications on the Work at all times.
   3. Manufacturer/Supplier Qualifications:

a. Manufacturer's Representative shall be present at beginning of Work and shall inspect Work periodically during application.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
a. Inspect the substrates with the intent to coordinate the Work related to the membrane and to insure a watertight design.
b. Coordinate the work with all other related work.
c. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted at final inspection.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.

C. Storage and Protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.5 PROJECT CONDITIONS

A. Environmental Requirements:
1. No application of fluid applied urethane membrane or flashing shall commence or proceed during inclement weather, or the threat of imminent precipitation.
2. All surfaces to receive the system shall be thoroughly dry and free of dew or frost.

3. Application temperatures are not limited except that materials shall be stored until time of mixing at temperatures above 60 degrees Fahrenheit to maintain a consistency suitable for mixing.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Field Measurements: Take and be responsible for field measurements as required. Prior to performing work report any significant differences between field dimensions and Drawings to Architect.

C. Inspection of Deck or Walls and Flashing Surfaces:
1. The Contractor shall examine all surfaces designated to receive the system and unacceptable surfaces shall be reported to the Architect.
2. Surfaces shall be slightly textured, but free of all voids, projections, fins, honey combing, and rock pockets.
3. Surfaces shall be free of contaminants such as, but not limited to oil, grease, paint, scale, cement laitances, curing compounds and similar materials.

1.6 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period Five (5) Years
1) For fluid applied membrane waterproofing system, including labor and materials.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES
a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified product manufacturer:
a. GACO WESTERN #LM-60.
2. Specified accessory product manufacturers:

a. Urethane sealants:
   1) SIKA CORPORATION "SikaFlex 1A".
b. Protection Boards:
   1) Horizontal Protection Boards:
      a) W.R. MEADOWS "Sealtight Protection Course – PC-2"
   2) Vertical Protection Boards:
      a) Drainage Composite: JDR ENTERPRISES, INC. - "J-Drain 302"
      b) Asphalt Impregnated: W.R. MEADOWS - "Sealtight Protection Course – PC-3"
c. Below Grade Membrane:
   1) GRACE "PrePrufe 300R" (or "PrePrufe 300LT").

B. Products from other manufacturers not listed must submit in accordance with Specification Section - PRODUCT SUBSTITUTIONS.

2.2 MATERIALS

A. Provide waterproofing materials recommended by manufacturer to be fully compatible with and able to develop bond to substrate under conditions of service and application required, as demonstrated by waterproofing manufacturer based on testing and field experience:
   1. Compound waterproofing for vertical or horizontal application and slope of substrate indicated. Provide waterproofing with not less than 100 percent solids.

B. Two-component, solvent free polyurethane complying with performance and physical requirements of ASTM C 836 "Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course", and with manufacturer's printed physical requirements as certified by a qualified independent testing agency.
   1. Specified product physical requirements:
   2.

Property	**ASTM TEST METHOD**	**VALUE**
Tensile	D412	175 psi
Elongation	D412	300 percent
Solids (by Volume)	-	100 percent
Water Vapor Permeability	E96	0.012 perm in.
Water absorption	D 47 21 days R.T.	1 percent maximum
Low Temperature	D746	Pass @ -50 degrees F.
Hardness, Shore A	D 2240	30
Tear resistance	D 524 Die C	30 pli

C. Below Grade Membrane:
   1. Pre-applied Integrally Bonded Waterproofing Membrane: "Preprufe 300R" Membrane (or "Preprufe 300LT" Membrane for application temperatures between 25 degrees F and 60 degrees F) by GRACE CONSTRUCTION PRODUCTS, a 1.2 mm nominal thickness composite sheet membrane comprising 0.8 mm of high density polyethylene film, and layers of specialty formulated synthetic adhesive layers. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete.
   2. Specified product physical requirements:

Property	ASTM TEST METHOD	VALUE
Thickness	D 3767 Method A	1.2 mm nominal
Lateral Water Migration Resistance	D 5385 Modified [1]	Pass at 71 m of hydrostatic head pressure
Low Temperature Flexibility	D 1970	Unaffected at -20 degrees F
Elongation	D 412 Modified [2]	500 percent
Crack Cycling at -9.4 degrees F, 100 Cycles	C 836	Unaffected, Pass
Tensile Strength, Film	D 412	27.6 MPa (4,000 lbs/in^2)
Peel Adhesion to Concrete	D 903 Modified [3]	880 N/m (5.0 lbs/in)
Lap Adhesion	D 1876 Modified [4]	880 N/m (5.0 lbs/in)
Resistance to Hydrostatic Head	D 5385 Modified [5]	71 m (231 ft)
Puncture Resistance	E 154	990 N (221 lbs)
Permeance	E 96 Method B	0.6 ng/Pa x s x m^2 (0.01 perms)
Water Absorption	D 570	0.5 percent

a. Footnotes:
   1) Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane. A hydrostatic head pressure of 71 m (231 ft) of water is the limit of the apparatus.
   2) Elongation of membrane is run at a rate of 50 mm (2 in) per minute.
   3) Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in) per minute at room temperature.
   4) The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in) per minute.
   5) Hydrostatic Head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 71 m (231 ft) of water which is the limit of the apparatus.

2.3 MIXES

A. Fluid applied membrane waterproofing shall be mixed a minimum of 5 minutes before applying, and in accordance with manufacturers recommendations.
   1. Quantities over two (2) gallons require power mixing.

2.4 ACCESSORIES

A. Flashing Materials:
   1. Flashing: 60 mil neoprene sheet, uncured, non-staining.
   2. Flashing Adhesive: Manufacturer's written recommended bonding & splicing adhesive.

3. Primer (For Metal Surfaces): Manufacturer's written recommended primer compatible with main waterproofing membrane materials, metal type to be bonded to, and air quality standards in the location where the project is located.
4. Release Tape: 1" masking tape, unless otherwise noted.
5. Urethane Sealant: As specified.
6. Primer Sealer System:
   a. For Structural Concrete Substrate:
      1) Manufacturer's written recommended primer/sealer system compatible with main waterproofing membrane material and air quality standards in the location where the project is located.
7. Protection Boards:
   a. Horizontal:
      1) Between Concrete Slabs: 1/8" thick x 4' x 8' panel
         a) Standard Duty multi-ply, semi-rigid board composed of mineral-fortified asphaltic core formed between a liner of asphalt-saturated felt and a glass mat liner which is weather-coated and covered with a polyethylene anti-stick sheet.
         b) Backfill protection board only.
   b. Vertical Drainage Composite: 1" thick.
      1) Core:
         a) Color Black.
         b) Compressive strength (ASTM D 1621) 30000 psf.
         c) Thickness (ASTM D 1777) 0.22 inch.
         d) Flow (ASTM D 4716) 5.5 gpm/ft. width.
      2) Fabric:
         a) Flow (ASTM D 4491) 205 gpm/ft2.
         b) Mullen Burst (ASTM D 3786) 285 psi.
         c) Puncture (ASTM D 4833) 80 lbs.
         d) U.V. Resistance (ASTM D 4355) Fully Stabilized.
         e) Grab Tensile (ASTM D 4632) 120 lbs.
   c. Vertical Asphalt Impregnated (No drainage requirement) - 1/2" thick x 4’ x 8’ panel.
      1) Asphalt Impregnated protection board
      2) Backfill protection board only.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual that affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface Preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
3. All control joints and non-moving cracks shall be treated prior to the application of the fluid applied membrane, over the main field of the deck.
   a. All control joints and non-moving cracks shall be filled with fluid applied membrane and strip coated with 60 mils of fluid applied membrane extending for 3" on each side of such joints on cracks.
   b. When coating the main field of the deck, the fluid applied membrane shall extend over these cracks and joints to obtain a total membrane thickness of 120 mils.
4. All moving cracks shall be treated prior to the application of the fluid applied membrane, over the main field of the deck.
   a. Remove all loose chips of substrate along the edge of the crack.
   b. Install urethane sealant in the crack (where possible) and strike flush with the concrete surface.
   c. All moving cracks shall be covered with 3" masking tape, centered over the crack and strip coated with 60 mils of fluid applied membrane extending 3" on each side of the tape.
   d. When the main field of the deck is coated with fluid applied membrane, it shall extend over these cracks to obtain a total buildup at 120 mils over such cracks.
5. Priming and sealing:
   a. Primer as recommended by manufacturer, shall be roller applied at a rate recommended by the manufacturer for the system installed, and in accordance with the manufacturer's warranty requirements.
      1) If the primer is not installed over the entire deck surface in one day, <u>do not overlap</u> prior day's work when applying the primer.
      2) It would be preferable to leave a narrow uncoated area than to overlap subsequent days of application of the primer.
      3) Drying time for primer shall be in accordance with the manufacturer's written recommended drying times for degrees of temperature range shown on the manufacturer's written instructions.
   b. Structural Grade Concrete and Concrete Masonry Units:
      1) When the porosity of the concrete is such that entrapped air may cause blisters or pinholes in the coating, the concrete surface shall be sealed with primer as recommended by manufacturer.
      2) The seal coat shall be applied by roller only.
      3) The seal coat shall be allowed to cure until such time that workmen applying the system can walk on it without damage to the coating.

4) Seal coat shall not be left exposed without top coat for more than 48 hours. Should a longer time elapse, the seal coat shall be wiped with primer as recommended by manufacturer.

c. Metal Surfaces:

1) Metal surfaces shall be primed with primer at a rate recommended by the manufacturer for the system installed, and in accordance with the manufacturer's warranty requirements.

2) Primer shall be allowed to dry in accordance with the manufacturer's written recommended drying times before overcoating with the fluid applied membrane waterproofing.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   a. Fluid applied membrane shall be applied in two (2) coats at the rate of 51 square feet per gallon per coat, resulting in an average dry mil thickness of 30 mils for each coat - sixty (60) mils average total thickness.
   b. For application on vertical surfaces, use manufacturers recommended fluid applied membrane for vertical surfaces.
   c. For application on horizontal surfaces, use manufacturers recommended fluid applied membrane for horizontal surfaces.
   d. Fluid applied membrane shall overlap all sheet membranes a minimum of 3".
   e. Sheet membranes shall be coated with recommended adhesive in areas where fluid applied membrane will overlap it.
   f. Newly applied membrane shall overlap cured membrane a minimum of 3".
   g. If cured material has been in place for 48 hours or more, it shall be wiped with manufacturers recommended reactivating agent in compliance with all air quality requirements before overlapping with freshly applied material.
2. In accordance with Regulatory Requirements.
3. Set plumb, level, and square.
4. Perform all testing prior to installation of protection board.

B. Layout:

1. Protection board layout lines shall be straight and true.
2. All fluid applied membrane installed below grade shall be covered with protection panel system.
   a. The protection panel will provide drainage against the wall and also protect the waterproof membrane during backfill operations.
3. Attach directly to waterproof membrane using manufacturer's written recommended adhesive, and in accordance with the manufacturer's written requirements.
   a. Press panel into place over the cured waterproofing membrane.
   b. Press panel firmly on entire surface to ensure good adhesive bond.
   c. Stagger vertical joints and butt panels tightly together.
   d. Field Cutting; Sue a hand saw, hot wire or hot knife.
   e. Cover weep holes with galvanized metal or stainless steel wire screen to support and retain panel.
   f. Connect to perimeter drain pipe with gravel in accordance with manufacturer's written recommendations.
   g. Cover gravel with geotextile fabric in accordance with manufacturer recommendations.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
   1. Water Testing:
      a. All horizontal areas should be water tested prior to the installation of a wear course.
      b. No area shall be water tested within 48 hours after application.
      c. Water testing shall include flooding of the entire deck either by section or entirely for a minimum period of 24 hours.
      d. Any area where leaks occur shall be drained, thoroughly dried, repaired, and then retested.
      e. Installation of the wear course shall not start until such time as the membrane is leak-free and has been accepted by the owner or his representative.
   2. Certification of the test.

B. Inspection:
   1. Schedule inspections and notify the Architect, Owner's Inspector and any regulatory agencies of the time at least 48 hours prior to the inspection.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
   2. Clean any soiled surfaces immediately.
   3. Finish shall be clean and ready for the application of any additional finishes.
   4. In accordance with manufacturer's written instructions and recommendations.

3.6 PROTECTION

A. Protection from Weather:
   1. Protect newly installed work from freezing for 24 hours after erection, installation or application.
   2. Until such time as the membrane has been covered with backfill or protective wear course, the area shall be kept free of all traffic and other trades.

B. Protection from Traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 071850 – VAPOR-ALKALINITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment, testing and services necessary to:
      a. Completely install all Vapor-Alkalinity Control 100 percent solids epoxy membrane materials, accessories and other related items necessary to control for water vapor and alkalinity in existing or new concrete slabs for the Project.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS (Including BID FORM)
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 09 30 00 TILE
   5. 09 64 66 RESILIENT WOOD FLOOR
   6. 09 65 16 RESILIENT SHEET
   7. 09 65 19 RESILIENT TILE
   8. 09 65 66 RESILIENT ATHLETIC FLOORING
   9. 09 67 23 RESINOUS FLOORING
   10. 09 68 40 CARPET
   11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

C. Cost of Work:
   1. The entire cost for providing the vapor-alkalinity control specified under this Section shall be listed on the BID FORM as a Line Item and included as a part of the Base Bid. Refer to the BID FORM.
   2. If it is determined by way of testing, and it is agreed to by the Owner, Architect, Contractor, and the Flooring Installer, that the work of this Section is not required, then this Work (or a portion of this Work agreed to by the Owner, Architect and the Contractor) for the Installation of the Vapor-Alkalinity Control Membrane System will be deleted from the Project by the way of a Change Order, and the Contract Sum shall be reduced accordingly.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ACI American Concrete Institute
         1) ACI Committee Report 201 "Guide to Durable Concrete"
      b. ASTM American Society for Testing Materials International

1.3 DEFINITIONS

A. Membrane System: "Water Vapor-Alkalinity Membrane System".

B. New Concrete Slab: Any concrete slab poured after the signing of the Contract for this Project, regardless of the duration of the construction period.

C. Existing Concrete Slabs: Any slabs existing (or poured) prior to this Project.

D. pH: Alkalinity.

E. RH: Relative Humidity.

F. MVER: Moisture Vapor Emission Rate.

G. Hg: Mercury.

1.4 SYSTEM DESCRIPTION

A. The Moisture Vapor Control System shall be specifically formulated and marketed for concrete floor slab moisture vapor and pH control.

B. Membrane System Performance Requirements: It is the intention of this section to form a guide for a complete membrane system. Any items not specifically noted but necessary for a complete membrane system shall be provided under this section. Membrane System shall comply with the following:
1. Shall control alkalinity for a long term maximum resistance of pH 14 per pH Testing of ASTM F 710 "Preparing Concrete Floors to Receive Resilient Flooring".
2. Shall control vapor transmission up to and including 100 percent readings per RH Testing of ASTM F 2170 "Determining Relative Humidity in Concrete Floor Slabs Using *in situ* Probes".
3. Perm Rate Results (net perms - grains /hr/sq.ft. in 1 inch of Hg) of the membrane system shall not exceed:
   a. New Concrete Slabs: 0.09 grains/sq. ft./hour in 1 inch of Hg or less per ASTM E 96 "Water Vapor Transmission of Materials" per the Water Method for new concrete slabs.
   b. Existing Concrete Slabs: 0.05 grains/sq. ft./hour in 1 inch of Hg or less per ASTM E 96 "Water Vapor Transmission of Materials" per the Water Method for renovation work on existing slabs.
4. Compatible with all types of floor covering products and systems specified for this project.
5. Independently tested with certified results.
6. Contain no silicate or water/alkaline soluble compounds.
7. Capable of the following in an environment of constant water vapor and water exposure:
   a. System shall be capable of curing well when water saturation of the surface underneath coatings can begin within a short period of time depending on the amount of osmotic water/moisture permeating through the concrete.
   b. Rapid adhesion to the substrate without jeopardizing the long term bonding performance.
8. Sufficient density to avoid water vapor damage to other adhered systems.
9. Resistant to most commonly encountered acids/solvents in case of topical exposure (spills).

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data:
a. Manufacturer's Data for each type of product specified.
2. Quality Assurance/Control:
a. Test Reports:
1) Independent Testing Laboratory test results for RH (relative humidity) in concrete.
2) Independent Testing Laboratory test results for pH on concrete.
3) Contractor test results for Perm Rating of the Membrane System that the net perms test results shall be submitted with verification that lab applied the manufacturer's product to the test samples.
b. Manufacturer's Instructions:
1) Written installation instructions.
c. Manufacturer's Field Reports:
1) Written field report detailing installation observations.
2) Final field report after curing indicating installation was performed properly.
d. Qualification Statements
1) Manufacturer's Membrane System Performance requirement letter.
2) List of Previous Projects.
3) Manufacturer's Installer Certification.
4) Manufacturer's Duration of Experience.
3. Closeout Submittals:
a. In accordance with Specification Section – PROJECT CLOSEOUT.
b. In accordance with this specification and with Specification Section – WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
a. All items shall be within the Membrane System Performance Requirements specified earlier within this specification section.
b. Provide list of at least three (3) projects available for inspection employing same vapor-alkalinity control system(s) within the last ten (10) years, within the same climate zone.
2. Installer Qualifications:
a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
3. Manufacturer's Qualifications:
a. Firm regularly engaged in the business and manufacture of vapor emission and alkalinity control installations of similar size and complexity with the system proposed for use, and have had experience for at least ten (10) years of manufacturing water-vapor reduction systems with the product submitted.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Mock-Up:
1. Install the Moisture Control System in a minimum 100 sq. ft. mock-up area, using the same methods, laborers and equipment that will be used for the entire installation. Test tensile bond strength of the moisture mitigation system to the concrete substrate following ASTM Test Method D 7234. The results shall be equal to or greater than 200 psi with failure in the concrete before proceeding with installation of the moisture control system.

D. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
   c. Review delivery, storage, and handling procedures.
   d. Review project conditions.
   e. Review condition of concrete slabs on grade.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE AND HANDLING

A. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name and product name.
2. Damaged products will not be accepted.

B. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units, in a locked, clean and neat, well ventilated area.
   a. Cover material with protective water proof covering providing for adequate air circulation and ventilation.
   b. Empty containers shall not be removed from the site, unless approved by the Architect.

1.8 PROJECT CONDITIONS

A. Environmental requirements:
1. Temperature:

a. Maintain ambient temperature in all spaces to receive independent testing and membrane system installation between sixty-five (65) degrees Fahrenheit and seventy-eight (78) degrees Fahrenheit for seven (7) days prior, during, and after installation.
b. Inform the Owner of ambient temperature in space to receive independent testing and membrane system installation and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

2. Ventilation:
a. During membrane system installation provide continuous ventilation and indirect air movement at all times during application and curing process.

B. Existing conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Concrete surfaces shall have cured for not less than twenty-eight (28) days before independent testing.
3. Not less than seven (7) days shall have passed since surfaces were last wet.

1.9 WARRANTY

A. Contractor's General Warranty:
1. In accordance with specification section - WARRANTIES

B. Manufacturer's Warranty:
1. In accordance with manufacturer’s written standard warranty.
a. Manufacturer's warranty shall cover against water vapor transmission or out of range levels of alkalinity failure through concrete slabs and includes all labor and material costs for replacement of all products installed over the membrane system.
b. Warranty period Fifteen (15) Years.

C. Installer's Warranty:
1. In accordance with the terms of Specification Section – WARRANTIES:
a. Warranty period Five (5) Years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Membrane System for New Concrete Slabs - Specified product manufacturer:
a. KOESTER AMERICAN CORP. "VAP I 2000 SYSTEM"
b. Approved equivalent manufacturers:

1) ALLIED CONSTRUCTION TECHNOLOGY 2170.
2) MAPEI "Planiseal EMB".

2. Membrane System for Existing Concrete slabs - Specified product manufacturer:
   a. KOESTER AMERICAN CORP. "VAP I 2000FS SYSTEM"
   b. Approved equivalent manufacturers:
      1) ALLIED CONSTRUCTION TECHNOLOGY 2170 Fast Setting Product.
      2) MAPEI "Planiseal EMB" Fast Setting Product.
3. Core Testing Repair Product:
   a. CTS CEMENT "RAPID SET CEMENT"

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:
1. Membrane System shall be the product of one manufacturer.

B. Membrane System for New Concrete Slab Substrates: One (1) Coat, epoxy 100 percent solids system, containing specifically formulated chemicals and resins complying with the Performance Requirements specified. No silicate or water based formulations are allowed.
1. Pot Life12 minutes.
2. Cure-Time 12 hours.
3. Solid Content 100 percent.
4. VOC, mixed Less than 10 g/L.
5. Flash Point Greater than 200 degrees F.
6. Storage Between 50 degrees F - 90 degrees F.
7. Shelf Life 1 Year minimum in original sealed container.

C. Membrane System for Existing Concrete Slab Substrates: One (1) Coat, epoxy 100 percent solids fast setting system, containing specifically formulated chemicals and resins complying with the Performance Requirements specified. No silicate or water based formulations are allowed.
1. Pot Life12 minutes.
2. Cure-Time 4 hours.
3. Solid Content 100 percent.
4. VOC, mixed Less than 10 g/L.
5. Flash Point Greater than 200 degrees F.
6. Storage Between 50 degrees F - 90 degrees F.
7. Shelf Life 1 Year minimum in original sealed container.

2.3 ACCESSORIES

A. Bonding Material (if required): Provide membrane manufacturer's written recommended bonding emulsion materials compatible with the membrane system.

B. Crack and Joint Filler:
1. Provide membrane system manufacturer’s written recommended crack and joint materials compatible with the membrane system.

2.4 MIXES

A. Vapor-Alkalinity Control Membrane System:
1. Use clean containers.
2. Mix thoroughly as per manufacturer's written requirements to obtain a homogeneous mixture.
   a. Use a low speed motor less than 400 rpm and a two bladed "jiffy mixing blade" only. DO NOT AERATE! Mix ratios are measured by volume.
   b. Specified membrane system shall have its components mixed at a ratio of 2.4:1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Preparation shall not begin until the Owner, Architect, and Contractor have reviewed independent testing laboratory results of Alkalinity and Relative Humidity testing and have informed the membrane system manufacturer and installer of areas where the membrane system is to be installed.
2. Prior to the execution (preparation) of the work under this specification section, the Owner's representative shall inspect the installed work executed under other sections of this Project Manual that affect the execution of work under this specification section.
   a. Membrane System Installer to investigate and inform the membrane system manufacturer if Alkali-Silica Reaction is present, and/or oil contamination, concrete additives (using chlorides), or any other soluble compounds that can contaminate surfaces have been used in any concrete mix, or is present in the existing concrete substrate.
3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
4. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of the surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Comply with ASTM F 3010 "Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings".
2. After the Testing Laboratory removal of all RH probes, fill all RH Test holes with core repair product in accordance with membrane manufacturer’s written recommendations, and allow curing before any other cleaning occurs.

3. Clean all surfaces to receive membrane system.
4. "Shotblast" all floors and clean surfaces with a dust contained vacuum to remove all residue off the substrate to a minimum CSP (Concrete Surface Profile) of 3. Shotblast existing areas to a minimum of CSP 4. Systems introducing water or acids to the floor systems (such as "Hydrablasting" or "Acid Etching") are NOT ALLOWED.
   a. Grinding floor areas is only allowed when floor areas are inaccessible by "Shotblasting".
      1) Grind to a CSP as recommended in writing by the membrane system manufacturer, but in no cases less than 3.
         a) Existing slabs shall be no less than 4.
      2) Where surface profiles require (because of silicate or other bond breaker film applications), grind to a higher level of CSP, as required in writing by the membrane system manufacturer for removal of film items not compatible with the system membrane.
   b. Protect electrical or mechanical equipment items in place from dust and particulate residue that could impede their proper operation.
   c. Remove ALL defective materials and foreign matter such as dust, adhesives, leveling compounds, paint, dirt, floor hardeners, bond breakers, oil, grease, curing agents, form release agents, efflorescence, laitance, "shotblast" bb's, etc.
   d. Remove, after "shotblasting", leaving no reinforcing fibers (if any) left on the concrete surfaces.
      1) Reinforcing fibers must be burned off, scraped and vacuumed.
5. Repair all cracks, expansion joint, control joints, and open surface honeycombs and fill in accordance with crack and joint filler manufacturer's written recommendations.
   a. Mix with silica sand for large cracks or voids.
6. Provide an uncontaminated, absorptive, sound surface.

3.3 APPLICATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Verify that required repairs and fills are complete, cured, and dry before application.

B. Assistance:
   1. Application shall be in direct consultation and review of manufacturer’s representative.

C. System Application:
   1. The coverage rate for the provided system shall be based on the surface texture and porosity of the substrates as well as the measured level of moisture from the examination of the substrates after surface preparation, and in accordance with manufacturer's written instructions. Approximate minimum coverage of the specified membrane system relative to existing levels of moisture vapor after surface preparation are as follows:
      a. New concrete slabs 150 sq. ft. / gal.
      b. Existing concrete slabs 130 sq. ft. / gal.
      c. Apply one coat of the specified system at the written recommended rates (see above) using a squeegee and or a 3/8 inch nap roller leaving NO areas untreated.
      d. Allow the substrate to cure a minimum of:
         1) New concrete slabs: 12 hours before installing underlayment or flooring system.

2) Existing concrete slabs: 4 hours before installing underlayment or flooring system.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. Prior to the execution (preparation) of the work of this specification section, the Project Inspector will arrange with the Independent Testing Laboratory to perform the following tests:
   a. Alkalinity Testing per ASTM F 710 "Preparing Concrete Floors to Receive Resilient Flooring".
   b. Relative Humidity Testing per ASTM F 2170 "Determining Relative Humidity in Concrete Floor Slabs Using *in situ* Probes".
2. Test only concrete slabs scheduled to receive floor coverings.
3. Test only when concrete floor slabs have cured a minimum of 28 days.
4. Test only when the concrete slabs have been acclimated to final environmental conditions as specified in the Article PROJECT CONDITIONS within this Specification Section.

B. Inspection:
1. Schedule inspections and notify the Architect, Project Inspector, and any other regulatory agencies of the time at least 48 hours prior to the inspection.
2. No work shall proceed without the inspections of the Project Inspector.

C. Manufacturer's Field Services:
1. Membrane System Manufacturer shall field verify and report on observations of system application per manufacturer's recommendations during installation.
2. Membrane System Manufacturer shall issue a Final Field Report, after curing, indicating installation was completed per manufacturer's recommendations.

3.5 CLEANING

A. Cleaning:
1. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
2. Clean any soiled surfaces immediately.
3. Remove all debris resulting from specified system installation from project area.
4. Finish shall be clean and ready for the application of any additional finishes.
5. Clean all tools and equipment as recommended in writing by the manufacturer.

3.6 PROTECTION

A. Protection:
1. Protect membrane system during specified cure periods from any kind of traffic, topical water, and contaminants.

END OF SECTION

SECTION 072100 – INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

B. Provide all material, labor, equipment and services necessary to completely install all Insulation, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

C. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 05 12 00 STEEL AND FABRICATIONS
5. 05 30 00 METAL DECK
6. 06 10 00 ROUGH CARPENTRY
7. 07 40 00 METAL PANELS
8. 07 51 13 BUILT-UP ROOFING
9. 07 60 00 SHEET METAL
10. 07 84 00 FIRESTOPPING
11. 08 11 00 METAL DOORS AND FRAMES
12. 09 22 16 METAL FRAMING
13. 09 24 00 CEMENT PLASTER
14. 09 29 00 GYPSUM BOARD
15. 09 50 00 ACOUSTICAL CEILINGS
16. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
17. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
1. In accordance with the following standards:
   a. MIMA Mineral Insulation Manufacturers Association
   b. NFPA National Fire Protection Association
   c. TIMA Thermal Insulation Manufacturers Association

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
   a. Product Data on materials and accessories.
2. Quality Assurance/Control Submittals:
   a. Manufacturer's Written Instructions:
      1) Submit three (3) copies of manufacturer's written instructions.
3. Closeout Submittals in accordance with the following:
   a. Warranty in accordance with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

A. In accordance with California Quality Standards.

B. The R values for the insulation materials shall be in accordance with "The Standard Mineral Wool Building Insulation" latest Edition of the MIMA.

C. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. ASTM American Society for Testing and Materials

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage of Materials:
1. All Materials shall be delivered and stored in original unopened packages with manufacturer's name and contents legibly indicated. Materials shall be stored in a dry place, and protected from damage.

1.6 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES
a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified blanket insulation product manufacturer:
a. OWENS CORNING
b. Acceptable alternative manufacturers:
1) CERTAINTEED
2) JOHNS MANVILLE CORPORATION
2. Specified sound blanket insulation product manufacturer:

a. OWENS CORNING
b. Acceptable alternative manufacturers:
1) CERTAINTEED
2) JOHNS MANVILLE CORPORATION

3. Specified sound deadening board product supplier:
a. BLUE RIDGE FIBERBOARD "SoundStop".
4. Specified draft stop insulation product manufacturer :
a. THERMAFIBER "Thermafiber".
5. Specified rigid roof board insulation product manufacturer:
a. RMAX (a SIKA company) "Multi-Max FA-3".
1) Provide Compatible Tape for TSX-8500 & R-3000.
b. Acceptable Alternative Manufacturers:
1) ATLAS.
2) JOHNS MANVILLE CORPORATION.
3) TREMCO.
6. Specified rigid wall board insulation product manufacturer:
7. Specified acoustical blanket insulation product manufacturer:
8. Specified Black Faced Acoustical Insulation (acoustical blanket insulation) product manufacturer:
a. OWENS CORNING "Select Sound Black Acoustical Fiberglass Blanket".
9. Specified Sound Attenuation Fire Blanket (SAFB) Rock Wool Insulation product manufacturer:
a. ROXUL AFB.
10. Specified Acoustical Liner product Manufacturer:
a. KNAUF INSULATION "Sonic XP Duct Liner".
11. Specified Foamed-In-Place Insulation product manufacturer:
a. DOW CHEMICAL "Great Stuff Pro".
12. Specified poultry netting, and FSK tape product manufacturer or approved equivalent:
a. INSULATION MATERIALS.
13. Specified welded stud stick pins and self-locking washers product manufacturer or approved equivalent:
a. SUNBELT STUD WELDING.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Thermal Blanket:
1. Construction in accordance with the following:
a. Type I: Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with a maximum flame-spread and smoke-developed indices of 25 and 50, respectively, per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials"; passing ASTM E 136 "Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C", for combustion characteristics.
1) Unless otherwise noted, blankets without vapor-retarder membrane coverings, used in Interior partitions not subject to moisture.
b. Type II: Kraft-faced, Glass-Fiber Blanket Insulation: ASTM C 665 "Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing", Type II (non-reflective faced), ASTM E 84 Class C (faced surface not rated for flame propagation); Category I (membrane is a vapor barrier).

1) Unless otherwise noted, this type of insulation should only be used in conditions not "subject to view" (enclosed cavities) or in attics where a finished ceiling is provided and the attic is not used as a return air plenum.

c. Type III: Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665 "Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing", Type III (reflective faced), ASTM E 84 Class A (faced surface with a foil-scrim or foil-scrim-kraft facing)

1) Unless otherwise noted, this product shall be used when the attic (although enclosed by a finished ceiling) is used as a return air plenum, or used in "exposed-to-view" exterior and interior walls and ceilings or attics subject to moisture and fire-rated conditions.

2. Thermal Resistance (R) values required (minimum) for blanket insulation, unless otherwise indicated on the drawings:

a. Roof Blanket Insulation: R-30.

b. Wall Blanket Insulation: R-19.

c. Attic Spaces: All attic spaces shall have continuous insulation of the proper type and with a minimum thermal resistance "R" value of R-30 for insulation only. Where attic spaces have vertical elements above ceilings, these shall be insulated as part of the attic space to R-30 minimum.

3. Thickness: No more than will fit into the space available without compressing. Where insulation is confined between finishes, which would compress the material, high efficiency insulation shall be used to provide the required resistance value.

B. Sound Blanket:

1. Sound Attenuation Batts, unfaced, as manufactured by OWENS CORNING ECOTOUCH SOUND ATTENUATION BATTS, 2-1/2" batts for wood or metal frame construction, complying with ASTM C 665 "Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing", Type I, and ASTM E 136 "Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C".

a. Flame Spread Index Maximum 25.

b. Smoke Developed Index Maximum 50.

C. Sound Deadening Board: "SoundStop" 1/2 inch thick Sound Deadening Board, manufactured in accordance with ASTM C 208 "Specification for Cellulosic Fiber Insulating Board", as supplied by BLUE RIDGE FIBERBOARD.

1.	Density:	17.5 - 18 pcf.
2.	Thermal Conductivity	0.38.
3.	Tensile Strength (parallel to surface):	150 psi.
4.	Tensile Strength (perpendicular to surface):	600 psi.
5.	Water Absorption by Volume, max. percent:	2 hour immersion, 7 percent max.
6.	Expansion, 50 to 90 percent relative humidity:	0.5 percent.
7.	Vapor Permeance, grains/hr/sq.ft.in. HG 5.	
8.	Flammability (per NFPA rating):	1 or slight.
9.	R-Value	1.3.
10.	Sound Transmission Coefficient (STC):	44 - 51.

D. Draft Stop:

1. 2" minimum to 4" thick Safing Insulation, as required on the drawings. Provide manufacturer's written recommended fasteners as required for the specific installation requirements.

a. Flame Spread and Smoke Developed Index maximum as follows in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":

1) Unfaced Safing Insulation:
   a) Flame Spread Index 15
   b) Smoke Developed Index 0.
2) Foil Faced Safing Insulation:
   a) Flame Spread Index 25
   b) Smoke Developed Index 5.

E. Rigid Board:
1. Roof Board:
   a. In accordance with:
      1) ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 2, Class 1, isocyanurate with front and back glass fiber/organic mat paper-facers (balanced panel), conditioned "R" value of 8.6 per 1.5 inchs minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials", and ASTM D 1621 “Test method for Compressive Properties of Rigid Cellular Plastics”.
         a) Flame Spread Index Maximum, core: 25 or less.
         b) Smoke Density Developed Index Maximum, core: 450 or less.
         c) Compressive strength: 20 PSI.
         d) 4' x 4' or 4' x 8' panels.
2. Wall Board:
   a. Isocyanurate with front and back aluminum foil-faced (balanced panel).
   b. General: Tested to meet NFPA 285 "Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components."
   c. In accordance with:
      1) ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 1, Class 1.
      2) ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials", and ASTM D 1621 “Test method for Compressive Properties of Rigid Cellular Plastics”.
   d. Properties:
      1) NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Pass.
      2) Flame Spread Index Maximum, ASTM E 84: 25 or less.
      3) Smoke Density Developed Index Maximum, ASTM E 84: 450 or less.
      4) Compressive strength: 25 PSI.
      5) 4' x 4' or 4' x 8' panels.
      6) R value per inch: 6.0.

F. Black Faced Acoustic Insulation (Acoustical Blanket):
1. Provide 1" thick Black Fiberglass acoustical blanket complying with ASTM C 533 "Specification for Calcium Silicate Block and Pipe Thermal Insulation", Type III, and ASTM C 423 "Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method".
   a. Flame Spread Index Maximum 25.
   b. Smoke Density Developed Index Maximum 50.

G. Acoustical Blanket:

1. Provide 1" thick Black Fiberglass acoustical blanket complying with ASTM C 533 "Specification for Calcium Silicate Block and Pipe Thermal Insulation", Type III, and ASTM C 423 "Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method".
   a. Flame Spread Index Maximum 25.
   b. Smoke Density Developed Index Maximum 50.
   c. Noise Reduction Coefficient, per ASTM C423 0.70, minimum.

H. Sound Attenuation Fire Blanket Insulation (SAFB) - Rock Wool:
1. Mineral Wool batts complying with ASTM C 665, Type 1 (without membrane facings), and rated non-combustible per NFPA Standard 220 per ASTM E 136 "Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C".
   a. Flame Spread and Smoke Developed Index maximum as follows in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
      1) Unfaced:
         a) Flame Spread Index 0.
         b) Smoke Developed Index 0.
   b. Nominal Density 2.5 pcf.
   c. "K" at 75 degrees BTU. in/hr sq. ft. degrees fahrenheit 0.27.
   d. "R" Value per inch of thickness 3.7.

I. Acoustical Liner:
1. Provide 1.5 PCF mat-faced acoustical liner complying with ASTM C 1071:
   a. Flame Spread Index Maximum: 25
   b. Smoke Density Index Maximum: 50.
   c. Thickness: 1".
   d. NRC: .70

J. Foamed-In-Place Insulation:
1. Low Pressure Type: Semi-flexible soft, single-component polyurethane sealant, to CAN/ULC-S710.1, and having the following properties:
   a. Core Density (ASTM D 1622) 1.7 pcf.
   b. Fire Resistance (ASTM E 84) Flame Spread = 10, Smoke Developed = 20.
   c. Color: Yellow.
   d. Cure Time: Approximately 12 hours.
   e. Tack Free Time: 6 - 9 minutes.
   f. Applicator: Gun applied.

2.3 ACCESSORIES

A. Staples:
1. Hammer type.

B. Wire:
1. Sixteen (16) gage line wire.

C. All other materials such as fasteners (i.e. insulation netting, line wires, stick-pins), and retainers not specifically described, but required to complete the work, shall be as recommended by approved manufacturer, and installed by the Contractor. Contractor shall choose the appropriate fastener or system for the cavity space or area to be insulated without letting the insulation sag.
1. Poultry Netting: As distributed by INSULATION MATERIALS.

a. 2" hexagonal, 20 gage galvanized in rated assemblies.

2. FSK Tape: As distributed by INSULATION MATERIALS.
   a. VENTURE TAPE product #1525CW.
3. Welded Stud Stick Pins: As distributed by SUNBELT STUD WELDING.
   a. Provide low-carbon "mild" steel, with the following properties:
      1) Tensile Strength: 60,000 psi.
      2) Yield: 50,000 psi.
      3) Elongation: 20% (in 2 inches).
   b. Size: 12 gage.
   c. Length sufficient to hold insulation to underside of decking, and extended enough to allow self-locking washers to hold insulation in place without crushing the insulation.
   d. Spacing: 24 inches o.c.
      1) Pins shall be placed within 3 to 5 inches of all area edges.
   e. Self-Locking Washers:
      1) 2 inch diameter, galvanized, compatible with welded stud stick pin size and gage.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. All building(s) shall have a complete thermal envelope of thermal blanket or rigid board insulation.
   a. Do not install insulation until the construction has progressed to the point that inclement weather will not damage or wet the insulation material.
   b. Install in accordance with manufacturer's written recommendations.
   c. Insulation shall fit snugly between framing members without voids. Fully insulate all areas between all framing members, cutting and fitting as required.
   d. Attach insulation to inside face of framing members.
      1) Wood Framing: Friction fit to keep from falling down within wall cavity. Attach with Hammer Staples at 6 inches on center with minimum staple penetration of 3/8 inch when insulation has a membrane facing.
      2) Metal Framing: Friction fit to keep from falling down within the cavity and use line wire across metal studs. Omit wire and spot tape with FSK Tape when insulation has a membrane facing.
   e. Vapor-Retarder Membrane: Shall be continuous and without unnecessary joints.
      1) At roof structure and exterior walls, after securing the insulation facing flanges, provide FSK Tape over all of the insulation facing butt joints and all overlapping facing flanges, so as to create a continuous vapor-retarder membrane at underside of the roof deck and inside of walls.
      2) Patch all tears, rips and holes in the vapor-retarder membrane.
   f. Cut and fit insulation material around pipes, conduits and outlet boxes, as necessary to maintain the full integrity of the insulation.

B. At Roof Framing:
1. Install thermal roof blanket Insulation between all exterior roof framing members.
   a. Wood Framing: Attach wire to framing with staples with minimum staple penetration of 5/8 inch.
   b. Metal framing: Attach with line wires perpendicular to framing at 12 inches on center.

C. At Wall Framing: Install thermal wall blanket insulation between all exterior wall framing members.

D. Sound Insulation:
   1. Install sound attenuation batts between all interior wall framing members.
   2. Install sound attenuation batts between all floor framing members.
   3. Install sound deadening board over interior wall framing members.

E. Draft Stop Insulation:
   1. Install Draft Stop Insulation where required.

F. Rigid Board Insulation:
   1. Install per manufacturer's written recommendations.
   2. Wall Board: Tape all edges as part of the rigid board system.

G. Acoustical Blanket:
   1. Install Acoustical Blanket where indicated and per manufacturer's written recommendations.

H. Sound Attenuation Fire Blanket (SAFB):
   1. Interior Stud Cavity: Friction fit SAFB's securely between studs. Butt ends of blankets closely together and fill voids.
   2. Creased SAFB: Bow the blankets slightly to fit into stud cavity. Slit the blankets vertically 1" deep with a utility knife.

I. Foamed-In-Place Insulation:
   1. General:
      a. Apply foamed-in-place insulation in strict accordance with manufacturer's installation guidelines.
         1) Avoid overfilling restricted spaces.
   2. Exterior Walls:
      a. Apply general purpose foamed-in-place insulation in cavaties created by wall framing, gaps and cracks up to 3 inches in size.
      b. Apply low pressure foamed-in-place insulation in gaps and cracks adjacent to door and widnow frames, up to a maximum gap width of 3 inches.

END OF SECTION

SECTION 074000 – METAL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
   2. This Section includes:
      a. Metal Roof Panels (Flat Sloped)
      b. Back Side of Parapet Panel
      c. Perforated Panel, Canopy
      d. Interior Acoustical Wall Liner Panel
   3. The Exterior Wall finishes and the water resistant barrier (WRB) shall comply with CBC Code Section 1402.5, 2603.5.5 and NFPA 285. The Rigid Insulation shall have a flame spread index no greater than 25 as determined by ASTM E84 or UL 723.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 11 01 CONCRETE FORMWORK
   4. 03 30 00 CAST-IN-PLACE CONCRETE
   5. 04 22 00 CONCRETE MASONRY UNITS
   6. 05 12 00 STEEL AND FABRICATIONS
   7. 05 30 00 METAL DECK
   8. 07 21 00 INSULATION
   9. 07 51 13 BUILT-UP ROOFING
   10. 07 60 00 SHEET METAL
   11. 07 72 00 ROOF ACCESSORIES
   12. 09 22 16 METAL FRAMING
   13. 09 91 00 PAINTING
   14. 11 66 43 SCOREBOARDS
   15. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   16. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following Standards:
      a. AAMA American Architectural Manufacturers Association
      b. AATCC American Association of Textile Chemists and Colorists
      c. AISC American Institute of Steel Construction.
      d. FMG Factory Mutual Guide (Wind Uplift Requirements for FMG 1A-90 minimum for Metal Roof Panels), or UL Equivalent.
      e. ICC International Code Council (Formerly ICBO)
      f. MBMA Metal Building Manufacturers Association, "Metal Roofing Systems Design Manual".

g. NAAMM National Association of Architectural Metal Manufacturers.
h. SMACNA Sheet Metal and Air Conditioning Contractors National Association.
i. TAPPI Technical Association of the Pulp and Paper Industry, Inc.
j. UL Underwriters Laboratories (FMG Equivalent for some manufacturers).

1.3 DEFINITIONS

A. The following definitions apply to this specification section:
1. Waterproof: Any material, treatment, or construction that resists flow or penetration of water (Means Illustrated Construction Dictionary, Third Edition, Unabridged)
2. Weathertight: Generally meaning the ability of the roofing system (including all roof panels, side seams, end laps, roof to wall flashing, ridge flashing, hip flashing, valley flashing, high side eave flashing, rake flashing, expansion joints, curb and penetration flashing, gutters, and wall panels) to prevent water intrusion under normal climatic conditions (including wind and snow conditions) for the area where the project is constructed.
a. Also, the word "Weathertightness" is a variation of the word "weathertight" and shall have the same definition applied. (Definition obtained from various manufacturers warranty literature.)

1.4 SYSTEM DESCRIPTION

A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.
1. General: Provide metal panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 "Test method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems"at the following test-pressure difference:
1. Test-Pressure Difference: Negative 1.57 lbf/sq. ft.
2. Test-Pressure Difference: Positive and negative 1.57 lbf/sq. ft.
3. Positive Preload Test-Pressure Difference:
a. Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
4. Negative Preload Test-Pressure Difference:
a. 50 percent of design wind-uplift-pressure difference.

C. Water Penetration: No water penetration when tested according to ASTM E 1646 "Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference" at the following test-pressure difference:
1. Test-Pressure Difference: 2.86 lbf/sq. ft. for roof slopes less than or equal to 30 degrees.
2. Test-Pressure Difference:
a. 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. ft. and not more than 12.0 lbf/sq. ft. for roof slopes steeper than 30 degrees.
3. Positive Preload Test-Pressure Difference:
a. Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.

4. Negative Preload Test-Pressure Difference:
   a. 50 percent of design wind-uplift-pressure difference.

D. FMG Listing: Provide metal roof panels and component materials that comply with requirements in FMG 4471 as part of a panel roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
   1. Fire/Windstorm Classification: Class 1A-90.
   2. Hail Resistance: MH Moderate Hail.
   3. Hail Resistance: SH Severe Hail.

E. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592 "Test method for Structural Performance of Sheet metal Roof and Siding Systems by Uniform Static Air Pressure Difference".
   1. Wind Loads: Determine loads based on the following minimum design wind pressures:
      a. Uniform pressure as indicated on Drawings.
   2. Deflection Limits: Engineer metal roof panel assemblies to withstand design loads with vertical deflections no greater than 1/180 of the span.

F. Seismic Performance: Provide metal roof panel assemblies capable of withstanding the effects of earthquake motions determined according to ASCE 7, and CBC 1616A.

G. Thermal Movements: Provide metal roof panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Coordination Drawings: Roof plans and Wall Elevations drawn to scale, coordinating penetrations and roof-and/or wall-mounted items. Show the following:
      a. Roof panels and attachments.
      b. Purlins and Rafters.
      c. Wall Panels and attachments.
      d. Roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, and items mounted on roof curbs.
      e. Wall-mounted items including supports, pipe supports and penetrations.
   2. Product Data.
      a. Material List and product information regarding material composition, product names, profiles, shapes, finishes, and application for each item.
      b. Submit manufacturer's full color range (including any standard, premium and custom colors) of all metal panels and exposed components for selection by the Architect.
   3. Shop Drawings.

a. Submit shop drawings and Structural Calculations prepared by the manufacturer under the supervision of a registered Civil or Structural Engineer in the State of California, detailing fabrication and assembly of the work under this section, as well as procedures and diagrams. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as unit of work of other related sections.
   1) Manufacturer shall prepare, review and approve all drawings and shop drawings prior to submittal to the Architect.
      a) Calculations shall include design wind load pressures for components and cladding (walls and roofs) in accordance with CBC 1609A.
      b) Calculations shall also include checks for panel spans between attachment points.
      c) Check of attachment hardware to panel.
      d) Check of fasteners connecting panel hardware to structure,
   2) Manufacturer shall approve of all details (including Architects standard details) prior to fabrication. If different details than the Architects details are required to satisfy manufacturers warranty requirements, submit the differences (highlighted as to differences) to the Architect for review.
   3) Show fabrication and installation layouts of metal roof panels; details of edge conditions, joints, lap seams, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.
   4) Include details of the following accessory items, at a scale of not less than 1-1/2 inches per 12 inches:
      a) Flashing and trim.
      b) Gutters.
      c) Downspouts.
      d) Roof curbs.

4. Samples.
   a. For each type of exposed finish required, prepared on Samples of size indicated below.
      1) Metal Panels: Provide 12 inches long by actual panel width.
      2) Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
      3) Roof Underlayment: 6 inch square samples.
      4) Vapor Retarders: 6 inch square samples.
      5) Water Barriers: 6 inch square samples.
      6) Accessories: 12 inch long samples for each type of accessory.
      7) Provide two (2) fasteners with any neoprene washers, metal washers, nuts or rivets for every type of fastener condition on this Project. Tag and label each fastener indicating that location and use for each fastener condition on this project.

5. Quality Assurance/Control Submittals:
   a. Installer Qualifications:
      1) Submit three (3) copies of manufacturer's Installer Certification.
   b. Manufacturer's Written Instructions:
      1) Submit three (3) copies of manufacturer's written instructions.
   c. Manufacturer's Field Reports:
      1) Submit three (3) copies of manufacturer's field reports.
   d. Manufacturer's Test Reports:
      1) Provide Test Reports per ASTM E 1592 or FM 4474.
   e. Engineering Calculations:

1) Submit four (4) copies of engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.

6. Closeout Submittals in accordance with the following:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Project Record Documents in accordance with Specification Section - PROJECT RECORD Documents.
   c. Warranty in accordance with Specification Section - WARRANTIES.
      1) Special Warranties:
         a) Twenty (20) Year Weather Tightness Warranty.
         b) Five (5) Year Installation Warranty.
         c) Twenty (20) Year Finish Warranty.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
         1) Installer shall have manufacturers signed Certified Installer Agreement as a rider to the warranty.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
      b. Manufacturer shall inspect during installation and after completion and report to the Architect.
         1) A factory trained representative approved by the manufacturer shall visit the project site a minimum of five (5) times, in order to review the installation of the metal panels, and provide a follow-up written report for the following periods in the construction schedule.
            a) At the preliminary metal panel conference.
            b) During the first week of installation, in order to review the installation requirements.
            c) When the metal panel installation is approximately 50% complete
            d) Upon completion of the metal panel installation.
            e) When punch list and corrections have been completed

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:

1. Preliminary Metal Panel Conference: Before starting roof deck and wall panel, sheathing, wood joists or purlin and rafter construction, conduct conference scheduled by the Contractor at Project site. Review methods and procedures related to roof construction and metal roof panels including, but not limited to, the following:
   a. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal panel installer, metal panel manufacturer's representative, deck, sheathing, wood joists or purlin and rafter installer, and installers whose work interfaces with or affects metal panels including installers of metal panel accessories and roof-mounted equipment.
      1) Review wood blocking layout (if any) required for metal panel fastener / anchorage system.
   b. Coordinate the work with all other related work.
   c. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   d. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
   e. Examine conditions for compliance with requirements, including flatness and attachment to structural members.
   f. Review structural loading limitations of metal panel substrate construction during and after roofing and wall construction.
   g. Review metal panel flashings, special metal panel details, metal panel drainage, metal panel penetrations, equipment curbs, and condition of other construction that will affect metal panels.
   h. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
   i. Review temporary protection requirements for metal panels during and after installation.
   j. Review metal panel observation and repair procedures after metal panel installation.
   k. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress Meetings: Scheduled by the Contractor for the proper performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule of necessary.
3. Final Inspection: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal panels from exposure to sunlight and high humidity, except to extent necessary for period of metal panel installation.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of metal panel framing and metal panel opening dimensions by field measurements before metal panel fabrication and indicate measurements on Shop Drawings.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field-trimming of panels. Coordinate metal panel construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified in Specification Section - ROOF ACCESSORIES.

B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of metal panel substrate, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.
   2. Installer shall have manufacturers signed Certified Installer Agreement as a rider to the warranty.

B. Manufacturer's Warranty:
   1. Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
      a. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
         1) Color fading more than 5 Hunter units when tested according to ASTM D 2244 "Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Coordinates".
         2) Chalking in excess of a No. 8 rating when tested according to ASTM D 4214 "Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films".
         3) Cracking, checking, peeling, or failure of paint to adhere to bare metal.
      b. Finish Warranty Period: 20 years from date of Substantial Completion.
         1) All costs for Warranty shall be included in the bid price. There shall be no additional costs associated with the implementation or maintaining of the warranty.
   2. Weathertightness Warranty for Standing-Seam Metal Roof Panels:

a. Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
   1) Warranty shall include roof panel side seams, end laps, roof to wall flashing, ridge flashing, hip flashing, valley flashing, high side eave flashing, rake flashing, approved expansion joints, approved curb and penetration flashing, approved gutters and built-in gutters, and approved wall systems.
   2) A Factory trained manufacturer representative approved by the manufacturer shall inspect during and at completion of installation and certify that the system is acceptable to the manufacturer's weathertightness standards.
b. Warranty Period: 20 years from date of Substantial Completion.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES
   a. Warranty Period Five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified Flat Sloped Roof Panel (Standing Seam) product manufacturer:
   a. GARLAND R-MER SPAN. IAPMO 662
   b. Acceptable alternative manufacturers:
      1) TREMCO TREMLOCK VP. ESL-1166
      2) UNA-CLAD UC-6WT. ICC ESR 3422
2. Specified Perforated Panels
   a. Manufacturer: DIAMOND PERFORATED PANELS.
   b. Quantity: Continuous Sheet with no joints, curved to profile on drawings.
   c. Material: Stainless Steel.
   d. Thickness: 11-Gauge.
   e. Width and Length: 48" x 120".
   f. Perforation: Custom Perforations and design by Architect.
   g. Panel Ends and Edges: 1" margin at perimeter with hemmed edges.
   h. Powder Coated after fabrication of panels.
3. Specified Interior Acoustical Wall Liner Panel product manufacturer:
   a. CENTRIA (Perforated Liner Panel) L21A.
4. Specified Back of Parapet Panel product manufacturer:
   a. NCI (CENTRIA) ECONOLAP 3/4".
   b. Acceptable alternative manufacturers:
      1) AEP SPAN NU-WAVE CORRUGATED.
5. Specified Vapor Retarder:
   a. REEF INDUSTRIES GRIFFOLYN T-65.
6. Specified Roof Underlayment product manufacturer:

a. TYPAR ROOF WRAP 30.

7. Specified Water Barrier (also qualifies as an "Air Barrier"):
   a. TYVEK COMMERCIAL WRAP.
   b. Acceptable alternative manufacturers:
      1) TYPAR METRO WRAP.
8. Specified Ice and Water Shield:
   a. GCP APPLIED TECHNOLOGIES; CE and WATER SHIELD HT.
      1) Formerly GRACE CONSTRUCTION PRODUCTS.
   b. Acceptable alternative manufacturers:
      1) CARLISLE COATINGS & WATERPROOFING CCW WIP 300HT.
9. Specified Penetration Flashing
   a. GRACE CONSTRUCTION PRODUCTS VYCOR V40.
   b. Acceptable alternative manufacturers:
      1) FORTIFIBER "For-I-Flash 40"
      2) TYVEK "FlexWrap and StraightFlash.
10. Specified Insulation:
   a. Acoustical Fiberglass OWENS-CORNING FIBERGLASS.
   b. Rigid Board RMAX - "RE-COVER BOARD-3".

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Properties:
1. Panels: Metallic-Coated Steel Sheet Prepainted with Coil Coating composed of steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755 "Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products". See Schedule Article at the end of this section for profiles and manufacturer/product names, gages, application and finish requirements.
   a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process", G90 coating designation; structural quality.
2. Flashing and Trim: Formed from zinc-coated (galvanized) steel sheet (minimum thickness and material to match gage of Metal Panels, unless noted otherwise) pre-painted with coil coating. Provide custom profile shape flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fascia, and fillers. Finish flashing and trim with same finish system as adjacent metal panels. All pieces shall have self-hemmed edges fully pre-finished. No raw or field painted cut-edges will be permitted.
   a. Provide components required for a complete metal panel assembly including trim, copings, fascia, corner units, closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels, unless otherwise indicated.
   b. Exactly matching materials, gage of Metal Panels, profile, texture and pre-finish.
   c. Supply in continuous lengths as long as possible with minimal seams the full extent of the roof.
   d. As required for a pre-finished, weathertight assembly.
   e. All metal work that comes in contact with and/or is an accessory to the metal panels shall be provided and installed by the Metal Panel Manufacturer from the same materials as the Metal Panels.

f. Mylar-Coated Tape: 1/4 inch x 1 inch with PSA one side and Mylar one side where required by the manufacturer.

3. Gutters: Formed from zinc-coated (galvanized) steel sheet (minimum thickness to match gage of Metal Panels, unless noted otherwise) pre-painted with coil coating. Match profile of trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, sized according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced 36 inches o.c., fabricated from same metal as gutters, unless noted otherwise. Provide bronze or copper wire ball strainers at outlets. Finish gutters to match metal roof panels.

4. Downspouts: Formed from zinc-coated (galvanized) steel sheet (minimum thickness to match gage of Metal Panels) pre-painted with coil coating; in 10-foot- long sections, complete with formed elbows and offsets, unless noted otherwise. Finish downspouts to match metal roof panels.

5. Roof Curbs: Fabricated from 0.0747-inch- thick, zinc-coated (galvanized) steel sheet pre-painted with coil coating, with welded top box and bottom skirt, and integral full-length cricket, unless noted otherwise. Fabricate curb sub-framing of minimum 0.0747-inch- thick, angle-, C-, or Z-shaped steel sheet, unless noted otherwise. Fabricate curb and sub-framing to withstand indicated loads, of size and height indicated. Finish roof curbs to match metal roof panels.

a. Insulate roof curb with 1-inch- thick minimum, rigid insulation.

B. Vapor Retarder: Provide GRIFFOLYN "T-65".

1. Performance Requirements:

a. Water Vapor Permeance 0.038 grams/hr·ft2·in·Hg.

1) Per ASTM E-96 "Standard Test Methods for Water Vapor Transmission of Materials".

2. Accessories:

a. Seam Tape GRIFFOLYN "FAB TAPE".

b. Repair Tape GRIFFOLYN "GRIFF-TAPE".

C. Roof Underlayment: Provide "TYPAR ROOF WRAP 30" with compatible lap seam tape, or approved equivalent.

1. Performance Requirements:

a. Gurley Hill (TAPPI T-460): Greater than 2500 sec/100cc.

b. Water Vapor Transmission per ASTM E-96 "Standard Test Methods for Water Vapor Transmission of Materials", Method A:

1) Greater than 13 perms.

c. Water Penetration Resistance per AATCC-127: 165 cm on Hydrostatic Head.

d. Trapezoidal Test per ASTM D 5733 "Standard Test Method for Tearing Strength of Nonwoven Fabrics by the Trapezoid Procedure":

1) Equal to 68 / 67.

D. Penetration Flashing: Self-adhered and self-sealing weather barrier strips, inn accordance with FS UU-B-790a, Grade A.

1. 40 mil minimum thickness in 9 inch and 12 inch widths as is appropriate for barrier application.

E. Water Barrier (also qualifies as an "Air Barrier"): Provide "TYVEK" "Commercial Wrap" with compatible lap seam tape, or approved equivalent, that complies with 60 Water Resistant, Grade D, in accordance with CBC Sections 1404.2 and 2510.6.

1. Provide manufacturer's preformed tape and recommended cap fasteners for attachment.

2. Seam and Repair Tape: DUPONT "TYVEK 3" WIDE TAPE".

F. Ice and Water Shield: Self-Adhering, Polyethylene-Faced Sheet, ASTM D 1970 "Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection", 40 mils thick minimum, elongation from 250 percent to 300 percent, consisting of slip-resisting polyethylene-film reinforcing and top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied.

G. Insulation:
1. Acoustical Fiberglass: ASTM C 665 "Standard Guide for Determination of the Thermal Resistance of Low-Density Blanket-Type Mineral Fiber Insulation", type indicated below; consisting of fibers manufactured from glass, Class 1, sized to fit the interior liner panel profile.
   a. Type I (blankets without membrane covering), passing ASTM E 136 "Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C", for combustion characteristics.
2. Roof Curb (1 inch thick minimum unless otherwise noted):
   a. Un-faced, Glass-Fiber Board Insulation: ASTM C 612 "Standard Specification for Mineral Fiber Block and Board Thermal Insulation", Type IA or Types IA and IB; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; and with a nominal density of 3 lb/cu. ft. and thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F.
3. Rigid Insulation:
   a. General:
      1) ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type II, isocyanurate with front and back asphalt paper-facers (balanced panel), conditioned "R" value of 5.60 per inch minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials", and ASTM D 1621 "Test Method for Compressive Properties of Rigid Cellular Plastics".
         a) Flame Spread Index Maximum, core: 25 or less.
         b) Smoke Density Developed Index Maximum, core: 450 or less.
      2) Compressive Strength: 20 PSI, in accordance with ASTM D 1621 "Standard Test Method for Compressive Properties Of Rigid Cellular Plastics".
   b. Continuous Insulation for Roof Panels:
      1) ASTM C 1289 , Type II, Class 1, isocyanurate with front and back asphalt paper-facers (balanced panel)
         a) 4' x 4' or 4' x 8' x 2.6" panels.
         b) Thickness: 5.2 inches, R30.
   c. Continuous Insulation for Wall Panels:
      1) ASTM C 1289 Type 1, Class 1, isocyanurate with front and back aluminum foil-faced (balanced panel),
         a) 4' x 4' or 4' x 8' panels.
         b) Thickness: 1 inch, R5.6.

H. Furring:
1. General: Comply with ASTM C 754 "Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products" for conditions indicated.
   a. Steel Sheet Components: Complying with ASTM C 645 "Standard Specification for Nonstructural Steel Framing Members" requirements for metal and with ASTM A 653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process", G60, hot-dip galvanized zinc coating.
2. Hat Channels (Subgirts): In accordance with ASTM C 645 "Standard Specification for Nonstructural Steel Framing Members".

a. Minimum Base Metal Thickness: Appropriate to depth indicated.
b. Depth: As indicated.

3. Cold-Rolled Channels: Thickness appropriate to span, bare steel with minimum 1/2-inch-wide flange.
   a. Depth: As indicated.
   b. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0747 inch.
   c. Tie Wire: ASTM A 641 "Standard Specification for Zinc–Coated (Galvanized) Carbon Steel Wire", Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.
4. Zee Channels:
   a. At Roofs: Provide in depth as indicated.
   b. At Walls: Provide in depth as indicated.
      1) Zee Channels: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.059 inch, and depth required to fit insulation thickness indicated.

2.3 ACCESSORIES

A. Profile Closures:
   1. Metal: Exposed To View:
      a. Provide metal closures, fabricated of same metal as metal roof panels.
   2. Neoprene: Concealed from view:
      a. Provide closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or pre-molded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction and to prevent nesting of birds or insects.

B. Clips: Minimum 0.0598-inch-thick, Galvanized or stainless steel panel clips per manufacturer's written recommendations (stainless steel clips only for aluminum or stainless panels) designed to withstand negative-load requirements.
   1. Compatible material and size with Standing Seam Roof System.

C. Cleats: Mechanically seamed cleats formed from minimum 0.0359-inch-thick, stainless-steel.

D. Backing Plates: Provide metal backing plates at panel end splices, fabricated from non-corrosive material recommended in writing by manufacturer.

E. Sealants:
   1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
   2. Joint Sealant: ASTM C 920 "Standard Specification for Elastomeric Joint Sealants"; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
   3. Butyl-Rubber-Based, Solvent-Release Sealant: In accordance with ASTM C 1311 "Standard Specification for Solvent Release Sealants".

F. Fasteners:

1. Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating.
    a. Fasteners for Metal Panels: Self-drilling or self-tapping type 304 stainless hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal roof panels.
    b. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
        1) Blind Fasteners: Stainless Steel Blind Rivets.
    c. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
    d. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
    1. Fabricate panels in longest practical lengths possible (20 foot minimum) to minimize seaming and lapping. See drawings for Curved Roof panel lengths for longer length and lapping requirements.
    2. Sound Control: Where sound-absorption requirements are indicated for liner panels, fabricate with 1/8 inch diameter holes at 3/8" o.c. staggered with a 10 percent free area.

B. Provide panel profile, including major ribs for full length of panel.

C. Fabricate metal panel joints with factory-installed butyl sealant that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.

D. Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
    1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
    2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
    3. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
    4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
    5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal roof panel manufacturer.
        a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal roof panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Exterior Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings for all exterior metal panels.
   1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces (both sides of panel when both sides are exposed to view) to comply with coating and resin manufacturers' written instructions.
      a. Fluoropolymer Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil; complying with physical properties and coating performance requirements of ASTM D 2247 "Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity", except as modified below:
         1) Humidity Resistance: 2000 hours.
         2) Water Resistance: 2000 hours.
   2. Durability: Provide coating field tested under normal range of weather conditions for a minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D 4214 "Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films"; and without fading in excess of 5 Hunter Units.
   3. Color: "Custom Colors" as selected by the Architect.

E. Interior Exposed Finishes: Apply the following coil-coating, as specified or indicated on Drawings for all interior liner panels, profile closures, flashing and trim.
   1. Apply pretreatment and manufacturer's standard white or light-colored epoxy primer (PPG 55PLY3305 or approved equivalent) finish, consisting of prime coat with a minimum total dry film thickness of 0.2 mils on each side.
   2. Color: "Custom Colors" as selected by the Architect.
   3. Perforated Metal Panels: Panels shall be polished (de-burred), cleaned of excessive lubricantes and degreased to be ready for painting.

F. Exterior Perforated Panels: Panels shall be galvanized, blasted and pre-treated prior to powder coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of work.
   1. Examine primary and secondary metal panel framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal panel manufacturer.
   2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before metal panel installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
   1. When applying Ice and Water Shield products, clean and prime the substrates in accordance with the manufacturer's written recommendations.

B. Install flashings and other sheet metal to comply with requirements specified in Specification Section SHEET METAL flashing and trim.

C. Install fascia and copings to comply with SMACNA requirements specified in Specification Sections - SHEET METAL and ROOF ACCESSORIES.

D. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous metal panel support members and anchorage according to metal panel manufacturer's written recommendations.

3.3 INSTALLATION

A. Roof Panel Installation:
   1. Metal Roof Panel over Metal Roof Deck:
      a. Place the vapor retarder on metal roof decks within the zee furring. Lap vapor retarder joints 6 inches minimum and adhesively attach in accordance with roofing manufacturer's written recommendations and in accordance with manufacturer's warranty requirements, to provide a continuous uninterrupted membrane. Tape all joints with compatible tape. Repair any holes or damage to vapor retarder with compatible repair tape.
      b. All fastening shall be done in accordance with FMG 1A-90 and manufacturer's written recommendations for the type of panel and fastening system required.
         1) Submit fastening schedule along with all shop drawings showing the type of fastener and the spacing required.

c. Insulation Board: Install insulation boards over roof deck on entire roof surface in thicknesses as indicated on the drawings.
   1) Install insulation board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
   2) Erect insulation horizontally and hold in place with zee furring spaced in accordance with wind uplift requirements. Securely attach narrow flanges of furring members to deck with welds in accordance with wind uplift requirements.

d. Place a layer of vapor retarder over installed insulation boards. Lap vapor retarder joints 6 inches minimum and adhesively attach in accordance with roof underlayment manufacturer's written recommendations and in accordance with manufacturer's warranty requirements, to provide a continuous uninterrupted membrane. Tape all joints with compatible tape. Repair any holes or damage to vapor retarder with compatible repair tape.

2. Metal Roof Panel Installation:

a. General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1) Provide Ice and Water Shield at all eaves, ridges, hips, valleys & gutters in accordance with roof panel manufacturer's written recommendations.
   2) Field cutting of metal panels by torch is not permitted.
   3) Install panels perpendicular to purlins.
   4) Rigidly fasten ridge end of flat sloped metal roof panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
   5) Provide metal closures at peaks, rake edges, rake walls and each side of ridge and hip caps.
   6) Flash and seal metal panels with profile closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
   7) Locate and space fastenings in uniform vertical and horizontal alignment.
   8) Install ridge and hip caps as metal panel work proceeds.
   9) All panels shall be fabricated in continuous lengths whenever possible to eliminate lap seams. When lap seams are unavoidable, locate panel splices over, but not attached to, structural supports. Locations of lap seams shall be submitted to the Architect for review as part of the submittal process. Panels that require lap seams shall be in the longest possible lengths to minimize the overall number of lap seams per roof area.
      a) Provide ice and water shield at all lap joints in accordance with metal roof panel manufacturer's written recommendations for a watertight seal. Follow manufacturer's cleaning and priming recommendations prior to application of this product.
      b) Length of lap seals shall be in accordance with manufacturer's warranty requirements for watertight seals.
   10) Lap metal flashing over metal panels to allow moisture to run over and off the material.

3. Fasteners:

a. Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.

4. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

5. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal panel manufacturer.
   a. Seal metal panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal panel manufacturer.
   b. Slopes equal to 1/2:12 and less less than 1:12 shall be provided without end laps.
   c. Prepare joints and apply sealants to comply with requirements in Specification Section - SEALANTS.

B. Exterior Wall Panel System:
1. Wall Panel Installation over Metal Framing:
   a. Place the one layer of the water barrier on wall framing. Lap water barrier joints 6 inches minimum and adhesively attach in accordance with water barrier manufacturer's written recommendations and in accordance with manufacturer's warranty requirements, to provide a continuous uninterrupted membrane. Tape all joints with compatible tape. Repair any holes or damage with compatible tape.
   b. Provide metal wall panels of full length from sill to top plate, unless otherwise indicated or restricted by shipping limitations. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
2. Fasteners:
   a. Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.
      1) All fastening shall be done in accordance with manufacturer's written recommendations for the type of panel and fastening system required.
         a) Submit fastening schedule along with all shop drawings showing the type of fastener and the spacing required.
         b) Locate and space fastenings in uniform vertical and horizontal alignment.
   b. Field cutting of metal wall panels by torch is not permitted.
      1) Install panels perpendicular to wall blocking or subgirts.
      2) Provide metal and neoprene closures at bottom and top of metal wall panels.
      3) Flash and seal metal wall panels with weather closures at perimeter of all openings. Fasten with self-tapping screws.
      4) Locate and space fastenings in uniform vertical and horizontal alignment.
      5) All panels shall be fabricated in continuous lengths whenever possible to eliminate lap seams. When lap seams are unavoidable, locate panel splices over, but not attached to, structural supports. Locations of lap seams shall be submitted to the Architect for review as part of the submittal process. Panels that require lap seams shall be in the longest possible lengths to minimize the overall number of lap seams per wall area.
         a) Length of lap seals shall be in accordance with manufacturer's warranty requirements for watertight seals.
      6) Lap metal flashing over metal wall panels to allow moisture to run over and off the material.
3. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.
4. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

a. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
b. Prepare joints and apply sealants to comply with requirements in Specification Section - SEALANTS.

C. Accessory Installation:
1. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
a. Install components required for a complete metal panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
a. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
b. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
3. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
4. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
a. Provide elbows at base of downspouts to direct water away from building.
b. Tie downspouts to underground drainage system when indicated.
5. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.
6. Pipe Flashing: Form flashing around pipe penetration and metal panels. Fasten and seal to metal panels as recommended by manufacturer.

3.4 FIELD QUALITY CONTROL

A. Erection Tolerances:
1. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed metal panel installation, including accessories. Report results in writing.

C. Remove and replace applications of metal panels where inspections indicate that they do not comply with specified requirements.

D. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

B. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

3.6 SCHEDULES

A. Metal Panel Schedule:

1. Exterior Roof Flat Sloped:
   a. Style: Standing Seam, low slope.
   b. Manufacturer: CENTRIA.
   c. Type: SRS-3.
   d. Gage: 22.
   e. Size: 3" nominal high seams x 16" wide panels.
   f. Finish: "Fluoropolymer" 3-coat system.
   g. Remarks: Panels are to be flat with no dimples. Provide 1-1/4"wide "T" shaped caps.
2. Wall Accent Panel:
   a. Style: Ribbed.
   b. Manufacturer: CENTRIA.
   c. Type: ECONOLAP 3/4", exposed fastener.
   d. Gage: 22.
   e. Size: 3/4" deep x 34 2/3" coverage.
   f. Finish: "Fluoropolymer" 3-coat system.
   g. Remarks: N/A.
3. Perforated Panel, Canopy
   a. Style: Flat panel
   b. Manufacturer: DIAMOND PERFORATED PANEL
   c. Material: Stainless Steel.
   d. Thickness: 11-Gauge.
   e. Width and Length: 48" x 120".
   f. Perforation: Custom Perforations and design by Architect.
   g. Panel Ends and Edges: 1" margin at perimeter with hemmed edges.
   h. Powder Coated after fabrication of panels
4. Back of Parapet Panel
   a. Style: Econolap 3/4"
   b. Manufacturer: NCI Centria
   c. Type: G-90 Galvanized Steel
   d. Gage: 20
   e. Size: 34" width x 40-feet
   f. Finish:
   g. Color: 971 Chromium Gray
5. Interior Acoustical Wall Panel:
   a. Style: Liner Panel.
   b. Manufacturer: CENTRIA.

c. Type: L21A, concealed fastener.
d. Gage: 20.
e. Size: 1-1/2" deep x 24" wide.
f. Finish: Epoxy primer coat on both sides, suitable for field painting. Refer to APPENDIX "B" - INTERIOR COLOR SCHEDULE.
g. Remarks: Perforated with 3 rolled dimples per panel and integral fiberglass insulation.

END OF SECTION

SECTION 074012 – MCM PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
   2. This section includes:
      a. Prefabricated MCM Panels with integral reveals, engineered "Route and Return Dry" attachment components and related accessories.
   3. The Exterior Wall finishes and the water resistant barrier (WRB) shall comply with CBC Code Section 1402.5, 2603.5.5 and NFPA 285. The Rigid Insulation shall have a flame spread index no greater than 25 as determined by ASTM E84 or UL 723.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 07 21 00 INSULATION
   4. 07 40 00 METAL PANELS
   5. 07 42 43 COMPOSITE WALL PANELS
   6. 07 60 00 SHEET METAL
   7. 07 92 00 SEALANTS
   8. 08 11 00 METAL DOORS AND FRAMES
   9. 08 41 00 STOREFRONTS
   10. 08 41 23 STOREFRONT TEMPERATURE RISE
   11. 09 22 16 METAL FRAMING
   12. 09 24 00 CEMENT PLASTER
   13. 09 29 00 GYPSUM BOARD
   14. 09 91 00 PAINTING
   15. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. AAMA American Architectural Manufacturers Association
      b. ASCE American Society of Civil Engineers
      c. ASTM American Society for Testing and Materials
      d. ICC International Code Council (Formerly ICBO)
      e. NAAMM National Association of Architectural Metal Manufacturers.
      f. NFPA National Fire Protection Association
      g. SEI Structural Engineering Institute
      h. SMACNA Sheet Metal and Air Conditioning Contractors National Association.

1.3 DEFINITIONS

A. The following definitions apply to this specification section
   1. Panel System:Wall panels, attachment components, miscellaneous framing, and accessories necessary for a complete weathertight wall system.
   2. Weathertight – meaning the ability to prevent water intrusion under normal climatic conditions (including pressure differentials, wind, and snow conditions) for the area where the project is constructed. Also the word “weathertightness is a variation of the word “weathertight and shall have the same definition applied.

1.4 SYSTEM DESCRIPTION

A. Regulatory Requirements:
   1. Evaluation Report, in accordance with DSA IR A5.
      a. System complies with ESR-3435 "Renobond FR and PE Metal Composite Material (MCM) Panels".

B. Design Requirements:
   1. Provide a watertight, high performance “Route and Return Dry" MCM Panel System. The MCM Panel System must consist of a dry gasket interlocking extrusion system. Any MCM Panel System utilizing a continuous field applied exposed or concealed sealant within the joinery is unacceptable.
   2. The MCM Panel System shall consist of concealed dry gasket perimeter extrusions, extruded stiffeners, gaskets, fasteners and may consist of related flashings where indicated, sealants between jamb panels and previously installed adjacent construction, and other miscellaneous accessories as required for a complete watertight installation. System shall be water and airtight without reliance on a membrane or air barrier
      a. Any items not specifically noted but necessary for a complete and watertight system shall be provided.
   3. The MCM Panel System shall be designed to provide controlled drainage to the exterior face of the wall for any leakage of water occurring at joints and/or condensation taking place within the wall system.

C. Performance Requirements:
   1. General: Provide MCM Panel System that comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.
      a. Design panel system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
   2. Air Infiltration:
      a. Air leakage through system of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 “Test method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen• at the following test-pressure difference:
         1) Test-Pressure Difference: 6.24 lbf/sq. ft.
   3. Water Penetration:

a. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 “Test Method for Determining Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference• "at the following test-pressure difference:
   1) Test-Pressure Difference: 6.24 lbf/sq. ft.

b. Water Penetration under Dynamic Pressure: No water penetration when tested according to AAMA 501.1 “Methods of Tests for Exterior Walls at the following test pressure:

c. AAMA 501 test is a slipstream velocity, creating a pressure on the wall equivalent to 15.0 psf with a water spray rate of 5 gallons per hour per square foot for 15 minutes with no uncontrolled water leakage to the room-side.
   1) Test Pressure Difference: 15.0 lbs/sq.ft.

4. Structural Performance: Provide MCM Panel System capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, in accordance with ASTM E 330 “Test Method for Determining Structural Performance of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference”:
   a. Wind Loads: Determine loads based on the following minimum design wind pressures:
      1) Uniform pressure as indicated on Drawings, but not less than 40 psf.
   b. Deflection Limits:
      1) Deflection of perimeter framing, normal to plane of wall between structural supports, to withstand design loads deflections no greater than L/175 of span length or 3/4 inch, whichever is less.
      2) Deflection of individual panels at mid-span not to exceed L/60.
      3) Anchor points deflection shall not exceed 1/16 inch in any direction.
      4) No permanent deformation exceeding l/1000 or failure to structural members at 150% design load.
5. Seismic Performance: Provide MCM Panel System capable of withstanding the effects of earthquake motions according to ASCE/SEI 7, 13.5.3, “Minimum Design Loads for Buildings and Other Structures, Design Requirements Nonstructural Components - Architectural Components”.
   a. Interstory Drift: No failure of deterioration of the assemblies when laterally racked to 3/4 inch in both directions and repeated for three (3) cycles in accordance with AAMA 501.4. System must pass the ASTM 331 static water test as previously described, following the racking.
6. Fire-Resistance Ratings: Comply with ASTM E 119 “Test methods for Fire Tests of Building and Construction Materials”; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
7. Thermal Movements: Provide MCM Panel System that allow for free and noiseless vertical and horizontal thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   a. Temperature Change (Range): -0 degrees F to +120 degrees F with a maximum +180 degrees F material surfaces.

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Product Data:
   a. Manufacturer's Data for each type of product specified.
      1) Include a material list with product names.
      2) Product information regarding material composition, profiles, shapes, finishes, and application for each item.
   b. Manufacturer's full color range (including any standard, premium, and custom colors) of all exposed finishes.
2. Shop Drawings:
   a. Provide Structural Calculations to support shop drawings.
      1) Use design loads indicated on drawings.
      2) Stamped and signed by a registered Civil or Structural Engineer in the State of California.
   b. Show wall elevations.
      1) Drawn to scale
      2) Indicate finish grain orentation on each component.
      3) Indicate wall panel locations and attachment to framing.
      4) Indicate detail cuts to larger scale drawings.
      5) Indicate penetrations and wall-mounted items. Coordinate with other related trades prior to submitting to Architect.
      6) Stamped and signed by a registered Civil of Structural Engineer in the State of California.
   c. Show fabrication and installation layouts of joints, edge conditions, panels profiles, corners, anchorages, trim, flashings, closures, and special details.
      1) Flashing, Trim, and anchorage details shall be drawn at a scale of not less than 1-1/2 inches per foot.
      2) Distinguish between factory and field assembled work.
      3) Stamped and signed by a registered Civil or Structural Engineer in the State of California.
3. Samples:
   a. MCM Panel System: 24-inch square minimum.
      1) Complete with factory applied edge treatment, fabricated into units' representative of the actual system.
   b. Finish Sample - four 6-inch square minimum of each color identified
   c. Parapet Cap, Trim, and Closures: 12-inch long.
      1) Include fasteners and other exposed accessories.
   d. Exposed Gaskets: 12-inches long
   e. Exposed Sealants: For each type and color of joint sealant required. Install joint sealants in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of metal-faced composite wall panels adjacent to joint sealants.
   f. Water Barriers: 6-inch square minimum.
   g. Ice and Water Shield: 6-inch square minimum.
4. Quality Assurance/Control:
   a. Installer's experience.
   b. Manufacturer's certification of Installers.
   c. Manufacturer's written installation instructions.
   d. Watertightness Test Report
   e. Manufacturer's final field report
5. Closeout Submittals:
   a. Maintenance Data in accordance with Specification Section – PROJECT CLOSEOUT.
   b. Project Record Documents in accordance with Specification Section – PROJECT DOCUMENTS

c. Warranty in accordance with this specification and with Specification Section – WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
1) Installer shall have manufacturers signed Certified Installer Agreement as a rider to the warranty.
2. Manufacturer/Fabricator Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
b. Manufacturer shall inspect during installation and after completion and report to the Architect.
1) A factory trained representative approved by the manufacturer shall visit the project site a minimum of five (5) times, in order to review the installation of the ACM panels, and provide a follow-up written report for the following periods in the construction schedule.
a) At the preliminary ACM panel conference.
b) At the Mock-Up assembly watertightness test.
c) When the ACM Panel System installation is approximately 50 percent complete
d) Upon completion of the ACM panel installation.
e) When punch list and corrections have been completed

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Mockups:
1. Provide Mock-up panels prior to installation of any exterior wall cavity and interior materials.
2. Mock-up Assemblies:
a. Mock-up shall be at exterior wall assemblies and shall integrate all other related work assemblies, including but not limited to, each type of wall openings, wall/eave interface, wall sill, parapet cap, various types of penetrations, material transitions, and shall be representative of the intended end-use configuration.
1) Mock-up shall be a minimum overall size of 10’-0” wide x 8’-0” high.
b. Mock-up will be used for establishing construction sequence, installation requirements of materials, and creating water tight assemblies.
c. Mock-up may become part of the completed Work upon successful testing for watertightness.
3. Installation:

a. The Project Inspector, Architect, Contractor's Superintendent, Manufacturer/Fabricator Representative, and Sub-Contractor's Superintendent shall observe the installation of materials.
b. Mock-up shall include the installation of water barriers, penetration flashings, related work flashings and materials, panels, and trim.
c. Prepare site and building for Water Spray Test.
d. A failed Mock-up shall be removed and the assembly reinstalled until the water tightness test is successful.

D. Meetings:
1. Preliminary MCM Panel System Conference: Before starting wall framing and sheathing construction, conduct conference scheduled by the Contractor at Project site. Review methods and procedures related to wall construction and MCM Panel System including, but not limited to, the following:
a. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, system installer, MCM Panel manufacturer's representative, system fabricator, wall framing installer, and installers whose work interfaces with or affects MCM Panels including installers of MCM Panel accessories.
1) Review backing layout required for MCM Panel System fastener / anchorage system.
b. Coordinate the work with all other related work.
c. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
d. Review methods and procedures related to MCM Panel assembly installation, including manufacturer's written instructions.
e. Examine conditions for compliance with requirements, including flatness and attachment to structural members.
f. Review MCM Panel System flashings, special details, rainage, penetrations, and condition of other construction that will affect MCM Panel System.
g. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
h. Review temporary protection requirements for MCM Panel System during and after installation.
i. Review MCM Panel System observation and repair procedures after MCM Panel System installation.
j. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress Meetings: Scheduled by the Contractor for the proper performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule of necessary.
3. Final Inspection: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package panels for protection during transportation and handling.

B. Unload, store, and erect panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack panels on platforms or pallets, covered with suitable weather tight and ventilated covering. Store panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on panels from exposure to sunlight and high humidity, except to extent necessary for period of MCM Panel System installation.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of MCM Panel System to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of MCM Panel System attachment components and MCM Panel System opening dimensions by field measurements before MCM Panel System fabrication and indicate measurements on Shop Drawings.

C. Coordinate MCM Panel System with flashing, trim, and construction of substrates, parapets, walls, and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section – WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty and commencing on the date of the project Notice of Substantial Completion:
      a. Material, Workmanship, and Panel integrity: 5 years.
      b. Finish in accordance with AAMA 2605: 20 years.
         1) Manufacturer agrees to repair finish or replace panels that show evidence of deterioration of factory-applied finishes within the specified warranty period.
            a) Color fading more than 5 Hunter unites when tested according to ASTM D 2244 "Practice for Calculation of Color tolerances and Color Differences from Instrumentally Measured Color Coordinates".
            b) Chalking in excess of a No. 8 rating when tested according to ASTM D 4214 "Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films".
            c) Cracking, checking, peeling, or failure of paint to adhere to metal.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section – WARRANTIES.
      a. Material and Workmanship: 5 years.
         1) Installer shall have manufacturer sign Certified Installer Agreement as a rider to the warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified MCM Panel System product manufacturer (Fire-Rated):
      a. ALCOA INC. "Reynobond FR" ICC ESL 1526, ESL-1546, ESR 3435.
   2. Specified Water Barrier (also qualifies as an "Air Barrier"):
      a. TYVEK "Commercial Wrap."
      b. Acceptable alternative manufacturers:
         1) TYPAR "Metro Wrap.".
   3. Specified Ice and Water Shield:
      a. GRACE CONSTRUCTION PRODUCTS "Ice and Water Shield."
      b. Acceptable alternative manufacturers:
         1) CARLISLE COATINGS & WATERPROOFING "Dri-Start A."
   4. Support Structure:
      a. "Z" Furring Channels and Steel Accessories specified product manufacturer:
         1) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
         2) Acceptable alternative manufacturers:
            a) CEMCO
            b) STUDCO
   5. Rigid Board Insulation product manufacturer:
      a. RMAX "TSX-8500 Thermasheath-3".
         1) Tape "R-Seal 3000".
      b. Acceptable Alternative Manufacturers:
         1) ATLAS.
         2) JOHNS MANVILLE CORPORATION.
         3) TREMCO.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.
   1. Substitution of systems shall provide evaluation report per DSA IR A5 showing performance meets or exceeds the criteria of this section.

2.2 MATERIALS

A. Rigid Board Insulation:
   1. ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 1, Class 1, isocyanurate with front and back aluminum foil-faced (balanced panel), conditioned "R" value of 5.60 per inch minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials", and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics".
      a. Flame Spread Index Maximum, core: 25 or less.
      b. Smoke Density Developed Index Maximum, core: 450 or less.

c. Compressive strength: 20 PSI.
d. 4' x 4' or 4' x 8' panels.
e. Thickness: 1".

B. Panel Material:
1. Aluminum:
a. Aluminum sheet shall be smooth surface coil-coated sheet material per ASTM B209 “Specification for Aluminum and Aluminum -Alloy Sheet and Plate”.
2. Panel Core:
a. Panel core shall be Fire Resistive Thermoplastic Material (FR).
b. Fire-Retardant: Noncombustible, with the following surface-burning characteristics per ASTM E84 “Standard Test Method for Surface Burning Characteristics of Building Materials”.
1) Flame Spread Index shall be equal to or less than 25.
2) Smoke Developed Index shall be equal to or less than 450.
3. Panel Colors:
a. Refer to Exterior Color Schedule (Appendix in Specifications) and Drawings for patterns.

C. Use the following for a Mounting System that utilizes extruded aluminum framing components.
1. Aluminum:
a. General: Aluminum Extrusions shall be per ASTM B221 “Specification for Aluminum and Aluminum –Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes”.
1) Aluminum shall be minimum 0.90 inch for structural units.
b. Perimeter Extrusions: AA-6063-T6, alloy and temper recommended by manufacturer for type of use and finish indicated.
c. Panel Stiffeners: AA-6063-T6, alloy and temper recommended by manufacturer for type of use and finish indicated.
2. Steel:
a. General: Miscellaneous Attachment Components shall be cold-formed metallic-coated steel sheet Grade 50 per ASTM C645 "Specification for Non-Structural Steel Framing Members.".
1) Provide G90 hot-dip galvanized zinc coating per ASTM A653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process."
b. Hat Channels and Sill Channels of minimum 16 gage.
3. Support Structure:
a. "Z" Furring Channels,
1) 1.25" legs x 1" (depth required for rigid insulation).
2) 54 Mils (16-Gage), 0.0566" (0.0538" min.), Typical unless noted otherwise.
3) 43 Mils (18-Gage), 0.0451" (0.0428" min)
4. Gaskets:
a. Fire-retardant treated EPDM or Neoprene.
5. Fasteners:
a. Attachment Components:
1) Provide self-tapping screws, and other suitable fasteners designed to withstand design loads.
2) Provide Stainless Steel type 304 fasteners for attaching material.
3) Provide exposed fastener heads of matching panel color by means of plastic caps or factory-applied coating.
4) Provide EPDM or PVC sealing washers for exposed fasteners.
b. Miscellaneous metal framing:

1) Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

D. Flashing and Trim:
1. Shall be formed from same material as aluminum composite material panels.
2. Exposed Finish shall be the same as aluminum composite material panels.
3. Provide 4" wide self-adhering butyl flashing tape where required.

2.3 ACCESSORIES

A. Water Barrier (also qualifies as an "Air Barrier"):
1. Provide TYVEK "Commercial Wrap" with compatible lap seam tape that complies with 60 minute Water Resistant, Grade D, in accordance with CBC Sections 1404.2 and 2510.6.
   a. Provide manufacturer’s preformed tape and recommended cap fasteners for attachment.
   b. Seam and Repair tape shall be DUPONT "Tyvek 3" wide minimum Tape."

B. Continuous Insulation for Wall Panels (Rigid Board Insulation):
1. ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 1, Class 1, isocyanurate with front and back aluminum foil-faced (balanced panel), conditioned "R" value of 5.60 per inch minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials," and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics."
   a. Flame Spread Index Maximum, core: 25 or less.
   b. Smoke Density Developed Index Maximum, core: 450 or less.
   c. Compressive strength: 20 PSI.
   d. 4' x 4' or 4' x 8' panels.
   e. Thickness: 1".

C. Ice and Water Shield:
1. Self-adhering Polyethylene faced sheet per ASTM D1970 "Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection."
2. Thickness shall be 40 mils.
3. Shall be slip-resisting polyethylene-film reinforcing top surface laminated to a SBS-modified asphalt adhesive with release-paper backing.
4. Elongation criteria shall be from 250 percent to 300 percent.

D. Sealants:
1. Shall be per ASTM C920 "Standard Specification for Elastomeric Joint Sealants."
2. Use elastomeric polyurethane or silicone sealant of type, grad, class, and use classifications required to seal joints and remain weathertight.
3. As recommended in writing by MCM Panel System manufacturer.

2.4 MAUFACTURED UNITS

A. Aluminum-Faced Composite Panels (ACM):
1. Provide factory-formed and assembled, metal composite material panels fabricated from two metal facings that are thermally bonded to a solid, extruded thermoplastic core in a continuous process under heat, pressure, and tension.

a. The core material shall be free of voids and/or air spaces and not contain foamed insulation material.
b. Products that are laminated sheet by sheet in a batch process using glues or adhesives between materials shall be acceptable.

2. Face sheets of panels shall be formed of 0.020 inch thick aluminum panels.
3. Face sheet shall be smooth.
4. Panel core shall be Fire Resistive Thermoplastic Material (FR).
5. Panel thickness shall be 4mm.
6. Fire Performance Characteristics:
   a. Shall be per ASTM E84 "Standard Test Method for Surface Burning Characteristics of Building Materials."
      1) Flame Spread Index shall be equal to or less than 25.
      2) Smoke Developed Index shall be equal to or less than 450.
   b. Shall pass NFPA 285 "Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall assemblies Containing Combustible Components."
7. Bond Integrity Performance Characteristics:
   a. Shall be per ASTM D1781 "Standard Test Method for Climbing Drum Peel for Adhesives."
   b. Peel Strength shall be equal to or more than 22.5 in-lb/in (100 N-m/m) minimum.
8. Exposed finish shall be coil-coated Fluoropolymer system.
   a. Type 1: Provide two-coat system.
9. Color as selected by Architect or as indicated in Color Schedules.
10. Unexposed finish shall be manufacturer standard primer.

2.5 FABRICATION

A. General:
1. Finish and Fabricate aluminum composite material panels and accessories at the factory by manufacturer’s standard procedures and processes as necessary to fulfill indicated performance requirements.
2. Comply with indicated profiles and with dimensional and structural requirements. Provide panel profile for full length of panel.
3. Fabricate all components such that installed directional grain pattern orientation flows consistently, unless noted otherwise.
4. Provide fabricated components for a complete weathertight panel system including trim, copings, fascia, corner units, sills, clips, flashings, sealants, gaskets, fillers, and similar items.
5. Match material and finish of aluminum composite material panels unless otherwise indicated.

B. Panels:
1. Form panel lines, breaks and angles to be sharp and true, with surfaces free from warp and buckle.
2. Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.
3. Provide panel profile for full length of panel.
4. Dimensional Tolerances:
   a. Panel Bow: 0.8 percent maximum of panel length or width.
   b. Squareness: 0.25 inch maximum.

C. Attachment Components:
1. General: Route and Return Dry Seal.

a. Fabricate panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact and that minimize noise from movements.
b. Fabricate perimeter extrusions and panel stiffeners requiring no further fabrication or modification in field.
c. Horizontal joints shall be dry seal, drained and back ventilated
d. Vertical joints shall be pre-formed returns with metal spline and aluminum extrusion receptors and extruded drain channels.
e. Horizontal and vertical reveals shall be 1/2-inch.
f. Rainscreen Systems are NOT ACCEPTABLE

2. Perimeter Extrusions: Provide extruded aluminum with integral weather-stripping, so as to provide the following essential features:
   a. Route and return the MCM Panel on all perimeters. Continuous Edge Grip• (CEG) is not acceptable.
   b. Exposed edge of the MCM Panel shall be protected inside an extruded aluminum pocket.
   c. Maximum overall panel thickness, including the attachment ship space, shall not exceed 2-inch.
   d. MCM Panels shall be mechanically attached to all perimeter extrusions. The mechanical fastener must not penetrate any portion of the outer (exterior) skin of the aluminum composite material. Attachment of the MCM Panels to the perimeter extrusions with structural silicone is not allowed.
   e. Do not substitute sealants for dry gasketing shown at the metal panel joinery.
3. Stiffeners:
   a. Placed as required to comply with deflection limits.
   b. Stiffeners are to be mechanically fastened to the perimeter extrusion.
   c. Stiffeners shall be bonded to the rear face of the MCM Panel using structural silicone or high strength double-sided bonding tape of sufficient size and strength to maintain panel’s specified deflection under load.

D. Flashing and Trim:
1. Fabricate flashing and trim to comply with manufacturer’s recommendations and recommendations in SMACNA’s "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
2. Form exposed sheet metal accessories without excessive oil canning, buckling, and tool marks that are true to line and levels indicated, with exposed edges folded back to form hems.
3. Fabricate non-moving aluminum seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
4. Seams other than aluminum shall be non-moving seams with flat-lock seams.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleat and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by panel manufacturer.
   a. Material shall be not less than the thickness of metal being secured.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work:
   1. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Coil-Coated Aluminum and Accessories:
   1. Exposed Face Sheet
      a. Fluoropolymer finishes per AAMA 620. Finish containing not less that 70 percent PVDF resin by weight in color coat.
      b. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      c. Entire elevation shall have material from one color lot.
      d. Type A: Fluoropolymer two coat system:
         1) First Coat: 0.2 mil primer.
         2) Second Coat: 0.8 mil PVDF color coat.
   2. Un-exposed Face Sheet:
      a. Manufacturer's standard primer.

E. Exposed Accessories, Trim and Fasteners.
   1. Match panel finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, MCM Panel supports, and other conditions affecting performance of work.
   1. Examine primary and secondary MCM Panel attachment components to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by MCM Panel manufacturer.
   2. Examine solid sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by MCM Panel manufacturer.
      a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine rough-in for components and systems penetrating MCM Panels to verify actual locations of penetrations relative to joint locations of MCM Panels before MCM Panel installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to water barrier, including removing projections capable of interfering with water barrier attachment.

1. When applying Ice and Water Shield products, clean and prime the substrates in accordance with the manufacturer's written recommendations.

B. Miscellaneous Supports:
1. Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 “Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products” and aluminum composite material panel manufacturer's written recommendations.

3.3 INSTALLATION

A. General:
1. Install aluminum composite material panels according to manufacturer’s written instructions in orientation, sizes, and locations.
   a. Maintain consistent panel grain direction.
2. Install panels perpendicular to supports unless otherwise indicated.
3. Anchor aluminum composite material panels and other components of the work securely in place, with provisions for thermal and structural movement.
4. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by aluminum composite material panels manufacturer.

B. Wall Panel Installation over Rigid Insulation Wall Board, Gypsum Sheathing and Metal Framing:
1. Place one layer of the water barrier over sheathing.
   a. Lap water barrier joints six (6) inches minimum and adhesively attach in accordance with water barrier manufacturer’s written recommendations and in accordance with manufacturer’s warranty requirements to provide a continuous uninterrupted membrane.
   b. Tape all joints with compatible tape. Repair any holes or damage with compatible tape.
2. Shim or otherwise plumb substrates receiving panels so that installed panels are plumb, level, true and within installation tolerances.
3. Flash and seal at perimeter of all openings and penetrations.
   a. Do not begin panel installation until water barrier, ice and water shield, and flashings concealed by aluminum composite material panels are installed.
   b. Fasten sheet metal flashing with self-tapping screws.
4. Install aluminum composite material panels, attachment components xtrusions and components to supports at locations, spacing, and with fasteners recommended by manufacturer to achieve performance requirements specified.
   a. Use stainless steel fasteners in size and spacing as indicated in approved Submittals.
   b. Field cutting of aluminum composite material panels by torch is not permitted.
5. Joint Sealers:
   a. Install gaskets, fillers, and sealants where indicated and where required for a weather-tight performance of assembly. Provide types of gaskets, fillers, and sealants indicated or if not indicated, types recommended by aluminum composite material panel manufacturer.
      1) Prepare joints and apply sealants to comply with requirements in Specification Section –SEALANTS.

C. Accessory Installation:
1. General:

a. Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
   1) Install components required for a complete assembly.

2. Flashing and Trim:
   a. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual."
   b. Provide concealed fasteners where possible and set units true to line and level.
   c. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   d. Install exposed flashing and trim that is without excessive oil canning, buckling, and toll marks and that is true to line and levels with exposed edges folded back to form hems.
   e. Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of ten (10) feet with no joints allowed within twenty-four (24) inches of corner or intersection.

3.4 REPAIR/RESTORATION

A. Repair or replace work that fails to meet Installation Tolerances, is identified as improperly installed, damaged upon visual inspection, and per manufacturer's service representatives written field report.
   1. Repair or remove and replace Work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

3.5 FIELD QUALITY CONTROL

A. Installation Tolerances:
   1. Shim and align aluminum composite material panels within installed tolerance of 1/4 inch in 20 feet – non-accumulative – on level, plumb, and location lines and within 1/8 inch off-set of adjoining faces and alignment of matching profiles.

B. Site Tests:
   1. As required by Regulatory Requirements.
   2. Mock-up Assemblies:
      a. Water Spray Test: Upon completion of the installation of the Mock-Up Assembly, conduct test for water penetration in according to AAMA 501.2 requirements.
         1) The Project Inspector, Architect, Contractor's Superintendent, and Subcontractor's Superintendent shall visually inspect for water penetration.
         2) A thermal imagining process conducted by the Owner's Testing Laboratory Service, shall be used for additional inspection for water penetration.
         3) Cost of additional testing and inspection required due to failure for water tightness shall be borne by the Contractor.
      b. Test Reports:
         1) The Project Inspector and/or Owner's Testing Laboratory Services shall provide a written report noting the installation and water tightness of the Mock-up Assemblies tested.
   3. Manufacturer's Field Service:
      a. Engage a service representative authorized by the aluminum composite material panel manufacturer to inspect completed installation including accessories. Provide written report results.

3.6 CLEANING

A. Clean in accordance with Specification Section – PROJECT CLOSEOUT.

B. Remove temporary protective coverings and strippable films as panels are installed, unless otherwise indicated in manufacturer's written installation instructions.

C. After panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealants.

D. On completion of panel installation, clean finished surfaces as recommended by aluminum composite material panel manufacturer. Maintain in a manner acceptable to the manufacturer and installer, which ensures the work of this section being without damage or deterioration, and clean until the time of the project's Substantial Completion.

END OF SECTION

SECTION 074243 – FIBER-CEMENT PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary for complete installation of Wall, Soffit and Facade Fiber-Cement Panel "Ventilated Rainscreen" System, Water Barrier, Insulation and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Pre-fabricated Fiber-Cement Panels, engineered support structure, and related accessories.
   2. The Exterior Wall finishes and the water resistant barrier (WRB) shall comply with CBC Code Section 1402.5, 2603.5.5 and NFPA 285. The Rigid Insulation shall have a flame spread index no greater than 25 as determined by ASTM E84 or UL 723

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 07 21 00 INSULATION
   4. 07 40 00 METAL PANELS
   5. 07 40 40 MCM PANELS
   6. 07 60 00 SHEET METAL
   7. 07 92 00 SEALANTS
   8. 08 11 00 METAL DOORS AND FRAMES
   9. 08 41 00 STOREFRONTS
   10. 08 41 23 STOREFRONT TEMPERATURE RISE
   11. 08 63 00 TRANSLUCENT PANELS
   12. 09 22 16 METAL FRAMING
   13. 09 24 00 CEMENT PLASTER
   14. 09 29 00 GYPSUM BOARD
   15. 09 91 00 PAINTING
   16. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. AAMA American Architectural Manufacturers Association
      b. ASTM American Society of Testing and Materials
      c. NFPA National Fire Protection Association

1.3 DEFINITIONS

A. The following definitions apply to this specification section
   1. Panel System: Wall panels, attachment components, miscellaneous framing, and accessories necessary for a complete weathertight wall system.

2. Weathertight: The ability to prevent water intrusion into the building under normal climatic conditions (including pressure differentials, wind, and snow conditions) for the area where the project is constructed. Also the word “weathertightness" is a variation of the word “weathertight" and shall have the same definition applied.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:
1. Provide a high performance “Ventilated Rainscreen" Fiber-Cement Panel System.
2. The Fiber-Cement Panel System shall consist of factory-molded, ultra high performance concrete (UHPC) solid exterior panels associated UHPC framing components with engineered support structure (subframe) materials, accessories and other miscellaneous accessories as required for a complete watertight installation.
   a. Any items not specifically noted but necessary for a complete and watertight system shall be provided.
3. The Fiber-Cement Panel System shall be designed to provide controlled drainage to the exterior face of the wall for any leakage of water and condensation taking place within the panel system.

B. Performance Requirements:
1. General: Provide “Ventilated Rainscreen" Fiber-Cement Panel System that comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.
   a. Design panel system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Fiber-Cement Panels shall comply to ASTM C 1185, Type A, Grade N requirements.
   a. Density - Thin Panel: 137 lbs./ft³
   b. Flexural Strength (Thin Panel) - Dry: Pass, Mean length direction not less than 3,800 lbs/in2 and width direction 3,600 lbs/in2.
   c. Flexural Strength (Thin Panel) - Wet: Pass, Mean length direction not less than 3,800 lbs/in2 and width direction 3,400 lbs/in2.
   d. Freeze/Thaw (Cladding): Pass. No visible cracks and not less than 90% post-exposure strength retention.
   e. Moisture Content - Thin Panel: less than 1.0%.
   f. Moisture Movement - Thin Panel: 0.00%.
   g. Warm Water: Pass. No visible cracks or structural alteration. Not less than 90.0% ratio of retained post-exposure strength.
   h. Water Absorption - Thin Panel: less than 4.0%.
   i. Water Tightness: Pass. No water droplet formation.
3. Surface Burning Characteristics per ASTM E 84:
   a. Flame Spread: Pass.
   b. Smoke Developed: Pass.
   c. Class A.
4. Fire Resistant per ASTM E 119.
5. Non Combustible per ASTM E 136.
6. Thermal Expansion per ASTM C 531.
   a. 6.41E-06 in/in/degree F (0.01 inches per meter at 40 degree temperature change).
7. Compressive Strength per ASTM C 873: Greater than or equal to 18,332 lbs./in²
8. Tensile Strength per ASTM C 496: Splitting matrix prism: 1,319 lbs./in².
9. Colorfastness & Weathering (500 hours) per ASTM G 155 and ASTM D 2244.
   a. 2.07 delta E. without coating (standard, varies with pigment type, texture and coating (consult with manufacturer for color information).

10. Anchor Pullout Strength per ASTM E 488:
    a. 8.5 mm embed in 13mm thick panel.
    b. Tension (Min. Mean) Peak Load - 386 lbf or greater.
    c. Shear (Min. Mean) Peak Load - 650 lbf or greater,

1.5 SUBMITTALS

A. General: Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data:
1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
2. Submit manufacturer's standard color range for selection by the Architect.
3. Manufacturer's Details: Submit drawings (*.pdf formats), including plans, sections, showing installation details that demonstrate product dimensions, edge/termination conditions/treatments, compression and control joints, corners, openings, and penetrations.

C. Shop Drawings.
1. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
    a. Panel elevations, sections, and dimensions.
    b. Panel thickness and fastener type and size.
    c. Finishes.
    d. Joint and connection details.
    e. Erection details.
    f. Panel cut-outs for Mechanical, Electrical, Plumbing, and Security devices and items.
    g. Panel frame details for typical panels including sizes, spacings, thicknesses, and yield strengths of various members.
    h. Locations and details of connection hardware attached to structure.
    i. Sizes, locations, and details of flex, gravity, and seismic anchors for typical panels.
    j. Erection sequence for special conditions.
    k. Relationship to adjacent materials.
    l. Shop Drawings for Mockups: Include plans, elevations, sections, full-size details, and attachments to other work.

D. Samples.
1. Submit samples of each product type proposed for use.
    a. Representative of finished exposed face of solid exterior UHPC panel. For each color and pattern specified, submit a minimum of two samples, each not less than 6 by 6 inches, and of actual thickness. Each sample to be labeled and dated. Approved sample to be stamped approved and returned to manufacturer for reference.

E. Quality Assurance/Control Submittals:
1. Provide manufacturer's Tolerances and Acceptance Criteria prior to any panel fabrication for the Architect's review.

F. Closeout Submittals in accordance with the following:
1. Operation and Maintenance Data:

a. Operation and maintenance data for installed products in accordance with Specification Section - SUBMITTALS.
b. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

2. Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
b. All products listed in this section are to be installed by a single installer trained by manufacturer or representative.
c. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's written warranty requirements.
2. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
b. All fiber cement panels specified in this section must be supplied by a manufacturer with a minimum of 5 years of experience in fabricating and supplying fiber cement cladding systems.
1) Products covered under this section are to be manufactured in an ISO 9001 certified facility.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Mockups:
1. Build mockup indicated on Drawings to verify selections made under sample submittals, and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
2. Build mockup, including insulation, supports, attachments, and accessories for typical conditions/parts not to exceed one (1) window surround , cornice section and or building corner and not more than 100 square foot area.
3. Approval of mockup does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. The Mock-up shall match the existing Junior High building joints. See drawings for fastener spacing.

D. Meetings:
1. Pre-Installation:
a. Coordinate the work with other work being performed.

b. Identify any potential problems, which may impede planned progress and proper installation of work.
c. Review structural load limitations of existing structure.
d. Review areas where existing construction is to remain and requires protection.

2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper work progress.
   b. Identify any problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems.
   b. Establish method and procedures to maintain protections while progressing to project completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be individually wrapped.
   2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Deliver exterior solid UHPC wall panels and support system components packaged to comply with manufacturers' requirements and adequately protected from damage during shipment.
   2. Panels are to be stored and handled vertically until installed.
   3. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Protect components from adverse job conditions prior to installation.
      b. Protect components from damage after installation including staining or solvents used in adjacent work, impact damage and abrasion, etc.
      c. Panels are to be stored and handled vertically until installed.
      d. Store with non-staining resilient spacers between panels, with suitable ventilation.
      e. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Environmental requirements:
   1. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
   2. Burning: No burning will be allowed on-site.
   3. Rain: The work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.
3. Field Measurements:
   a. Verify actual measurements/openings by field measurements before material fabrication, and show recorded measurements on approved shop drawings, as required.
   b. Coordinate shop drawings and field measurements with adjacent work/assemblies and with associated trades/sub-contractors prior to finalizing shop drawings.
   c. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.9 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
   1. In accordance with manufacturer's written standard warranty for defects in fiber cement panels:
      a. Warranty Period Twenty-Five (25) Years.
      b. Manufacturers warranty against manufacturer's defects in panel finish:
         1) Warranty Period Fifteen (15) Years.

C. Fabricator's Warranty (Accessories, Clips, other attachments, etc.):
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period Ten (10) years.

D. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period Five (5) years.

1.10 MAINTENANCE

A. Extra Material:
   1. Furnish to Owner not less than 5 percent of each color of each pattern of 5' x 1' Fiber-Cement Panels Installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Water Barriers:
   a. Building Wrap (also qualifies as an "Air Barrier"):
      1) TYVEK "Commercial Wrap".
      2) Acceptable alternative manufacturers:
         a) TYPAR "Metro Wrap".
   b. Sealing Tape:
      1) DUPONT 3" wide tape "Tyvek 3".
      2) Acceptable alternative manufacturers:
         a) 3M COMPANY "8086 Construction Sheathing Tape".
         b) CANTECH INDUSTRIES "Clipper Tape".
2. Penetration Flashing:
   a. GRACE CONSTRUCTION PRODUCTS "Vycor V40".
   b. Acceptable alternative manufacturers:
      1) FORTIFIBER "Fort-I-Flash 40".
      2) TYVEK "Flex Wrap" and "Straight Flash".
3. Support Structure:
   a. "Z" Furring Channels, Hat Channels, and Steel Accessories specified product manufacturer:
      1) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
      2) Acceptable alternative manufacturers:
         a) CEMCO
         b) STUDCO
4. Engineered support structure
   a. Custom Hat Channel Furring and Steel Accessories specified product manufacturer:
      1) KNIGHT WALL SYSTEM.
5. Rigid Board Insulation product manufacturer:
   a. RMAX "TSX-8500 Thermasheath-3".
      1) Tape "R-Seal 3000".
   b. Acceptable Alternative Manufacturers:
      1) ATLAS.
      2) JOHNS MANVILLE CORPORATION.
      3) TREMCO.
6. Fiber-Cement Board product manufacturer:
   a. TAKTL STANDARD ESR 3899.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Continuous Insulation for Wall Panels:
1. ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 1, Class 1, isocyanurate with front and back aluminum foil-faced (balanced panel), conditioned "R" value of 5.60 per inch minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials", and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics".
   a. Flame Spread Index Maximum, core: 25 or less.
   b. Smoke Density Developed Index Maximum, core: 450 or less.
   c. Compressive strength: 20 PSI.
   d. 4' x 4' or 4' x 8' panels.
   e. Thickness: 1".

B. Building Wrap (also qualifies as an "Air Barrier"): Woven and non-woven polyolefin sheets approved per ICC ES Reports for Water-Resistive Barriers for buildings of any construction type and equivalent to Grade D paper with 60 minute water-resistant rating.

C. Sealing Tape (3" wide minimum):
1. Minimum 3" wide tape.
2. Sealing Tape shall be compatible with Building Wrap.

D. Penetration Flashing: Self-adhered and self-healing weather barrier strips, in accordance with FS UU-B-790a, Grade A.
1. 40 mil. minimum thickness, in 9-inch and 12-inch widths as is appropriate for barrier application.

E. Engineered Support Structure:
1. PanelRail
   a. 3/4" depth x 2"
   b. Zinc Coated (ASTM A1046)
   c. Thickenss: 18-Gage.
   d. Finish: Black PVDF
   e. Length: 120"
   f. Vent Holes: 4" on center
2. Reveal-Rail
   a. 3/4" depth x 5 1/8"
   b. Zinc Coated (ASTM A1046)
   c. Thickenss: 18-Gage.
   d. Finish: Black PVDF
   e. Length: 120"

F. Support Structure:
1. Steel Sheet:
   a. Steel sheet for 16 gage and heavier shall comply with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", structural steel classification, Grade 50 ksi, Class 1 or 2.
   b. Steel sheet for 18 gage shall comply with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", structural steel classification, Grade 33 ksi, Class 1 or 2.

c. When hot-rolled steel sheet and strip is used in fabrication of metal members they shall comply with ASTM A1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength", structural steel classification, Grade 50 ksi.

2. Coating:
   a. Steel sheet shall be galvanized in accordance with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", G90 minimum and comply with ASTM A 924 "Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process".
   b. When hot-rolled steel sheet and strip is used in fabrication of metal members, hot-dip galvanize coating shall be in accordance with ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products".
3. Thickness:

Reference Gage	Mils	Minimum Base-Metal Thickness (inch)	Minimum design Thickness (inch)
18	43	0.0428	0.0451
16	54	0.0538	0.0566
14	68	0.0677	0.0713
12	97	0.0966	0.1017
10	118	0.1180	0.1240

G. Rigid Board Insulation:
1. Exterior:
   a. In accordance with:
      1) ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 1, Class 1, isocyanurate with front and back foil-faced (balanced panel), conditioned "R" value of 6.0 per inch minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials", and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics".
         a) Flame Spread Index Maximum, core: 25.
         b) Smoke Density Developed Index Maximum, core: 450.
         c) Compressive strength: 20 PSI.
         d) 4' x 4' or 4' x 8' x 1" panels.
         e) Thickness: 1".
2. Tape:
   a. High Strength dead soft aluminum foil coated with cold weather acrylic pressure sensitive adhesive approved as a Water-Resistive Barrier Component AC71 per ASTM E 331 and AATTCC Test Method 127.

H. Fiber-Cement Panels:
1. Exterior Panels, factory-formulated with ultra high performance concrete and reinforced with alkali-resistant (AR) glass mesh, factory-mixed and manufactured; complying with ASTM C1186. Type A, Grade IV.
2. Panel Characteristics:
   a. Panel Sizes: 12" H nominal x 60" W nominal. Refer to drawings for variation in sizes.
   b. Panel Dimensional Tolerances:
      1) Panel Thickness: 5/8-inch nominally, thickness variation +/- 0.05-inch.
      2) Panel Edges: Open Square Cut at vertical to horizontal transitions and open quirk miter at all vertical corner joints..

3) Panel Weight: 7.2 lbs/ft^2, at 5/8-inch thickness.

c. Panel Finishes:

1) Finish exposed, front-facing surface of UHPC as follows, to match approved design reference sample. Panel faces shall be free of joint marks, grain, or other obvious defects.

2) Finish Characteristics:

a) Texture Smooth.

b) Finish Mediablast.

c) Sealer Microseal.

3) Pattern Direction: Horizontal.

d. Panel Color:

1) Panel to be Integrally through colored.

2) Refer to Interior Color Schedule.

I. Accessories:

1. As recommended in UHPC panel manufacturer's written instructions.
2. Adhesives and Sealants:
   a. As recommended in UHPC panel manufacturer's written instructions.
3. Stainless Steel Drill Screws: Of sufficient lengths and sizes to securely fasten support structure to building wall framing members, and as follows:
   a. Screws complying with ASTM C 1002 for fastening to steel members less than 0.033 inches thick.
   b. Screws complying with ASTM C 954 for fastening to steel members from 0.033 to 0.112 inches thick.

J. Support Structure:

1. Components:
   a. Horizontally-oriented attachment system support bracket/angle bracket anchored directly to building structure.
2. "Z" Furring Channels,
   a. 1.25" legs x 1" (depth required for rigid insulation).
   b. 54 Mils (16-Gage), 0.0566" (0.0538" min).
3. Auxiliary Materials:
   a. Panel Anchors: Concealed, undercut type, for attaching UHPC panels to panel-mounted extruded aluminum 'C' clips and substructure support system. Panel anchor holes to be factory pre-drilled by UHPC panel manufacturer.
      1) KEIL Concealed Anchoring System for Façade Panels, provided by panel manufacturer.
   b. Miscellaneous Materials:
      1) Aluminum Extrusions: ASTM B 221, Alloy 6005 T5.
      2) Aluminum Sheet: ASTM B 209, Alloy 6061-T5.
      3) Carbon Steel Shapes and Plates: ASTM A 36, finished as follows:
         a) Hot-Dipped Galvanized.
      4) Stainless Steel Bars and Shapes: ASTM A 276, Type 304 or better.

K. Rigid Board:

1. Wall Board:
   a. In accordance with:

1) ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 1, Class 1, isocyanurate with front and back foil-faced (balanced panel), conditioned "R" value of 5.60 per inch minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials", and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics".
   a) Flame Spread Index Maximum, core: 25.
   b) Smoke Density Developed Index Maximum, core: 450.
   c) Compressive strength: 20 PSI.
   d) 4' x 4' or 4' x 8' panels.
   e) Thickness: 1".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.
   4. Fiber-cement panels can be installed over braced wood, steel studs and sheathing including plywood, OSB, plastic foam or fiberboard sheathing.
      a. Fiber-cement panels can also be installed over Structural Insulated Panels (SIPS), Concrete Masonry Units (CMU's) and Concrete Block Structures 9CBS's) with furring strips, and Pre-Engineered Metal Construction.
   5. Allowable stud spacing: See manufacturer's written installation instructions for details.
   6. A weather resistant barrier is required when installing fiber-cement panels.
      a. Use an approved weather resistive barrier (WRB) as defined by the current CBC.
   7. Appropriate metal flashing shall be used to prevent moisture penetration around all doors, windows, wall bottoms, material transitions and penetrations.

B. Do not install panels or components that appear to be damaged or defective.

C. Do not install wet panels.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's instructions and recommendations.

2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.

B. Installation of Water Barriers:
1. Install Water Barriers prior to installation of exterior wall, exterior soffit and exterior fascia framing.
2. Water Barriers shall be installed at all exterior walls, exterior soffits and fascias.
3. Install Water Barriers with Penetration Flashing, Metal Accessories, and all other related work in "shingle" or "weatherboard" fashion.
4. Water Barriers shall be installed as required in CBC Sections 1404.2, 1405, and 2510.6 as follows:
   a. Provide two layers of Water Barriers.
      1) One inner layer of Building Wrap (also qualifies as an "Air Barrier"):
         a) Seal all edges, laps and penetrations with a 3" wide minimum Sealing Tape as part of rainscreen system.
      2) One outer layer of Building Wrap.
   b. The Water Barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 6 inches and free from holes and breaks.
      1) Where vertical joints occur, barrier shall be lapped not less than 6 inches.
   c. Exposure:
      1) Maximum exposure of Water Barriers shall be 30 days prior to support structure and Rigid Board installation, application or less as required by Water Barrier Manufacturer.
         a) Protect Water Barriers from the elements (both exposure to the sun and water) with a temporary 6-mil visqueen barrier or other material approved by the barrier manufacturer.

C. Installation of Penetration Flashing:
1. Apply Penetration Flashing in conjunction with Water Barriers, Support Structure and all other related work.
2. Install Penetration Flashing at all openings and penetrations at all exterior walls, exterior soffits and exterior fascias.
3. Install Penetration Flashings with Water Barriers, exterior Support Structure and all other related work in "shingle" or "weatherboard" fashion.
4. Penetration Flashings shall be installed as required in CBC Sections 1404 in 9" widths and continuous to 9" past all intersections around all openings, penetrations and termination to other Water Barriers of all related work.
   a. Should any penetration warrant a greater width of wall flashing, provide 12" wide flashing as required.
   b. When an object extends through the Water Barrier, return the edge of the Penetration Flashing 1" and apply to the sides of the penetrating item.
5. Objects such as electrical back-boxes, electrical speaker enclosures, penetrations created by structural members, and the like.

D. Installation of Sheet Metal Transitions:

1. Apply Sheet Metal Transitions in conjunction with Water Barriers, Penetration Flashings and all other related work.
2. Install Sheet Metal Transitions to create water tight barrier and allow drainage of water to the exterior as shown on the drawings.
3. Install Sheet Metal Transitions with Water Barriers, Penetration Flashing Sheets and all other related work in "shingle" or "weatherboard" fashion.
4. Install all Metal Accessories in accordance with manufacturer's written instructions.
   a. All Metal Accessories shall be fully supported in accordance with CBC, secure flanges to framing.
   b. Install in 10 foot lengths wherever possible.
   c. All joints (butt, mitered, bent, continuing around corners, or changing directions) shall be cut accurately, welded, or folded, sealed, pop-riveted and sealed again, for a watertight joint.

E. Support Structure:
1. General:
   a. Complete support structure assembly to support and anchor exterior UHPC wall panels. Support structure to be anchored to building structure.
2. Layout:
   a. Lines shall be straight and true.
   b. Set plumb, level, and square.
   c. Panel layout shall be a running bond pattern.
3. Horizontal support rails (Concealed attachment):
   a. Horizontally-oriented attachment system support bracket/angle bracket anchored directly to building structure.
   b. Rails to be painted black.
   c. Fasteners: Corrosion-resistant stainless steel fasteners and anchors of type, size and spacing required for type of substrate and project conditions.
4. Install wall reinforcements, channel cleats, clips, hangers, and other accessories required for connecting UHPC wall panels to supporting members and backup materials per project/façade engineers approved design.
   a. Horizontally-oriented attachment system support bracket/angle bracket anchored directly to building structure.
   b. Vertical Girts to be painted black.
   c. Fasteners: Corrosion-resistant stainless steel fasteners and anchors of type, size and spacing required for type of substrate and project conditions.
5. Vertical girt cold formed hat channels that fasten to horizontal "Z" furring channels.

F. Rigid Board Insulation:
1. Install per manufacturer's written recommendations.
2. Wrap and Tape all edges as part of rain screen system.
3. Exposed side of rigid boards are to be primed with an appropriate primer and painted black.

G. Fiber-Cement Panels:
1. General:
   a. Install products in accordance with the latest written installation guidelines of the manufacturer and all applicable building codes and other laws, rules, regulations and ordinances.
   b. Review all written manufacturer installation, maintenance instructions, and other applicable documents before installation.
2. Panel Cutting in field if needed:
   a. Field-cut panels and drill face-fastening anchor holes in accordance with the UHPC panel manufacturer's written directions.

b. Do not field-modify factory-drilled concealed/undercut panel anchor holes.
c. Special Precautions may include, but not limited to:
1) Always cut fiber cement panels outside or in a well ventilated area. Do not cut the products in an enclosed area.
2) Always wear safety glasses and NIOSH/OSHA approved respirator whenever cutting, drilling, sawing, sanding or abrading the products. Refer to manufacturer SDS for more information.
3) Use a dust-reducing circular saw with a diamond-tipped or carbide-tipped blade.
4) Silica Dust Warning: Fiber cement products may contain some amounts of crystalline silica, a naturally occurring, potentially hazardous mineral when airborne in dust form. Consult product SDS or visit www.osha.gov/SLTC/silicacrystalline/index.html.
d. Seal all field cut edges with manufacturer's recommended sealer to match field color of panel.
3. Vertical Control/Expansion Joints and/or Horizontal/Compression Joints may be required. Refer to written installation guide(s).
4. Provide miscellaneous reinforcement of adhered panel parts and unitized panel parts per manufacturer and installation contractor's engineer.
5. Lift UHPC wall panels and install without damage.
6. Install UHPC panels level, plumb, square, and in alignment.
7. Provide temporary supports and bracing as required to maintain position, stability, and alignment of panels until permanent connections are completed.
8. Fasteners to be 12-gage, grade 304 Stainless Steel torx T25 recessed, color matched.

3.4 Erection Tolerances:

A. Erect UHPC panels to comply with the following noncumulative tolerances.
1. Plan Location from Building Grid Datum: Plus or minus 1/2 inch.
2. Top Elevation from Nominal Top Elevation: As follows:
a. Exposed Individual Panel: Plus or minus 1/8 inch.
b. Exposed Panel Relative to Adjacent Panel: 1/8 inch.
3. Support Elevation from Nominal Elevation: As follows:
a. Maximum Low: 1/2 inch.
b. Maximum High: 1/4 inch.
4. Maximum Plumb Variation over the Lesser of Height of Structure or 100 Feet: 1 inch.
5. Plumb in Any 10 Feet of Element Height: 1/4 inch.
6. Maximum Offset in Alignment of Matching Edges: 1/8 inch.
7. Face Width of Joint: As follows (governs over joint taper):
a. Panel Dimension 20 Feet or Less: Plus or minus 1/4 inch.
8. Maximum Joint Taper in 10 Feet: 1/8 inch.
9. Differential Bowing, as Erected, between Adjacent Members of Same Design: 1/8 inch.

3.5 CLEANING AND PROTECTION

A. Perform cleaning procedures according to UHPC panel manufacturer's written instructions.

B. Clean soiled UHPC surfaces with water, using soft fiber brushes and sponges, and rinse with clean water. Mild detergent may be used if water alone is not satisfactory. Power washing is permitted, if the spray is not concentrated and nozzle is not held within 5 ft. for the panel surface. Prevent damage to UHPC surfaces and staining of adjacent materials.

C. Prevent damage to UHPC surfaces and staining of adjacent material.

D. The installer is responsible for removing all metal, and UHPC scraps, clips, or fasteners along with crates and packing materials from this work, from the site when the installation is complete.

END OF SECTION

SECTION 075113 - BUILT-UP ROOFING
(Granulated SBS Modified Cap Sheet and Reflective Surfacing System)

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Provide all material, labor, transportation, equipment and services necessary to completely install Built-Up Roofing materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. 05 30 00 METAL DECK
4. 07 21 00 INSULATION
5. 07 40 00 METAL PANELS
6. 07 40 10 MCM PANELS
7. 07 42 43 FIBER-CEMENT PANELS
8. 07 60 00 SHEET METAL
9. 07 72 00 ROOF ACCESSORIES
10. 09 11 00 METAL FRAMING
11. 09 29 00 GYPSUM BOARD
12. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
1. In accordance with the following standards:
a. FMG Factory Mutual .
b. NIST BSS #55, Building Series #55: Preliminary performance criteria of Bituminous Membrane Roofing, National Institute of Standards and Technology, Gaithersburg, MD.
c. NRCA National Roofing Contractor's Association (NRCA).
d. SMACNA Sheet Metal and Air Conditioning Contractors National Association, Vienna, VA.
e. UL Underwriter's Laboratory (UL) test certification labels or equivalent testing agency with same follow-up testing and certified label program must be displayed on related roof assembly materials.
f. UL 790 Underwriter's Laboratory, certified roof assembly to roof type identified on the drawings.

1.3 SYSTEM DESCRIPTION

A. Typical metal deck roof system section for this project:

1. Metal deck, RP Vapor Retarder, with two layers of Rigid Board thermal insulation, first layer mechanically attached to the metal deck and the other layer mopped down to the first with staggered edges (minimum thickness of both layers sufficient to meet thermal insulating requirements of roof system), or greater thickness as required to meet and to provide any slopes for crickets; a top layer of 1/2 inch thick Cover Board insulation mopped down (with staggered edges so that no edges of bottom layers of insulation align with top layer of insulation); and a two (2) ply hot asphalt applied bituminous roofing system with Mineral Surfaced Cap Sheet(3-ply total) conforming to the performance requirements stated herein.
    a. The completed roofing system requires a Class A rating.
    b. The completed roofing system requires fastening to comply with FMG 1-90 wind uplift requirements.
    c. On parapets over 40 inches in height, provide roofing termination bars.

B. The extent of hot asphalt bituminous roofing system work is indicated by provisions of this section, and is defined to include roofing, insulation immediately under the roofing systems, elastomeric flashings, stripping, walkpads, and roofing accessories integrally related to roofing installation with all compatible with manufacturer's warranty requirements.

1.4 SUBMITTALS

A. General:
1. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Coordination Drawings:
1. Submit installer's coordination drawings indicating the work of this section coordinates with that of related sections for proper interface of the completed work. Installer shall coordinate and obtain approvals of other related sections prior to submitting to the Architect.

C. Product Data.
1. Submit manufacturer's product data including performance requirements of all materials.
2. SRI of Cool Roof Coating.
3. Material Safety Data Sheets will not be reviewed, but if submitted will be turned over to the Owner in compliance with local rules and regulations.

D. Shop Drawings.
1. The Roofing Contractor, in consort with the Material Manufacturer, is to submit detailed drawings of all flashing and roofing system details compatible with the manufacturer's requirements for the roofing system warranties, required herein for review and approval, prior to start of roof framing by the General Contractor.

E. Quality Assurance/Control Submittals:
1. Certificates:
    a. Submit three (3) copies of certification from a Corporate Officer of the Roofing Material Manufacturer stating that major roofing system components including insulation, flashing, coatings, hot asphalt adhesives; roofing ply sheets; reinforcement fabrics, felts, walkpads, mastics, and sealants are compatible with all the other components of the roofing system and the warranties required herein, for single source liability.
    b. Submit three (3) copies of certification from Roofing Material Manufacturer that hot asphalt coatings and adhesives are not "Red Label".

c. Submit three (3) copies of certification from Underwriter's Laboratory (or approved equivalent prior to submittal) that the roofing systems meet or exceed listed performance requirements listed herein.

d. Submit three (3) copies of certification from an independent laboratory showing test results (utilizing the ASTM testing criteria listed herein) for all roofing materials or completed assemblies, indicating compliance with the performance requirements listed herein.

2. Manufacturer's Written Instructions:

a. Submit three (3) copies of manufacturer's written installation standards for the roofing system specified, and the warranty requirements for this project.

3. Manufacturer's Field Reports:

a. Submit three (3) copies of manufacturer's field reports for each roofing system type indicated (i.e. those appropriate for metal decks) indicating the final status of the installed roofing systems over various roof decking systems, and that they are in compliance with the manufacturers warranty requirements.

F. Closeout Submittals in accordance with Specification Sections in Division One:

1. Project Record Documents in accordance with Specification Section - PROJECT RECORD DOCUMENTS.

2. Warranty in accordance with Specification Section - WARRANTIES.

a. Special warranties:

1) Five (5) Year Workmanship Warranty.

2) Ten (10) Year Major Manufacturer's Roofing System Warranty.

1.5 QUALITY ASSURANCE

A. General Requirements:

1. The Roofing Contractor shall ensure that all products used in conjunction with the installation of the new roofing system(s) are totally free of asbestos. Products containing asbestos are prohibited on this project.

2. Deliver all roof system materials in original manufacturer labeled packages. All roofing products delivered to the site and used on this project will bear Class A Fire Rating Labels.

3. All hot asphalt adhesives and cements shall be compliant with current applicable VOC Requirements State and Local on the project. Contractor shall use products with personal protection when applicable. The Roofing Contractor shall insure that all product users read container labels and MSDS information prior to use.

B. Only those manufacturers who produce, label and warrant all major and/or primary components of the specified roofing system, can exhibit $10,000,000.00 product liability, or a $2,000,000.00 product liability policy with a $5,000,000.00 umbrella per event insurance coverage and comply with all other requirements of this Specification.

C. The products listed herein establish the size, weight, pattern, color range and function selected by the Architect for this Project. The intent is not to limit competition, but to utilize only those products which have been employed previously on projects of a similar nature and found acceptable.

D. Qualifications:

1. Material Qualifications:

a. Roofing Material Manufacturer shall:

1) Be nationally recognized in roofing and waterproofing industry for at least ten (10) years.

2) Provide local Field Representative to make periodic site visits, report work quality and job progress.
3) Provide list of at least three (3) projects available for inspection employing same system(s) within the last three years, within the same climate zone and 75 mile distance of project building(s).
4) Be approved by Owner and the Architect.
5) Provide Owner and the Architect proof/copy of material product liability insurance for all materials.
6) Provide Owner and the Architect certified independent laboratory test results for all roofing materials.
7) The presence and activity of the manufacturer's representative and/or Owner's representative shall in no way relieve the roofing contractor of his/her contractual liabilities/responsibilities.
8) Provide to the Owner names of at least three (3) qualified roofing applicators/installers.

2. Installer Qualifications:
   a. The Roofing Contractor shall be experienced and certified in writing by the Roofing Material Manufacturer to install manufacturer's products and systems in accordance with manufacturer's warranty requirements.
   b. The Roofing Contractor and his/her installers shall:
      1) Be acceptable to the Owner, Architect and Roofing Material Manufacturer.
      2) Provide list of at least three (3) projects available for inspection employing similar system(s) within the last three years, within the same climate zone and within 75 miles distance of project building(s).
      3) Obtain and provide all required data from Roofing Material Manufacturer.
         a) These specifications are based on minimum performance requirements of both the Roofing Contractor and Roofing Material Manufacturer.

E. Regulatory Requirements:
1. In accordance with Specification Section - Regulatory Requirements, and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.
   b. CRRC Cool Roof Rating Council
   c. FMG Factory Mutual.
   d. NIST BSS #55, Building Series #55: Preliminary performance criteria of Bituminous Membrane Roofing, National Institute of Standards and Technology, Gaithersburg, MD.
   e. NRCA National Roofing Contractor's Association (NRCA).
   f. SMACNA Sheet Metal and Air Conditioning Contractors National Association, Vienna, VA.
   g. UL Underwriter's Laboratory (UL) test certification labels or equivalent testing agency with same follow-up testing and certified label program must be displayed on related roof assembly materials.
   h. UL 790 Underwriter's Laboratory, certified roof assembly to roof type identified on the drawings.

F. Meetings:
1. Pre-installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with all other related work.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress Meetings: Scheduled by the Contractor during the performance of the work.

a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule of necessary.

3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been filed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
2. Handle materials to avoid bending, tearing, or other damage during transportation and installation.
3. Material handling equipment shall be selected and operated so as not to damage existing construction or applied roofing.
   a. Do not operate or situate material handling equipment in locations that will hinder smooth flow of vehicular or pedestrian traffic.

B. Acceptance at Site:
1. Coordinate delivery with Contractor.
2. Products delivered to the job-site must be in manufacturer's original, new, dry and unopened containers with labels indicating brand name, grade and ASTM number.
3. Deliver materials in sufficient quantity to allow continuity of work.
4. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six [6] inches above ground, allowing air circulation under stacked units.
   a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
   b. Store roll goods on ends only and protect from moisture contamination of any kind.
   c. Discard rolls and insulation which have flattened, creased, allowed to become damp/wet, or otherwise damaged.
   d. Place and store materials on pallets.
   e. Do not stack pallets.
2. Store materials marked "keep from freezing" in areas where temperatures will remain above 40 degrees Fahrenheit.
3. Neatly stack products on dunnage.
4. Remove breathable waterproof covering. Cover top and sides of all stored materials at interior and exterior storage areas with canvas tarpaulin or equivalent cover to allow the materials to "breathe".
   a. Secure cover.
   b. Do not use polyethylene to cover materials.
5. Rooftop Storage:
   a. Disperse material to avoid concentrated loading. Any damage to the structure resulting from non-conformance to this requirement will be the sole responsibility of the roofing contractor.
6. Materials necessary for two day's work may be stockpiled on roof under the provisions outlined in paragraph 5 above.
7. No materials may be stored in opening or in contact with ground or roof/deck surface.
8. The Roofing Contractor shall assume full responsibility for the protection and safekeeping of roofing materials and products stored on the job-site premises.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
1. Do not work in rain, snow, or in presence of moisture, including dew or fog.
2. Do not work in temperatures at or below 40° F.
3. Do not install materials marked "keep from freezing" in areas where temperatures will remain below 40 degrees Fahrenheit.
4. Remove any work exposed to freezing and replace with new.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.
3. The Roofing Contractor shall have SOLE responsibility for accuracy of all measurements, estimates or material quantities and sizes, and site conditions that will affect work.

1.8 WARRANTY

A. In accordance with Specification Section - WARRANTIES.

B. Special Warranty:
1. Roofing Contractor’s Workmanship and Materials Warranty:
   a. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.
   b. The roofing contractor shall warranty to maintain the roof and flashing in a watertight condition for the period of years specified from the date of acceptance and shall be responsible for the repair of any failure that is the result of defects in materials and workmanship.
      1) Warranty Period Five (5) years.
   c. The roofing contractor shall obtain from the Roofing Material Manufacturer and the General Contractor a co-endorsement of the Warranty.

C. Warranty:
1. Upon project completion, Contractor shall issue to the District a ten (10) year renewable Major Manufacturer's Roofing System No Dollar Limit Warranty (included in bid cost), effective as of the date of recordation of the Notice of Completion. After 10 years, this warranty can be extended for another 10 years provided certain terms are met per the manufacturer’s instruction based on roof inspection and payment of warranty fee.
2. Roof system manufacturer shall provide re-inspection of roof system, including all integral components, at two-year anniversary, and provide District with written summary of roof system analysis.
3. Warranty specified requires that the manufacturer be responsible for repair and correction of all incurred leaks. Additionally, the manufacturer shall be required to repair at no cost to the owner the following:
   a. Deterioration of the roofing membrane or base flashing resulting from ordinary wear and tear of the elements.
   b. Blisters, bare spots, fishmouths, wrinkles or ridges in the roof system.

c. Splits in the membrane not caused by structural movement or failure of any material underlying the roofing membrane or base flashing.
d. Slippage of the roofing membrane or base flashing.

4. Contractor shall submit a copy of the manufacturers warranty prior to approval of the roof system intended for use. Additionally, if a substitution is intended the contractor shall submit test data to verify performance criteria is met by roof system manufacturer. This data shall be performed by a certified independent laboratory and be no less than 6 months old.

D. Written guarantee and warranty will include entire roof assembly including: Insulation, roof membrane, flashings and all termination details.

E. Reflective coating: Contractor to issue a 10-year manufacturer's product warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Horizontal Roof Systems approved for use by the District:
1. JOHNS MANSVILLE Spec # 3FID-HA.
2. TREMCO Powerply Standard Smooth / Powerply Standard FR
3. GARLAND Versiply 60 / Versiply Mineral FR
4. Note: Systems that would be substituted will list all requirements to meet this specification in its current catalog. Information provided beyond the catalog will be deemed unreliable. This includes a list of system components and their equal physical properties. New or experimental products will not be approved.

2.2 MATERIALS

A. Gypsum Board Roof Board:
1. Manufacturer: G-P GYPSUM "DENS-DECK".
2. Thickness 5/8 inch.
3. Surfacing: Glass Mat.
a. Flute Spanibility: 5/8 inch thick: 8 inches per ASTM E 661 "Test Method for Performance of Wood and Wood-Based Floor and Roof Sheathing Under Concentrated Static and Impact Loads".
b. "R" Value: 5/8 inch thick: 0.67 per ASTM C 518 "Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus".
4. Water Absorption, per ASTM C 473 "Test methods for Physical Testing of Gypsum Panels and Products": 10.0
5. Compression Strength: 500-900 psi normal.
6. Surface Water Absorption, nominal per ASTM C 473 "Test methods for Physical Testing of Gypsum Panels and Products": 2.5 grams.
7. Flame Spread / Smoke Developed Index per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials": 0/0.
8. Mold Resistance per ASTM D 3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber": No Growth.

B. Laminated Sheet Vapor Retarder: Two-layer, fire-retardant polyethylene laminate, reinforced with cord grid.
1. Specified product manufacturer, or as recommended by Roofing manufacturer:
a. REEF INDUSTRIES GRIFFOLYN T65.

2. Permeance Rating: Not more than 0.062 perm when tested in accordance with ASTM E96/E96M.
3. Flame-Spread Index: Not more than 5 when tested in accordance with ASTM E84.
4. Smoke-Developed Index: Not more than 35 when tested in accordance with ASTM E84.
5. Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Rubberized-Asphalt-Sheet Vapor Retarder, Self-Adhering: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.

1. Specified product manufacturer, or as recommended by Roofing manufacturer:
   a. GCP APPLIED TECHNOLOGIES, INC. Grace Ice and Water Shield.
   b. PROTECTO WRAP Jiffy Seal Ice & Water Guard HT

A. Insulation Materials:

1. Insulation Board:
   a. Isocyanurate Insulation Board: Class 1, isocyanurate with top surface Asphalt Coated Felt facer, conditioned "R"-Value of 6.00 per inch.
      1) Flame Spread Index: 25 maximum, in accordance with ASTM E84.
      2) Smoke Density Developed Index: 125 – 175 range in accordance with ASTM E84.
   b. 4' x 8' x thickness as indicated on the drawings (minimum thickness as required for a Class A Roof System), and as indicated for roof slope.
      1) Cricket Board: 2' x 4' dimension minimum, tapered thicknesses, slope as indicated.
2. Cover Board:
   a. Fiberboard: Regular density, asphalt impregnated on two sides, in accordance with ASTM C 208.
   b. 4' x 8' x 1/2 inch minimum thickness (as required for a Class A roof system).
3. Cant Strip:
   a. Fiberboard, in accordance with ASTM C 208. Length: Forty-eight (48) inches.
      1) Minimum thickness: Three (3) inches nominal and 4 inches nominal for face.

B. Miscellaneous Roof Materials used for Roofing System and Wall Flashing:

1. Insulation adhesive:
   a. Per ASTM D 312, Type IV asphalt.
2. Primer: Per ASTM D 41.
3. Walkpads: 1/2" thick 3'x4' recycled rubber.
4. Accessories:
   a. SBS modified mastics and sealants as required by manufacturer.
   b. Caulking: Polyurethane - Vulkem 116 made by MAMECO or Sonolast NP-1 made by SONNEBORN.
5. Reinforced woven glass mesh (asphalt saturated).
6. Mechanical Fasteners:
   a. Provide industry-standard, non-corrosive types of mechanical fasteners (i.e.: screws and plates, termination bars, drawbands) for hot asphalt built-up roofing system work, tested by manufacturer for required pull-out strength where applicable and compatible with substrate type, roofing products used and warranties required. Size of fasteners and plates shall be as recommended by roofing manufacturer in accordance with manufacturer's warranty requirements, and sufficient to comply with FMG 1-90 wind uplift requirements.

2.3 Roofing Materials:

A. Roofing assembly (Type of deck and insulation are job specific):
1. Field of roof (**3-ply total** applied over roofing insulation)
   a. 1-ply SBS base sheet fully adhered, hot asphalt
   b. 1-ply SBS interply base sheet fully adhered, hot asphalt
   c. 1-ply SBS cap sheet fully adhered, hot asphalt
2. Base Sheet:
   a. Shall comply with ASTM D6162 Type II, Grade S.
   b. 90lbs. minimum weight per square.
   c. Shall meet ASTM D 5147.
      1) Breaking strength shall be 105lbs. MD and CMD at room temperature.
      2) Tensile/Tear Strength per ASTM D 5147 95 lbf minimum MD at 73 degrees.
      3) Elongation at break shall be 4% MD and XMD at 73 degrees.
3. Interply Sheet:
   a. Shall comply with ASTM D6162 Type II, Grade S.
   b. 90lbs. minimum weight per square.
   c. Shall meet ASTM D 5147.
      1) Breaking strength shall be 105lbs. MD and CMD at room temperature.
      2) Tensile/Tear Strength per ASTM D 5147 95 lbf minimum MD at 73 degrees.
      3) Elongation at break shall be 4% MD and XMD at 73 degrees.
4. Surfacing Cap Sheet:
   a. 100lb. Minimum weight per square.
   b. Shall comply with ASTM D 5147.
      1) Breaking strength shall be 80lbs. MD and 40 lbs. CMD. At room temperature.
      2) Granule adhesion: UL test 55B. Maximum loss of 0.5 grams.
5. White Reflective Coating - Coating system must be approved by the manufacturer for use with the roofing system.
   a. Coating shall be Title 24 Compliant, and SRI shall be greater than 0.75.

B. Wall Flashing Materials for roof side parapets:
1. Base & Wall flashing: (1) layer SBS base sheet and (1) layer SBS cap sheet.
2. Base Sheet:
   a. Shall comply with ASTM D6162 Type II, Grade S.
   b. 90lbs. minimum weight per square.
   c. Shall meet ASTM D 5147.
      1) Breaking strength shall be 105lbs. MD and CMD at room temperature.
      2) Tensile/Tear Strength per ASTM D 5147 95 lbf minimum MD at 73 degrees.
      3) Elongation at break shall be 4% MD and XMD at 73 degrees.
3. Surfacing Cap Sheet:
   a. 100lb. Minimum weight per square.
   b. Shall comply with ASTM D 5147.
      1) Breaking strength shall be 80lbs. MD and 40 lbs. CMD. At room temperature.
      2) Granule adhesion: UL test 55B. Maximum loss of 0.5 grams.

C. Auxilliary Roofing Materials:
1. Roofing Asphalt: Shall be SBS modified and shall comply with ASTM D 312 type III and current California VOC standards (250 grams/liter max).

2. Asphalt Roofing Cement shall comply with ASTM D 4586, asbestos free, of consistency required by Roofing Manufacturer for application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
2. Prior to installation of roofing, the Roofing Contractor shall inspect the new deck conditions and verify that the new roof system may be installed in strict accordance with original design, the manufacturer's current recommendations, and all other pertinent codes and regulations.
3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
4. Execution of work under this specification section shall constitute acceptance of existing conditions.
5. Check projections, curbs, and deck for inadequate anchorage, foreign material, moisture, or unevenness that would prevent quality and execution of the new roofing system.

B. General quality of work:
1. Substrate: Free of foreign particles prior to laying roof membrane.
2. Phased application:
   a. Not permitted.
   b. All plies shall be completed each day.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
2. Roofing Contractor shall be responsible for protection of property during course of work.
   a. Lawns, shrubbery, paved areas, and building shall be protected from damage.
   b. Repair damage at no extra cost to Owner.
3. Provide at site prior to commencing removal of debris, a dumpster or dump truck to be located adjacent to building where directed by General Contractor.
4. Roofing, flashing, membrane repairs, and insulation shall be installed and sealed in a watertight manner on same day of installation or before arrival of inclement weather.
5. At start of each work day drains within daily work area shall be plugged.
   a. Plugs to be removed at end of each work day.
6. Preparation work shall be limited to those areas that can be covered with installed roofing material on same day.
7. Arrange work sequence to avoid use of newly constructed roofing for storage, walking surface, and equipment movement.

8. At end of each working day, completed segment shall be sealed with water stops along edges to prevent water infiltration.
9. Provide clean plywood walkways and take other precautions required to prevent tracking of debris into new membrane area where debris pieces can be trapped within new roofing membrane.
   a. Contractor shall instruct and police his/her workers to ensure that debris is not tracked into or allowed to be wind driven into the new membrane.
   b. Discovery of entrapped debris or other foreign matter within new membrane is sufficient cause for rejection of the membrane.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.

B. Substrate Board Installation:
   1. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.

Retain first subparagraph below for steel roof decks.

   a. At steel roof decks, install substrate board at right angle to flutes of deck.
      1) Locate end joints over crests of steel roof deck.
   b. Tightly butt substrate boards together.
   c. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.

Retain one of first two subparagraphs below if mechanical fastening of substrate board to steel roof deck is required. Substrate board is usually attached when base layer of roof insulation, which overlays substrate board, is attached. See third subparagraph below.

Fasten substrate board to top flanges of steel deck in accordance with recommendations in [FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification] [SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity] and FM Global Property Loss Prevention Data Sheet 1-29.

Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof in accordance with roofing system manufacturer's written instructions.

Retain subparagraph below for roofing systems not including a vapor retarder but incorporating the first layer of insulation over the substrate board to be mechanically attached to the roof deck.

   d. Loosely lay substrate board over roof deck.

C. Insulation Installation:
   1. General: All insulation will extend over horizontal surfaces, including parapet braces, until the insulation boards meet the vertical parapet wall surfaces.
      a. Flush all insulation board surfaces that meet adjacent surfaces to be free from any uneven or gapped joints, sharp edges or other irregularities.
   2. Metal Deck:
      a. Loose lay RP Vapor Retarder and seal all laps.
      b. Mechanically attach bottom layer of Rigid Board thermal or roof slope insulation to the metal deck at upper flute so fasteners don't show below metal deck.

1) Mechanical fasteners exposed at underside of Metal Deck shall be clipped to expose no more than 1/4" below Metal Deck Surface.
2) Fastener density:
   a) Field zone: 8 fasteners and stress plates per 4' x 8' insulation board.
   b) Perimeter zone: 16 fasteners and stress plates per 4' x 8' insulation board.
   c) Corner zone: 32 fasteners and stress plates per 4' x 8' insulation board.
3) Fastener Size:
   a) #14 minimum screws with 3" diameter Insulation Fastening Plates or as recommended by roofing manufacturer for Warranty and uplift requirements.
4) Install additional fasteners to ensure insulation is firm under foot.
5) Stagger joints at least six (6) inches.
6) Drive mechanical fasteners flush to top surface.
7) Bottom layer shall form continuous insulation joints over deck flange.
   a) Do not cantilever insulation edges over deck ribs.
   b) Minimum bearing surface 1-1/2 inches.

c. Adhere Cover Board insulation to Rigid Board, staggering the joints.
   1) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

D. Flashing:
1. General Flashing Specifications:
   a. All other flashings not specifically detailed herein will be applied in accordance with manufacturer's written recommendations and approved by the Architect.
   b. All sheet metal that will come in contact with bituminous materials shall be primed with the specified asphaltic primer and allowed to dry before applying bitumen.
   c. The bottom edge of all flashing shall be three-coursed.

E. Wall Flashing:
1. SBS Modified Wall Flashing Installation:
   a. Roofing Contractor shall install base flashing at the base of all existing vertical wall and curb surfaces in the following manner:
      1) All flashing must be temporarily sealed at the end of each working day.
      2) Refer to manufacturers recommended installation procedures and the system performance requirement for proper installation of perimeter flashings.
      3) All Wall Flashings will receive a backer sheet utilizing the ply/base sheet.
      4) Wall Flashing shall extend from the top of the parapet and down the face of the wall. Embed the SBS Modified flashing sheet in a continuous application of flashing mastic per the manufacturer's current written recommendations.
      5) Secure the top edge of the base using a galvanized metal termination bar. Fasten the termination bar to concrete walls using 1/4" concrete screws turned into pre-drilled holes at 8 inches on center minimum. Fasten the termination bar to framed walls using #14 screws at 8 inches on center, minimum, or as recommended by roofing manufacturer for warranty and uplift requirements.
      6) The flashing sheet shall extend to the outside edge of all raised edge nailers.

F. Roofing Contractor shall install roof drain flashings as follows:
1. Drain rings shall be removed prior to built-up roofing application.

2. A minimum 3 foot square lead flashing sheet shall be set into a solid coating of asphaltic mastic over the installed roofing plies. Install a two (2) ply stripping using specified base sheet. First ply shall be embedded in a asphaltic mastic and shall cover the lead completely and extend onto the field of the roof 6" in all directions. Second ply shall be embedded in hot asphalt adhesive, fully covering the first stripping ply and extending past the first ply a minimum of 6" in all directions. All plies, including the lead flashing and field plies must extend into the drain and under the clamping ring.
3. The drain ring shall be set into asphaltic mastic and immediately tightened. A guard screen shall be installed over all drains.
4. After complete installation of the roofing system, Roofing Contractor shall inspect and test all roof drains to assure that no clogging of the drainage system is present. The roof drain leader should be in such condition that full diameter of the drain leader is clear.

G. Roofing Contractor shall tie onto all flanged metal components in the following manner:
1. Prime all metal that is to come into contact with asphaltic compounds with specified primer.
2. All flanges shall be set into asphaltic mastic over the finished roofing plies. Galvanized metal flanges will be fastened to the underlying wood nailers at three (3) inches on. center, staggered.
3. All flanges, including pipe flashing, edge flashing, flanged vents, flanged units, pitch pans, etc., will be flashed on the roof with two plies of compatible stripping ply sheet. Install a two (2) ply stripping using specified compatible base sheet. First ply shall be embedded in a asphaltic mastic and shall cover the lead completely and extend onto the field of the roof 6" in all directions. Second ply shall be embedded in hot asphalt adhesive, fully covering the first stripping ply and extending past the first ply a minimum of 6" in all directions.

H. Contractor shall install all edge metal in the following manner:
1. Set edge metal into layer of asphaltic mastic over finished field plies.
2. Install metal cleats. Cleats shall be at least one gage heavier than the metal edge.
3. Metal sections shall be a maximum of ten (10) feet in length. Leave a minimum of 1/2" space between metal sections. Install a minimum of 4" wide lap over and nail in place through 1/2" gap in metal sections. Nail metal edge 3” o.c. staggered.
4. Install two plies of stripping ply sheet to metal flange and roof surface. Apply five-coursing by installing a 12 inch flashing ply embedded into and covered with hot asphalt adhesive over a 6 inch flashing ply embedded into and covered with asphaltic mastic. Ensure asphaltic mastic is feathered smooth and 3/4 inch from inside outside metal edge.

I. Roofing system application:
1. Install specified number of plies, at Metal Deck of specified composite reinforced roofing felts over the cover board and the roof deck system, set into solid mopping applications of hot asphalt in the following manner:
   a. Starting at the low point of the roof, apply one 18 inch side strip, and then over starter strip, apply a full 36 inch wide specified roofing felt. Following plies are to be applied full width, overlapping the preceding felt by 18 inches in such a manner that there be at least two (2) plies of interply felt at any point.
   b. Cut 12 to 18 foot lengths of specified felt, allow to relax thirty (30) minutes @ 55 deg. F+ or sixty (60) minutes @ 55 deg. F-. Flop shingle fashion into a full width uniform application of hot asphalt applied at a nominal rate of 25.0 pounds per 100 square feet. The specified felt must be firmly and uniformly set into the asphalt with all edges well sealed.
   c. Lightly broom and/or roll each ply of specified felt into place, full width, immediately after installation. Felts shall lay flat and be fully bonded in such a manner that in no area shall felt touch felt. Use only a squeegee or conduit type broom.

d. Apply uniform and continuous pressure to exposed edge and end laps to ensure complete adhesion.
e. Lap ply ends 6 inches. Stagger end laps 3 feet minimum.
f. Header laps in roof field shall be at least 2 feet.
g. Overlap previous day's work 18 inches.
h. Cut out and patch all fishmouths and side laps which are not completely sealed. Replace all sheets which are not fully and continuously bonded.
i. Roof surface will be rolled after each work day to smooth fishmouths.

J. Contractor shall adhere to the following guidelines:
1. Roofing materials shall not be installed during inclement weather. Roofing materials shall not be applied when moisture in any form, such as dew, can be seen or felt on the surface to which those materials are to be applied.
2. Valleys and waterways shall receive an additional ply of fiberglass felt which shall be at least 36 inches wide. This ply shall be laid on top of the insulation prior to the application of the other plies and shall extend at least 18 inches up the inclines, out of the valleys.
3. Interply applications of hot asphalt shall be continuous and applied at a nominal rate of 25 pounds per 100 square feet. Application methods shall insure that all plies are completely embedded in asphalt.
4. All exposed deck and insulation must be covered with the completed roof membrane system, at the end of each day's work. All roof terminations and openings shall be water sealed.
5. Staging of the roof membrane application or temporary membrane is not acceptable. Membrane shall be installed in final form, with the exception of the cap sheet, on a daily basis.
   a. If phased roofing occurs, following prior approval of the Architect, as a result of emergency conditions, install additional plies over phased areas so that a continuous three (3) ply system is installed.
6. Foot and wheeled traffic shall be kept off the newly installed membrane until asphalt has sufficiently cured to prevent displacement voids.
7. All membrane deficiencies such as voids, bridging, fishmouths, cuts, tears, etc., shall be repaired in an acceptable manner. Incorporate into such repairs as many plies as are affected by the deficiency.
8. Air void pockets, as determined by test samples, shall not exceed eight percent (8%) per interply mopping for individual sample and average of all samples shall be not less than five percent (5%) per interply adhesive. If corrective action is required, cut the roofing felts down to the void and cover with three plies of fiberglass felt set into hot asphalt applied at a nominal rate of 45 pounds per 100 square feet.

K. Cap Sheet: Install lapped granulated cap sheet starting at low point of roofing system. Offset laps from laps of preceding ply sheets and align cap sheet without stretching. Lap in direction to shed water. Extend cap sheet over and terminate beyond cants.
1. Embed cap sheet in a solid application of hot asphalt adhesive applied at rate required by roofing system manufacturer.

L. Walkpad Installation:
1. Install walkpad panels in a path 3 feet wide around all HVAC mechanical units requiring regular maintenance (coordinate with mechanical contractor for items requiring maintenance). Space between pads no greater than 6 inches, and no less than 4 inches
2. Adhere to roofing in a spot application of asphalt mastic.

M. Apply Reflective Surfacing over completed cap sheet and flashings in the following manner:
1. Remove all dirt, dust, and other loose debris from the roof. Area to be coated must be a clean, sound, and dry surface.

2. Prime roof surface prior to application of reflective coating at a rate of 200-400 sq ft. /gal.
3. Refer to manufacturer’s installation procedures and apply at a minimum of 3 gal./SQ.

3.4 REPAIR / RESTORATION

A. Repair of deficiencies:
1. Installations of details noted as deficient during Final inspection must be repaired and corrected by the Roofing Contractor and made ready for re-inspection, within five (5) working days of notification.

3.5 FIELD QUALITY CONTROL

A. Inspection:
1. Schedule inspections and notify the Architect, Owner’s Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.

B. Manufacturer's field services:
1. Provide the services of a factory-authorized service representative to supervise the field assembly of components and installation of products or systems and related connections specified within this section, with weekly reports of the results in writing to the Architect.

3.6 CLEANING

A. Clean in accordance with Specification Section – PROJECT CLOSEOUT.
1. Clean any soiled surfaces at the end of each day, minimum.
2. Finish shall be clean and ready for the application of any additional finishes.

3.7 PROTECTION

A. Protection from weather:
1. Protect newly installed work from freezing for 24 hours after erection, installation or application.

B. Protection from traffic:
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 075400 – SINGLE-PLY ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specifications Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Ketone ethylene ester (KEE) roofing system.
2. Accessory roofing materials.
3. Substrate board.
4. Vapor retarder.
5. Roof insulation.
6. Insulation accessories and cover board.
7. Asphalt materials.
8. Walkways.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. 03 30 00 CAST-IN-PLACE CONCRETE
2. 05 12 00 STEEL AND FABRICATIONS
3. 05 30 00 METAL DECK
4. 06 10 00 ROUGH CARPENTRY
5. 07 21 00 INSULATION
6. 07 60 00 SHEET METAL
7. 09 22 16 METAL FRAMING
8. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.3 SYSTEM DESCRIPTION

A. General:
1. Performance Requirements:
   a. Fire Rating: UL Class A.
   b. Wind Uplift: FMG IA-90.
2. Typical system components for all roofing types:
   a. Flashings and Flashing Accessories.
   b. Walkways.

B. Typical metal deck roof system for this project:
1. Metal deck.
2. Substrate board.
3. Vapor Retarder.
4. Rigid Board (Isocyanurate Board), mechanically attached.
5. Cover Board (Fiberboard).
6. Single-Ply Roofing System.

1.4 REFERENCES

A. Standards:
1. In accordance with the following standards:
a. FM Factory Mutual.
b. SMACNA Sheet Metal and Air Conditioning Contractors National Association, Inc.
c. UL Underwriter's Laboratories

1.5 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.6 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data:
a. Single-ply roofing system.
b. Accessory roofing materials.
c. Substrate board.
d. Vapor retarder.
e. Roof insulation.
f. Insulation accessories and cover board.
g. Walkways.
h. First option in subparagraph below applies only to concrete, lightweight insulating concrete, and steel roof decks. Section option applies to concrete, lightweight insulating concrete, cementitious wood fiber, steel, and wood roof decks. See the Evaluations.
i. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav or SPRI's Directory of Roof Assemblies listing.
2. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
a. Layout and thickness of insulation.
b. Base flashings and membrane terminations.
c. Flashing details at penetrations.
d. Retain one or more subparagraphs below.
e. Tapered insulation thickness and slopes.
f. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
g. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
h. Tie-in with air barrier.
3. Samples for Verification: For the following products:
a. Insulation.
b. Cover board.
c. Roof membrane and flashing, of color required.
d. Walkway pads or rolls, of color required.
e. Accessories.
4. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

B. Quality Assurance/Control Submittals:
1. Manufacturer Certificates:

a. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
   1) Submit evidence of compliance with performance requirements.
b. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

2. Product Test Reports: For roof membrane and insulation, tests performed by independent qualified testing agency indicating compliance with specified requirements.
3. Evaluation Reports: For components of roofing system, from ICC-ES.
4. Field Test Reports:
   a. Concrete internal relative humidity test reports.
   b. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.
5. Field quality-control reports.
6. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

C. Closeout Submittals in accordance with the following:
1. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
2. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
3. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
4. Warranty in accordance with Specification Section – WARRANTIES.

1.7 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturers: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.
2. Installers: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

B. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.
      1) Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
      2) Review methods and procedures related to roofing installation, including manufacturer's written instructions.
      3) Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
      4) Review deck substrate requirements for conditions and finishes, including flatness and fastening.
      5) Review structural loading limitations of roof deck during and after roofing.
      6) Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
      7) Review governing regulations and requirements for insurance and certificates if applicable.

8) Review temporary protection requirements for roofing system during and after installation.
9) Review roof observation and repair procedures after roofing installation.

b. Preinstallation Roofing Conference: Conduct conference at Project site.
1) Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2) Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3) Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4) Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5) Review structural loading limitations of roof deck during and after roofing.
6) Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7) Review governing regulations and requirements for insurance and certificates if applicable.
8) Review temporary protection requirements for roofing system during and after installation.
9) Review roof observation and repair procedures after roofing installation.

2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.

3. Completion: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
   1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, substrate board, and other components of roofing system.
   2. Warranty Period: 20 years from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, and walkway products, for the following warranty period:
   1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings to withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings to remain watertight.
   1. Accelerated Weathering: Roof membrane to withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
   2. Impact Resistance: Roof membrane to resist impact damage when tested according to ASTM D3746, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

B. Material Compatibility: Roofing materials to be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and are listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.

1. Fire/Windstorm Classification: Class 1A-90.
2. Hail-Resistance Rating: FM Global Property Loss Prevention Data Sheet 1-34 MH.

D. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and are listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.
1. Wind Uplift Load Capacity: 60 psf.

E. Energy Performance: Roofing system to have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested in accordance with ANSI/CRRC S100.

F. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 KETONE ETHYLENE ESTER (KEE) ROOFING SYSTEM

A. KEE Sheet: ASTM D6754/D6754M, fabric reinforced and fabric backed.
1. Specified product manufacturer:
   a. SEAMAN CORPORATION (FIBERTITE) "60 mil SM FB."
   b. Acceptable alternative manufacturers:
      1) GARLAND "60 mil KEE-STONE 60FB."
      2) TREMCO "60 mil TREMPLY- KEE FB."
2. Thickness: 60 mils.
3. Flashing Thickness: 60 mil.
4. Exposed Face Color: White.

B. Source Limitations: Obtain components for roofing system from manufacturers approved by roof membrane manufacturer.

2.4 ACCESSORY ROOFING MATERIALS

A. General: Accessory materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
1. Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.

C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

D. Roof Vents: As recommended by roof membrane manufacturer.
1. Size: Not less than 4-inch diameter.

E. Bonding Adhesive: Manufacturer's standard, water based.

F. Water-Based, Fabric-Backed Membrane Adhesive: Roofing system manufacturer's standard water-based, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.

G. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

H. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.

I. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 ROOF BOARD:

A. Glass-Mat Gypsum Roof Substrate Board: ASTM C1177/C1177M, water-resistant gypsum board.
1. Manufacturer: G-P GYPSUM "DENS-DECK".
2. Thickness 5/8 inch.
3. Surfacing: Glass Mat.
a. Flute Spanibility: 5/8 inch thick: 8 inches per ASTM E 661 "Test Method for Performance of Wood and Wood-Based Floor and Roof Sheathing Under Concentrated Static and Impact Loads".
b. "R" Value: 5/8 inch thick: 0.67 per ASTM C 518 "Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus".
4. Water Absorption, per ASTM C 473 "Test methods for Physical Testing of Gypsum Panels and Products": 10.0
5. Compression Strength: 500-900 psi normal.
6. Surface Water Absorption, nominal per ASTM C 473 "Test methods for Physical Testing of Gypsum Panels and Products": 2.5 grams.
7. Flame Spread / Smoke Developed Index per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials": 0/0.
8. Mold Resistance per ASTM D 3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber": No Growth.

2.6 VAPOR RETARDER

A. Laminated Sheet Vapor Retarder: Two layer, fire-retardant polyethylene laminate, reinforced with cord grid.
1. Specified product manufacturer, or as recommended by Elastomeric Roofing manufacturer:
2. SEAMAN CORPORATION (FIBERTITE) VaporTite.
3. Permeance Rating: Not more than 0.062 perm when tested in accordance with ASTM E96.
4. Flame-Spread Index: Not more than 5 when tested in accordance with ASTM E84.
5. Smoke-Developed Index: Not more than 35 when tested in accordance with ASTM E84.
6. Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

B. Rubberized-Asphalt-Sheet Vapor Retarder, Self-Adhering: ASTM D1970, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.
1. Specified product manufacturer, or as recommended by Roofing manufacturer:
a. GCP APPLIED TECHNOLOGIES, INC. Grace Ice and Water Shield.
b. PROTECTO WRAP Jiffy Seal Ice & Water Guard HT.

9.

2.7 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by roof membrane manufacturer, approved for use in FM Approvals' RoofNav listed roof assemblies.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
   1. Specified product manufacturer, or as recommended by Elastomeric Roofing manufacturer:
      a. SARNAFIL Sarnatherm ISO.
   2. Compressive Strength: 20 psi.
   3. Size: 48 by 48 inches or 48 by 96 inches.
   4. Thickness: Refer to drawings.

C. Tapered Insulation: Provide factory-tapered insulation boards.
   1. Material: Match roof insulation.
   2. Minimum Thickness: 1/4 inch.
   3. Slope:
      a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
      b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

2.8 INSULATION ACCESSORIES AND COVER BOARD

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

C. Induction-Welding Plates: Minimum 3-inch diameter with recessed center, 0.034-inch thick, aluminum-zinc-alloy-coated steel plates, factory-coated with adhesive formulated for roof membrane, with corresponding corrosion-resistant fasteners and thermal isolation spacers below plates.

D. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
   1. Modified asphaltic, asbestos-free, cold-applied adhesive.

E. Cellulosic-Fiber Insulation Cover Board: ASTM C208, Type II, Grade 2, high-density cellulosic-fiber insulation board, having a minimum compressive strength of 40 psi.
   1. Thickness: 1/2" minimum.
   2. Surface finish: Integral coating, six sides.

2.9 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads, approximately 3/16 inch thick and acceptable to roofing system manufacturer.
   1. Size: Approximately 36 by 60 inches.
   2. Color: Contrasting with roof membrane.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
   1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
   2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
   3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Specification Section – METAL DECK.
   4. Verify that any damaged sections of cementitious wood-fiber decks have been repaired or replaced.
   5. Verify that adjacent cementitious wood-fiber panels are vertically aligned to within 1/8 inch at top surface.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
   1. Submit test result within 24 hours of performing tests.
      a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

D. Install sound-absorbing insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOFING, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

3.4 INSTALLATION OF SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.
   1. At steel roof decks, install substrate board at right angle to flutes of deck.
      a. Locate end joints over crests of steel roof deck.
   2. Tightly butt substrate boards together.
   3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
   4. Attach substrate board over roof deck with preliminary attachment of 4 #14 fasteners and 3” universal steel stress plates per 4 x 8 board.

3.5 INSTALLATION OF VAPOR RETARDER

A. Laminate Sheet: Loosely lay laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 and 6 inches, respectively.
   1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
   2. Continuously seal side and end laps with tape.

B. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.
   1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
   2. Seal laps by rolling.

C. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.6 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Installation Over Metal Decking:
   1. Install base layer of insulation with end joints staggered not less than 12 inches in adjacent rows and with long joints continuous at right angle to flutes of decking.
      a. Locate end joints over crests of decking.
      b. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
      c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
      d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
      e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
         1) Trim insulation so that water flow is unrestricted.
      f. Fill gaps exceeding 1/4 inch with insulation.
      g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

h. Loosely lay base layer of insulation units over substrate.

i. Mechanically attach base layer of insulation and substrate board using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.

1) Field zone: 8 fasteners and stress plates per 4' x 8' insulation board.

2) Perimeter zone: 16 fasteners and stress plates per 4' x 8' insulation board.

3) Corner zone: 32 fasteners and stress plates per 4' x 8' insulation board.

4) Install additional fasteners to ensure insulation is firm under foot.

5)

6)

D. Place thermal spacers and plates on insulation in required fastening patterns to achieve FM rating and secure in accordance with manufacturer’s instructions.

1. Install plates and fasteners tight and flat to substrate with no dimpling, and with fastener extending 1 inch minimum into roof deck; do not overdrive fasteners.

3.7 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.

2. At internal roof drains, conform to slope of drain sump.

a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.

4. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

a. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

B. Install slip sheet over cover board and immediately beneath roof membrane.

C. Place plates on insulation in required fastening patterns to achieve FM rating and secure in accordance with manufacturer’s instructions.

1. Install plates and fasteners tight and flat to substrate with no dimpling, and with fastener extending 1 inch minimum into roof deck; do not overdrive fasteners.

3.8 INSTALLATION OF ADHERED ROOF MEMBRANE

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll roof membrane and allow to relax before installing.

C. Start installation of roofing in presence of roofing system manufacturer's technical personnel Owner's testing and inspection agency.

D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

F. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.

G. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.

H. Apply roof membrane with side laps shingled with slope of roof deck where possible.

I. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.
   1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
   2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
   3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

J. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.9 INSTALLATION OF BASE FLASHING

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.10 INSTALLATION OF WALKWAYS

A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.
   1. Install flexible walkways at the following locations:
      a. Perimeter of each rooftop unit.
      b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
      c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
      d. Top and bottom of each roof access ladder.
      e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
      f. Locations indicated on Drawings.
      g. As required by roof membrane manufacturer's warranty requirements.

2. Provide 6-inch clearance between adjoining pads.
3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.

B. Perform the following tests:
1. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
   a. Perform tests before overlying construction is placed.
   b. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of base flashing.
   c. Flood each area for 24 hours.
   d. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.
      1) Cost of retesting is Contractor's responsibility.
   e. Testing agency to prepare survey report indicating locations of initial leaks, if any, and final survey report.
2. Testing agency to prepare survey report indicating locations of initial discontinuities, if any.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.12 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.13 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
1. Owner: <**Insert name of Owner**>.
2. Owner Address: <**Insert address**>.
3. Building Name/Type: <**Insert information**>.
4. Building Address: <**Insert address**>.
5. Area of Work: <**Insert information**>.
6. Acceptance Date: _____.
7. Warranty Period: <**Insert time**>.
8. Expiration Date: _____.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
   a. lightning;
   b. peak gust wind speed exceeding <**Insert** mph>;
   c. fire;
   d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
   e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
   f. vapor condensation on bottom of roofing; and
   g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.
1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION

SECTION 076000– SHEET METAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Sheet Metal materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 05 12 00 STEEL AND FABRICATIONS
   5. 05 30 00 METAL DECK
   6. 06 10 00 ROUGH CARPENTRY
   7. 06 41 23 MODULAR CASEWORK
   8. 07 14 16 FLUID-APPLIED WATERPROOFING
   9. 07 21 00 INSULATION
   10. 07 40 00 METAL PANELS
   11. 07 51 13 BUILT-UP ROOFING
   12. 07 72 00 ROOF ACCESSORIES
   13. 07 92 00 SEALANTS
   14. 08 11 00 METAL DOORS AND FRAMES
   15. 08 14 16 WOOD DOORS
   16. 08 91 00 LOUVERS
   17. 09 22 00 METAL FRAMING
   18. 09 24 00 CEMENT PLASTER
   19. 09 91 00 PAINTING
   20. 10 05 00 MISCELLANEOUS SPECIALTIES
   21. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   22. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. DOD Department of Defense
   2. LIA Lead Industries Association.
   3. NRCA National Roofing Contractors Association
   4. SMACNA Sheet Metal and Air Conditioning Contractor's National Association, 6th Edition, Architectural Sheet Metal Manual.
   5. SSPC The Society of Protective Coatings

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Shop Drawings.
   a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
2. Closeout Submittals in accordance with Specification Sections in Division One:
   a. Warranty in accordance with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
   a. Work shall be in accordance with Standards and details set forth in latest edition of the SMACNA Manual and Specifications unless indicated otherwise.
   b. The roofing manufacturer and installer selected for this project will select the roof flashing material and detailing for all roof penetrations compatible with the roofing system used and the warranties required. The schedule for roofing penetrations at the end of this section and the details contained within the drawings are minimum standards required for this project.
2. Installer Qualifications:
   a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.5 PROJECT CONDITIONS

A. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.6 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with Specification Section - WARRANTIES.
   a. Warranty Period Five (5) Years.

C. Installer's Warranty:

1. Workmanship and Materials Warranty:
   a. Warranty Period Five (5) years.
   b. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.
   c. The subcontractor shall warranty to maintain the roof flashing in a watertight condition for the period of years specified from the date of acceptance and shall be responsible for the repair of any failure that is the result of defects in materials and workmanship.
   d. The subcontractor shall obtain from the Roofing Installer and the General Contractor a co-endorsement of the Warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer:
      a. Ice and Water Shield:
         1) GRACE CONSTRUCTION PRODUCTS
            a) ICE and WATER SHIELD HT.
         2) Acceptable alternative manufacturers:
            a) CARLISLE COATINGS & WATERPROOFING - CCW WIP 400.
      b. Penetration Flashing:
         1) GRACE CONSTRUCTION PRODUCTS "VYCOR V40".
         2) Acceptable Alternative Manufacturer:
            a) FORT-I-FIBER "Fort-I-Flash 40".
            b) TYVEK "FlexWrap" and "Straight Flash".
      c. Reglets:
         1) FRY REGLET CORPORATION.
      d. Primer Paint:
         1) DEVOE COATINGS PAINT.
      e. Galvanized Repair Paint:
         1) RECTORSEAL.
      f. Rigid Board Insulation:
         1) RMAX "TSX-8500" and "R-Seal 3000" Tape

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Sheet Metals:
   1. Steel Sheet:

a. Zinc-Coated, Commercial quality with 0.20 percent copper, ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process", G-90 hot-dip galvanized, mill phosphatized where indicated for painting; 0.0359 inch thick (20 gage) minimum, except as otherwise indicated.

2. Lead Sheet:
   a. ASTM B 749 "Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products", Type L51121, copper-bearing sheet lead, minimum 4 lb/sq. ft. (0.0625 inch thick) minimum for burning (welding) unless otherwise indicated.
3. Aluminum Sheet:
   a. Provide sheet aluminum in accordance with ASTM B 209 "Specification for Aluminum and Aluminum-Alloy Sheet and Plate", alloy 3003, temper H14, AA-C22A41 clear anodized finish.
      1) Gage: 0.063 inches.
      2) Prepare anodized finish for application of primer and finish coats as indicated on the drawings.
4. Stainless-Steel Sheet:
   a. ASTM A 167 "Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip", Type 304, soft annealed, with No. 4 finish, except where harder temper is required for forming or performance; minimum 0.0625 inch thick (16 gage), unless otherwise indicated.

2.3 MANUFACTURED UNITS

A. Reglets:
1. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.
2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
3. Plaster Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
5. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
6. Accessories:
   a. Counterflashing Wind-Restraint Clips: Provide "windlok clips" to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.
      1) Material: Galvanized steel, thickness matching material being installed, unless otherwise noted.
   b. Factory fabricated reglet corners.
      1) Factory fabricated reglet and flashing inside and outside corners mitered and sealed.

2.4 ACCESSORIES

A. Solder:
1. Solder for galvanized steel:
   a. ASTM B 32 "Specification for Solder Metal", Grade Sn50, used with rosin flux.
2. Solder for stainless steel:

a. ASTM B 32 "Specification for Solder Metal", Grade Sn60, used with an acid flux of type recommended by stainless-steel sheet manufacturer; use a noncorrosive rosin flux over tinned surfaces.

B. Stainless Steel Welding Rods:
1. Type recommended in writing by stainless-steel sheet manufacturer for type of metal sheets furnished

C. Fasteners:
1. Same material as sheet metal or other non-corrosive metal as recommended by sheet metal manufacturer, unless otherwise indicated on the drawings.
a. Match finish of exposed heads with material being fastened.

D. Electrolytic Insulation:
1. Asphalt Mastic:
a. SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4-mm) dry film thickness per coat.
2. Other electrolytic insulation materials:
a. Asphalt impregnated felt, neoprene or EPDM rubber.

E. Sealants shall be in accordance with Specification Section - SEALANTS.
1. Mastic Sealant:
a. Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
2. Elastomeric Sealant:
a. Generic type recommended by sheet metal manufacturer and fabricator of components being sealed.
3. Epoxy seam sealer:
a. 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.
4. Tape Sealant:
a. Acrylic Modified asphalt impregnated, non-drying sealant tape.

F. Adhesives:
1. Type recommended by sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of sheet metal.

G. Metal Accessories:
1. Provide sheet metal clips, straps, anchoring devices, screens, mesh, and similar accessory units as required for installation of work, matching or compatible with material being installed; noncorrosive; size and thickness matching material being installed.

H. Roofing Cement:
1. ASTM D 4586 “Specification for Asphalt Roofing Cement, Asbestos Free”, Type I.
a. Verify with roofing material utilized for this project as being compatible with materials and roofing manufacturer's warranty requirements.

I. Gutter Sealing System (when applicable):
1. Primer:
a. Suitable for metal gutter metal type and compatible with Coatings and Fabrics.
2. Base, Intermediate and Finish Layer Coating:
3. Base Layer Fabric:
a. Polyester Fabric compatible with primer and coatings.

J. Penetration Flashing:
1. Self-Adhered and self-healing weather barrier strips, in accordance with FS UU-B-790a, Grade A.
   a. 40 mil. minimum thickness, in 9 inch and 12 inch widths as is appropriate for the barrier application.

K. Rigid Board Insulation:
1. In accordance with:
   a. ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board", Type 1, Class 1, isocyanurate with front and back foil-faced (balanced panel), conditioned "R" value of 6.00 per inch minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials", and ASTM D 1621 “Test method for Compressive Properties of Rigid Cellular Plastics”.
      1) Flame Spread Index Maximum, core: 25.
      2) Smoke Density Developed Index Maximum, core: 450.
      3) Compressive strength: 20 PSI.
      4) 4' x 4' or 4' x 8' panels.

2.5 FABRICATION

A. Sheet Metal Fabrication Standard: Fabricate sheet metal to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
1. Comply with details shown to fabricate sheet metal that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
2. Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
3. Seams:
   a. Fabricate nonmoving seams in sheet metal with "Drive Cleat" or "Lock" seams.
4. Expansion Provisions:
   a. Space movement joints at maximum of 10 feet (3 m) with no joints allowed within 24 inches of corner or intersection.
   b. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
   c. Gutter Expansion control and design, unless otherwise indicated on the drawings:
      1) Ends of a gutter shall occur no more than fifty (50) feet apart with at least one downspout in between, and gapped in accordance with Chapter 1, Table 1-7.
      2) Adjacent ends shall be telescoped or enclosed with covers in a manner to accommodate expansion as indicated in Chapter 1, Fig. 1-5 to 1-7 and 1-10.
5. Sealed Joints:
   a. Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
6. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
7. Conceal fasteners and expansion provisions where possible.

a. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

8. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
   a. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.6 FINISHES

A. Shop Finishing:
   1. All exterior galvanized sheet metal, unless specified otherwise, shall have all surfaces, except surfaces receiving roofing felt, properly cleaned and prepared and then painted with one coat Galvanized Metal Primer prior to installation.
      a. Galvanized Metal Primer: 4020PF "DEVGUARD", or approved equivalent.
      b. Galvanized repair paint: High-Zinc-Dust-Content, in accordance with SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight paint for re-galvanizing welds and repair painting galvanized steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
   3. Prime substrates as required by manufacturer's written instructions and recommendations.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Structurally reinforce and anchor work as required.
6. Work shall be weather and water tight as required.
7. Where dissimilar metals come into surface contact, cover surface in contact with electrolytic insulation.
8. Immediately following installation, and prior to roofing application, the metal will be primed with a quick drying primer compatible with roofing system installed and in compliance with roofing manufacturer's warranty requirements.

B. Layout:
1. Lines shall be straight and true.
2. Field mitered joints shall be neat, true to line, and water tight.
3. Fastening:
   a. In accordance with approved shop drawings.
4. Sealants:
   a. Seal all joints with sealant.

C. Assistance:
1. Installation shall be in direct consultation and review of roofing system manufacturer where applicable.

D. Penetration Flashing:
1. Apply Penetration Flashing in conjunction with Water Barriers, Metal Accessories and all other related work.
2. Install Penetration Flashing at all openings and penetrations at all exterior walls and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e., Toilets, Showers, Lockers, Kitchens, etc.).
3. Install Penetration Flashings with Water Barriers, Metal Accessories and all other related work in "shingle" or "weatherboard" fashion.
4. Penetration Flashings shall be installed as required in CBC Sections 1404 in 9" widths and continuous to 9" past all intersections around all openings, penetrations and termination ofSheet Metal Systems.
   a. Should any penetration warrant a greater width of wall flashing, provide 12" wide flashing as required.
   b. When an object extends through the Sheet Metal System, return the edge of the Penetration Flashing 1" and apply to the sides of the penetrating item.
5. Objects such as electrical back-boxes, electrical speaker enclosures, penetrations created by structural members, and the like.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.

3.5 SCHEDULES

A. The Schedules are divided into "Architectural" Sheet Metal Items and "Utility" Sheet Metal Items:
   1. Architectural Sheet Metal Items: Those items visible from the interior occupied spaces and from all exterior viewing positions. Fabrication of all Architectural Items shall provide a fully finished appearance on all visible surfaces. Fabrication shall be soldered or welded joints and ground smooth. Solid flat head riveted joints may be used if necessary, but limited in use and must be indicated on the shop drawings by the fabricator, and accepted by the Architect. The use of sheet metal screws, pop rivets, or bolts are not be permitted. All joints between section shall be uniformly gapped with a maximum of 1/16" and splice backing shall be centered on the joint.
   2. Utility Sheet Metal Items: Those items not visible from the interior occupied spaces nor from exterior viewing positions. Fabrication of all Utility Items shall be in accordance with SMACNA Standards and shop practices.

B. Sheet Metal Schedules should be used as a guide only and it is not considered as a complete list. Refer to Drawings for locations of all conditions requiring sheet metal items.

C. Multiple types of material are specified for various items in the Schedules. Verify with roofing manufacturer as to which material shall be used to be compatible to the roofing material provided and to satisfy roofing warranty requirements.

D. Materials gages specified for Items in the Schedules are minimum and shall be provided unless otherwise noted on the Drawings.

E. Schedule's Remarks / SMACNA No., 6th Edition, and are references of the standards for fabrication. Refer to Drawings for configurations and other fabrication requirements of sheet metal items.

F. Architectural Sheet Metal Items

“ARCHITECTURAL” SHEET METAL ITEMS					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
Parapet Cap	Parapet Walls	Steel	20	Shop	Chapter 3, similar to Fig. 3-4A or Fig. 3-4G with E-1 and E-4 edge styles, as indicated on drawings. Provide J9 "Drive Cleat" joints, typical.
Cap Coping	Parapet Walls	Steel	20	Shop	Chapter 3, similar to Fig. 3-4G with E-4 edge style, as indicated on drawings. Provide J9 "Drive Cleat• " joints, typical.
Drip Flashing	Various Conditions	Steel	22	Shop	Chapter 4, minimum 4" under finish and minimum 4" cover. Provide J2 "Butt & Backup Plate" • joints with 1/16" gap. Fabricate Transition pieces and End Caps.
Counter Flashing	Various Conditions	Steel	22	Shop	Chapter 4, minimum 4" under finish and minimum 4" cover with 3/4" hemmed drip. Provide J2 "Butt & Backup Plate• " joints with 1/16" gap. Fabricate Transition pieces and End Caps.

"ARCHITECTURAL" SHEET METAL ITEMS					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
Opening Heads, Jambs & Sill Flashing	Metal Frames	Steel	22	Shop	Weld and Grind smooth all joints
Opening Heads, Jambs & Sill Flashing	Aluminum Windows	Alum	0.0253	Match Aluminum Window Finish.	Seal all joints.
Opening Heads, Jambs & Sill Flashing	Storefront	Alum	0.0253	Match Storefront Finish.	Seal all joints.
Opening Heads, Jambs & Sill Flashing	Curtain Wall	Alum	0.0253	Match Curtain Wall Finish.	Seal all joints.
Wall Penetration Flashing	Exterior Wall	Steel	22	Shop	Similar to Chapter 6, Figures 6-36, 37, 38 & 39.
Scuppers	Parapet Wall	Steel	22	Shop	Chapter 1, similar to Fig. 1-26A-B or 1-30A-B.
Gutters	Exterior	Steel	18	Shop	Chapter 1, Fig. 1-1. Provide expansion joints similar to Fig. 1-7. Solder overflow and downspout outlets.
Conductor Head	Exterior	Steel	18	Shop	Chapter 1, similar to Fig. 1-25. Solder downspout outlet.
Down Spouts	Exterior	Steel	18	Shop	Chapter 1, similar to Fig. 1-31, 1-32A or B. Provide Fig. 1-35B or J hangers.
Fascia Panels	Exterior	Steel	18	Shop	Weld and grind smooth all joints.
Color Band Panels	Exterior	Steel	18	Shop	Weld and grind smooth all joints.
Serving Counter	Serving Counter	S.S.	16	#4	Weld and Grind smooth all joints
Work Counter	Work Counter	Steel	16	Shop	Weld and Grind smooth all joints
Fabricated Tilt Mirror	Student Restrooms	S.S.	16	#4	Weld and grind smooth all joints.
Cap	Various Conditions	Steel	20	Shop	Provide "Drive Cleat" joints, Seal all joints
Finish Transition	Various Conditions	Steel	20	Shop	Seal all joints
Column Umbrella Flashing	Exterior Columns	Steel	18	Shop	Provide soldered "Butt Seam with Backup Plate" joints. Seal all joints.

"ARCHITECTURAL" SHEET METAL ITEMS					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
Reveal Screed	Exterior Wall	Steel	20	Shop	Provide soldered "Butt Seam with Backup Plate" joints. Seal all joints.
Extended Trim	Exterior	Alum.	.063	Clear Anodized	

G. Utility Sheet Metal Items

"UTILITY" SHEET METAL ITEMS					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
Clips & Cleats	Various Conditions	Steel	22	Shop	
Parapet Boot Flashing	Parapet Cap & Cap Coping	Steel	18	Shop	Solder all joints. Minimum 4" under finish and min. 4" cover.
Counter Flashing	Various Conditions	Steel	22	Shop	Minimum 4" under finish and min. 4" cover with ¾" hemmed drip. Provide J2 "Butt & Backup Plate" joints with 1/16" gap. Fabricate Transition pieces and End Caps.
Reglet & Counter Flashing	Plaster Parapets	Steel	24	Shop	FRY Spring Lock Type "ST" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Reglet & Counter Flashing	Plaster Parapets	Steel	24	Shop	FRY Spring Lock Type "STX" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Reglet & Counter Flashing	Masonry Parapet	Steel	24	Shop	FRY Spring Lock Type "MA" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Reglet & Counter Flashing	Masonry Parapet	Steel	24	Shop	FRY Spring Lock Type "SM" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Structural Support Flashing	Roof Penetration	Steel	18	Shop	Chapter 4, Similar to Figures 16A or B or C if welded or soldered, and grind smooth.
Vent Pipe Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Fig. 4-15B.
Pipe or Conduit Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, similar to Figure 4-15C.
Multiple Pipe or Conduit Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop Or Shop	Chapter 4, similar to Figure 4-15A or 4-15B.
Insulated Pipe Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Similar to Fig. 4-15C. Refer to Plumbing.
Mechanical Flue Pipe	Roof Penetratio	Lead or	4#/sf or	Shop	Chapter 4, Similar to Fig. 4-15C. Refer to Plumbing.

"UTILITY" SHEET METAL ITEMS					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
Flashing	n	Steel	22		
Manufactured Curb Flashing	Roof Penetration	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Hatch Flashing	Roof Penetration	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Ventilating Units Flashing	Roof Penetration	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Scuppers	Parapet Screens	Steel.	22	Shop	Chapter 1, similar to Fig. 1-26A-B or 1-30A-B.
Roof Splash Pans	Roof	Steel.	22	Shop	Chapter 1, Fig. 1-36, 2-rib corrugation section..
Valley Flashing	Metal Panel Roof	Steel.	22	Shop	Chapter 6, Similar to Fig. 6-6 or Fig. 1-21 or Fig. 1-23, Detail 10, or Fig. 6-9, Detail 7 and Chapter 4, Fig. 4-10.
Built-in Gutter	Metal Panel Roof	S.S.	16	Shop	Chapter 1, similar to Fig. 1-4 or Fig. 1-21 or Fig. 1-23. Provide expansion joint similar to Fig. 1-8. Weld and grind smooth all joints.
Louver Screens	Louvered Openings	Steel.	14	Shop	Chapter 7, Fig. 7-7A or B. Provide 12 gage (0.105) 3 x 3 welded wire mesh.
Plumbing Sheet Metal	Various Plumbing Conditions	Steel.	22	Shop	Refer to Plumbing Drawings and Specifications.
Mechanical Sheet Metal	Various Mechanical Conditions	Steel.	22	Shop	Refer to Mechanical Drawings and Specifications.
Electrical Sheet Metal	Various Electrical Conditions	Steel.	22	Shop	Refer to Electrical Drawings and Specifications.
Roof and Overflow Drain Pans	Roof	Lead	#4	Shop	See Details.
Mechanical, Large Flue Flashing	Roof Penetration	Steel	22	Shop	Chapter 4, Detail 4-14A.

END OF SECTION

SECTION 077200 – ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all roof accessory materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 05 12 00 STEEL AND FABRICATIONS
   4. 05 30 00 METAL DECK
   5. 06 10 00 ROUGH CARPENTRY
   6. 07 40 00 METAL PANELS
   7. 07 51 13 BUILT-UP ROOFING
   8. 07 60 00 SHEET METAL
   9. 07 92 00 SEALANTS
   10. 09 22 16 METAL FRAMING
   11. 09 91 00 PAINTING
   12. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ASTM American Society for Testing and Materials
      b. LIA Lead Industries Association.
      c. NRCA National Roofing Contractors Association (If the roofing system scheduled to be installed calls for related sheet metal flashing to be in accordance with NRCA detailing in order to satisfy their warranty requirements, then the NRCA detailing shall govern in lieu of SMACNA standards.)
      d. OSHA Occupational Safety and Health Administration
      e. SMACNA Sheet Metal and Air Conditioning Contractor's National Association, latest Edition, Architectural Sheet Metal Manual.

1.3 SYSTEM DESCRIPTION

A. (Manufactured Curbs Only) This section specifies curbs for mechanical and electrical equipment specified in Division 23 and Division 26, as well as architectural curbs in Division 05, Division 07 and Division 08. These curbs are designed and fabricated as welded single piece units that are structurally designed by the manufacturer to span structural framing. The curbs require structural calculations from the manufacturer in accordance with the CBC for the mechanical or electrical units supplied that are mounted on top of the curbs.

1. Manufactured curbs shall be designed, engineered, and fabricated for exact mechanical units selected after bid, and can be designed for compound slopes and difficult roofing conditions. Designs shall accommodate each type of roofing condition.
2. All curbs shall be designed to be a minimum of 8-inches above the finished roof at the top most portion of the curb, and designed with crickets for watertight connections.
3. Construct curbs to match roof slopes with plumb and level top surfaces for mounting mechanical or electrical equipment.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Coordination Drawings (Manufactured Curbs only):
   a. Manufacturer(s) shall coordinate with the Contractor and the Roofing Subcontractor all applicable work placed on or penetrating the roof deck and roof membrane system for the proper selection of Roof Accessories for this project. Manufacturer shall coordinate with the Contractor all weights and dimensions from approved shop drawings of mechanical equipment and piping/conduit required for this project and fabricate accordingly. All items coordinated (including Structural Calculations) shall be presented within the shop drawings for the Architect's and Structural Engineer of Record's review.
2. Product Data.
   a. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
   b. Submit manufacturer's standard color range for selection by the Architect.
3. Shop Drawings.
   a. Submit shop drawings prepared by, or under the supervision of a registered Civil or Structural Engineer in the State of California, detailing fabrication and assembly of the work under this section, as well as procedures and diagrams. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as unit of work of other related sections.
      1) Manufactured Curbs must be coordinated with the Structural Shop Drawings and Mechanical / Electrical Equipment supplied as to size and weights for any roof top installation.
4. Quality Assurance/Control Submittals:
   a. Manufacturer's Written Instructions:
      1) Manufacturer's written instructions.
5. Closeout Submittals in accordance with the following:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
   c. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
   d. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
   a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
2. Manufacturer/Supplier Qualifications:

a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be individually wrapped.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. Hatch Railing System shall provide a warranty against defects in material and workmanship:
a. Warranty Period Twenty-Five (25) Years.
1) From the Date of Substantial Completion.

C. Installer's Warranty:
1. Weather Tightness Warranty for Roof Accessories: Manufacturer's Standard form in which manufacturer agrees to repair or replace Roof Accessory assemblies that fail to remain weathertight, including leaks within specified warranty period. Warranty shall guarantee manufactured Roof Accessories to be free from defects in materials or workmanship.
a. Warranty Period Five (5) Years.
1) From the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified Manufactured Curb product manufacturer, or approved equivalent:
      a. ROOF PRODUCTS, INC., RP Series to match specified products.
      b. Acceptable alternative manufacturers:
         1) ROOF PRODUCTS & SYSTEMS CORP.
   2. Specified Accessories product manufacturer, or approved equivalent:
      a. DEKSUS, Deck-Tite watertight flashing boots.
   3. Specified Roof Hatch product manufacturer, or approved equivalent:
      a. BILCO COMPANY, S-20 Series.
      b. Acceptable alternative manufacturers:
         1) BABCOCK-DAVIS HATCHWAYS, INC.
      c. Single Leaf Model to match specified products.
         1) DUR-RED PRODUCTS, Ladder Hatch Model to match specified products.
         2) NYSTROM , Single Leaf Model to match specified products.
   4. Specified Equipment Access Hatch product manufacturer, or approved equivalent.
      a. BILCO TYPE D Series.
      b. BILCO TYPE L Series.
      c. Acceptable alternative manufacturers:
         1) BABCOCK-DAVIS HATCHWAYS, INC.
   5. Specified Hatch Railing System manufacturer, or approved equivalent:
      a. BILCO COMPANY, "Bil-Guard."
   6. Specified Aluminum Cage Ladder system manufacturer, or approved equivalent.
      a. OKEFFES
   7. Specified Aluminum Ships Ladder system manufacturer, or approved equivalent.
      a. OKEFFES

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. Manufactured Curbs:
   1. General:
      a. Curbs shall be constructed to match roof slope of roof and provide a level top surface for mounting of mechanical equipment.
         1) Minimum height of all curbs shall be 8 inches above finished roof per NRCA requirements.
      b. Provide ROOF PRODUCTS, INC., Model Numbers as follows:
         1) RPC Series for Built-up Roofs.
         2) RPMB Series for Metal Roofs.

3) RPES Series for Equipment Supports.

2. Equipment Curbs: Provide ROOF PRODUCTS, INC., Model Numbers as follows:
   a. RPC-5 for Built-up roofs.
   b. RPMB-5 for Metal Roofs.
   c. Factory installed pressure treated fire retardant wood nailers.
   d. Welded 18 gage minimum galvanized steel shell and base plate, as applicable to roof equipment situation, with continuous mitered and welded corner seams.
   e. 3 lb. density rigid fiberglass insulation board.
   f. Internal angle reinforcing (1" x 1" x 12 gage) on sides greater than 36 inches in length, spaced 24 inches o.c.
   g. All welds to be coated with manufacturer's "Alumanation 100".
   h. Internal curb duct supports as required for the type of Mechanical units selected for the project.
3. Equipment Platform: Provide ROOF PRODUCTS, INC., Model Numbers as follows:
   a. RPPF-5 for Built-up Roofs.
   b. Factory installed pressure treated fire retardant wood nailers.
   c. Welded 18 gage minimum galvanized steel shell and base plate, as applicable to roof equipment situation, with continuous mitered and welded corner seams.
   d. 3 lb. density rigid fiberglass insulation board.
   e. Internal angle reinforcing (1" x 1" x 12 gage) on sides greater than 36 inches in length, spaced 24 inches o.c.
   f. All welds to be coated with manufacturer's "Alumanation 100".
   g. Internal curb duct supports as required for the type of Mechanical units selected for the project.
   h. Platform Cover:
      1) Welded 18 gage galvanized steel construction.
      2) Cover cross broken for positive water run-off.
      3) Flared drip edge.
      4) Flat Lock and Soldered seams on covers 43 inches x 105 inches and larger.
   i. Platform: Provide 1-1/8" thick fire-retardant treated T & G plywood top sheathing
   j. Vapor Retarder: Two layers of 15lb building paper between plywood platform and curb cover.
4. Equipment Supports: Provide ROOF PRODUCTS, INC., Model Numbers as follows:
   a. RPES-3 for Built-up Roofs.
   b. 18 gage minimum galvanized steel shell, base plate and counterflashing.
   c. Factory installed pressure treated fire retardant wood nailer.
   d. Internal bulkhead re-enforcement.
   e. All welded construction.
   f. Vapor Retarder: Two layers of 15lb building paper between wood nailer and counterflashing.
5. Accessories:
   a. Square to Round adapter as indicated on the drawings:
      1) Cross broken for positive run-off.
      2) Type WG 16 gage galvanized steel construction.
      3) Watertight construction.
      4) Insulated to prevent condensation.
   b. "Dectite" size and number applicable to the size of pipes penetrating the roof deck indicated in the Contract Documents.
   c. Fasteners as required by the manufacturer for the proper installation of the roof curbs and weather resistant coating as standard with the manufacturer.
   d. Neoprene strips, sheets or washers as required by the manufacturer for weathertight construction.
   e. Provide Isolation Rails as required by Mechanical in DIV. 23 or Electrical in DIV. 26.

B. Roof Hatch System: System includes Roof Hatch, Ladder Post, and Roof Hatch Railing System.

1. Roof Hatch:
   a. Model "Type S-20", 30 inch x 36 inch, or as indicated otherwise.
   b. Cover:
      1) Material: 14 gage galvanized steel.
      2) Insulation: 1 inch fiberglass.
      3) Liner: 22 gage galvanized steel.
      4) Flange: 3 inch beaded.
   c. Curb:
      1) Material: 18 gage galvanized steel.
      2) Insulation: 1 inch thick fiberboard.
         a) Provide continuous 1 inch thick by 3 inch fire retardant treated wood nailer for termination of roofing materials at top of curb. Fasten to top of curb from inside of curb with #10 self tapping screws at 12 inches o.c. maximum. Wire brush off any burrs from screw head on inside of curb after attaching nailers.
      3) Height: Minimum height shall be 8 inches above finished roof.
      4) Cap Flashing: 14 gage galvanized steel with full welded, mitered corner of watertight construction.
      5) Hardware:
         a) Material: Cadmium plated steel.
         b) Hinges: Heavy Pintle.
         c) Operators: Compression springs enclosed in telescopic tubes.
         d) Latch: Positive snap with turn handles and padlock hasps inside and outside.
         e) Cover Seal: Neoprene, all sides.
         f) Hold-open Arms: Automatic with handle for one hand release.
      6) Finish:
         a) Cover, curb and hardware shall be cleaned and chemically treated for maximum adhesion in preparation for manufacturer's standard primer paint.
2. Roof Hatch Ladder Post:
   a. "LadderUP®Safety Post LU-2".
      1) General:
         a) Safety post shall comply with all OSHA and Cal OSHA safety guidelines for this work.
         b) Safety Post shall be mounted so as not to interfere with the proper operation of any roof hatch covers.
      2) Performance Characteristics:
         a) Tubular Post shall lock automatically when fully extended.
         b) Safety Post shall have controlled upward and downward movement.
         c) Release lever shall disengage the post to allow it to be returned to its lowered position.
         d) Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14" on center and clamp brackets to accommodate ladder rungs up to 1-3/4" in diameter.
         e) If hollow rungs are encountered, provide solid bars of equal length as hollow rungs of diameter suitable for insertion into hollow rungs to prevent crushing of the rungs due to clamping of the Safety Post.

3) Post: Hot dip galvanized finish, suitable for mounting on rear of ladder to top two rungs with clamp brackets, including all fasteners required.
   a) All materials for Safety Post shall be in compliance with ASTM A 36, "Standard Specification for Structural Steel."
   b) Post shall be manufactured of high strength galvanized steel square tubing. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.
4) Balancing Spring: Provide a stainless steel spring balancing mechanism to provide smooth, easy, controlled operation when raising and lowering the safety post.
5) Hardware: Spring nuts shall be galvanized steel, and all other mounting hardware shall be Type 316 stainless steel.

3. Roof Hatch Railing System:
   a. "Bil-Guard 2.0" Hatch Railing System:
      1) General:
         a) System shall comply with the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a safety factor of two.
         b) System shall attach to the capflashing of the roof hatch and shall not penetrate any roofing material.
         c) Hinged gate shall ensure continuous barrier around roof hatch.
      2) Posts, Rails and Gate:
         a) Material: Aluminum Schedule 40 6061 T6 alloy, 1-1/4" outside diameter.
      3) Hardware:
         a) Gate Locking Mechanism: cast aluminum.
         b) Hinges: Spring hinges, type 316 stainless steel, 3/8 inch thick.
         c) Fasteners: Type 316 stainless steel.
      4) Accessories:
         a) Provide all bolts, locknuts, washers, pins, screws, nylon washers, neprene pads, and torsion rods, etc. required for a complete assembly.
      5) Finish: Manufacturer's powder coat.
         a) Color: Light gray.

C. Roof Hatch System: System includes Roof Hatch, Ladder Post, and Roof Hatch Railing System.
   1. Roof Hatch:
      a. Model "Type L", 30 inch x 96 inch, or as indicated otherwise.
      b. Cover:
         1) Material: 14 gage galvanized steel.
         2) Insulation: 1 inch fiberglass.
         3) Liner: 22 gage galvanized steel.
         4) Flange: 3 inch beaded.
      c. Curb:
         1) Material: 18 gage galvanized steel.
         2) Insulation: 1 inch thick fiberboard.
            a) Provide continuous 1 inch thick by 3 inch fire retardant treated wood nailer for termination of roofing materials at top of curb. Fasten to top of curb from inside of curb with #10 self tapping screws at 12 inches o.c. maximum. Wire brush off any burrs from screw head on inside of curb after attaching nailers.
         3) MinimumHeight: 8 inches above finished roof.

4) Cap Flashing: 14 gage galvanized steel with full welded, mitered corner of watertight construction.
5) Hardware:
   a) Material: Cadmium plated steel.
   b) Hinges: Heavy Pintle.
   c) Operators: Compression springs enclosed in telescopic tubes.
   d) Latch: Positive snap with turn handles and padlock hasps inside and outside.
   e) Cover Seal: Neoprene, all sides.
   f) Hold-open Arms: Automatic with handle for one hand release.
6) Finish:
   a) Cover, curb and hardware shall be cleaned and chemically treated for maximum adhesion in preparation for manufacturer's standard primer paint.

2. Roof Hatch Ladder Post:
   a. "LadderUP®Safety Post LU-2".
      1) General:
         a) Safety post shall comply with all OSHA and Cal OSHA safety guidelines for this work.
         b) Safety Post shall be mounted so as not to interfere with the proper operation of any roof hatch covers.
      2) Performance Characteristics:
         a) Tubular Post shall lock automatically when fully extended.
         b) Safety Post shall have controlled upward and downward movement.
         c) Release lever shall disengage the post to allow it to be returned to its lowered position.
         d) Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14" on center and clamp brackets to accommodate ladder rungs up to 1-3/4" in diameter.
         e) If hollow rungs are encountered, provide solid bars of equal length as hollow rungs of diameter suitable for insertion into hollow rungs to prevent crushing of the rungs due to clamping of the Safety Post.
      3) Post: Hot dip galvanized finish, suitable for mounting on rear of ladder to top two rungs with clamp brackets, including all fasteners required.
         a) All materials for Safety Post shall be in compliance with ASTM A 36, "Standard Specification for Structural Steel."
         b) Post shall be manufactured of high strength galvanized steel square tubing. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.
      4) Balancing Spring: Provide a stainless steel spring balancing mechanism to provide smooth, easy, controlled operation when raising and lowering the safety post.
      5) Hardware: Spring nuts shall be galvanized steel, and all other mounting hardware shall be Type 316 stainless steel.
3. Roof Hatch Railing System:
   a. "Bil-Guard 2.0" Hatch Railing System:
      1) General:
         a) System shall comply with the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a safety factor of two.
         b) System shall attach to the capflashing of the roof hatch and shall not penetrate any roofing material.
         c) Hinged gate shall ensure continuous barrier around roof hatch.
      2) Posts, Rails and Gate:

a) Material: Aluminum Schedule 40 6061 T6 alloy, 1-1/4" outside diameter.

3) Hardware:
   a) Gate Locking Mechanism: cast aluminum.
   b) Hinges: Spring hinges, type 316 stainless steel, 3/8 inch thick.
   c) Fasteners: Type 316 stainless steel.

4) Accessories:
   a) Provide all bolts, locknuts, washers, pins, screws, nylon washers, neprene pads, and torsion rods, etc. required for a complete assembly.

5) Finish: Manufacturer's powder coat.
   a) Color: Light gray.

4. Aluminum ShipsLadder
   a. Specified product manufacturer, or approved equivalent: OKEEFE'S INC.
   b. Configurations as shown on Drawings.
   c. Non-spark, high strength aluminum.
   d. Serrated treads.
   e. Mill finish.

D. Equipment Access Hatches:
1. Building L Dimensions: 9'-6" x 11'-6" for a clear opening width of 8'-4" x 10'-10"
2. Cover:
   a. Material: 14 gage galvanized steel.
   b. Insulation: 1 inch fiberglass.
   c. Liner: 22 gage galvanized steel.
   d. Flange: 3 inch beaded.
3. Curb:
   a. Material: 18 gage galvanized steel.
   b. Insulation: 1 inch thick fiberboard.
      1) Provide continuous 1 inch thick by 3 inch fire retardant treated wood nailer for termination of roofing materials at top of curb. Fasten to top of curb from inside of curb with #10 self tapping screws at 12 inches o.c. maximum. Wire brush off any burrs from screw head on inside of curb after attaching nailers.
   c. Height: 12 inches.
   d. Cap Flashing: 14 gage galvanized steel with full welded, mitered corner of watertight construction.
4. Hardware:
   a. Hardware Materials:
      1) Material: Cadmium plated steel.
      2) Hinges: Heavy Pintle.
      3) Operators: Compression springs enclosed in telescopic tubes.
      4) Latch: Positive snap with turn handles and padlock hasps inside and outside.
      5) Cover Seal: Neoprene, all sides.
      6) Hold-open Arms: Automatic with handle for one hand release.
5. Finish:
   a. Cover, curb and hardware shall be cleaned and chemically treated for maximum adhesion in preparation for manufacturer's standard primer paint.

E. Hatch Railing System (for all hatches within ten (10) feet of the roof edge):
1. "Bil-Guard" Hatch Railing System:
   a. System shall comply with the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a safety factor of two.

b. Posts and Rails are pultruded from a fire retardant, fiberglass-reinforced polymer (FRP).
   1) FRP material shall have a molded-in, high visibility, safety yellow color and shall be treated with a UV inhibitor.
c. Mounting brackets shall be fabricated form 1/4" thick hot dip galvanzied steel.
d. Gate hinges and post guides shall be constructed of 6063-T5 aluminum and torsion rods shall be Type 302 stainless steel.
e. All fasteners shall be Type 316 stainless steel.
f. Rail Panels that completely surround the hatch (number is dependent upon the roof hatch length).
g. One (1) Gate Panel as required per hatch.
h. Corner Brackets as required per hatch.
i. Pivot Brackets as required per hatch.
j. Center brackets as required per hatch.
k. Gate mounting post as required per hatch.
l. Complete hardware package as required for the size of hatch as required per hatch.
   1) Includes all bolts, locknuts, washers, pins, screws, nylon washers, neprene pads, and torsion rods per the size of the hatch.
m. Gate Latch Kit as required per hatch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface Preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   a. Provide Hatch Railing System on all hatches or fire vents within ten (10) feet of any roof edge) and install in accordance with manufacturer's written instructions.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Damaged products shall not be installed.

B. Layout:
1. Lines shall be straight and true.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.

B. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 ADJUSTING

A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

3.6 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.
3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 078116 – FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 05 12 00 STEEL AND FABRICATIONS
   4. 05 30 00 METAL DECK
   5. 09 22 00 METAL FRAMING
   6. 09 24 00 CEMENT PLASTER
   7. 09 29 00 GYPSUM BOARD
   8. 09 50 00 ACOUSTICAL CEILINGS
   9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   10. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Unless otherwise indicated by the structural engineer on the drawings, the structural frame definition shall be considered to be the columns and the girders, beams, trusses and spandrels having direct connections to the columns.
   1. Unless otherwise indicated by the structural engineer on the drawings, lateral force bracing in the exterior wall or in the interior of the building is not considered to be part of the structural frame where the bracing serves no other purpose but to resist the lateral loads. In this case, lateral load bracing in the exterior walls would be protected in accordance with CBC Table 602 for exterior, non-bearing walls. Interior lateral force bracing would be protected as for interior, permanent partitions.

B. Unless otherwise indicated by the structural engineer on the drawings, secondary member definitions are floor or roof panels which have no connection to the columns.
   1. Beams that are adjacent to elevator shafts, stair shafts or under penthouse structures are to be considered primary beams and part of the structural frame.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Material List.
   2. Colors.
   3. Samples.
   4. Quality Assurance/Control Submittals:
      a. Manufacturer's Data:

1) Submit manufacturer's written instructions for proper application of the sprayed fireproofing. Submit UL Design Number information showing proper thicknesses of fireproofing in accordance with the fire ratings required by the Contract Documents.
   a) Submittals of UL Design numbers for manufacturers other than W.R. GRACE, shall be submitted to the CSFM for prior approval as equivalent protection prior to review of the Architect, and must be incorporated into a "No Cost" change order for official CSFM approval. If no prior approvals can be obtained from the CSFM, then submit W.R. GRACE products as specified.

b. Test Data:
   1) Submit laboratory test results for fireproofing material that complies with the Physical Properties and test methods specified in Part 2 of this Section.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In addition to complying with all pertinent codes and regulations, comply with the materials handling and workmanship provisions of CCR Title 19 and CBC.
      a. The sprayed fireproofing shall have been tested by Underwriters' Laboratories in accordance with the procedures of ASTM E 119 "Test methods for Fire tests of Building Construction and Materials". The structural steel members shall be protected with proper fireproofing thicknesses, densities and types.
   2. Floor Assembly: The floor deck assembly shall have properly proportioned concrete fill above the metal deck to provide a 1-hour <u>un-restrained</u> fire resistant deck assembly as substantiated by a fire test in accordance with the procedures of ASTM E 119 "Test methods for Fire tests of Building Construction and Materials", and performed by Underwriters' Laboratories or other California State Fire Marshal recognized testing agency. The floor assembly utilizing concrete fill above the metal deck does not require Sprayed Fireproofing on the underside of the metal deck, but all support beams require sprayed fireproofing in accordance with fire resistance rating scheduled herein.
   3. Roof Assembly: Roof assembly shall provide a 1-hour <u>unrestrained</u> fire resistant deck assembly as substantiated by a fire test in accordance with the procedures of ASTM E 119 "Test methods for Fire tests of Building Construction and Materials" and performed by Underwriter's Laboratories or other California State Fire Marshal recognized testing agency. The roof assembly does require sprayed fireproofing on underside of metal deck in thicknesses coinciding with the rating of the deck assembly indicated on the drawings, and all support beams require sprayed fireproofing in accordance with fire resistance rating scheduled herein.

B. The fireproofing material shall not be subject to losses from the finished application by sifting, flaking or dusting. This performance shall be measured by the results of a test for erosion resistance when subjected to high velocity air flow across the surface of dried samples.

C. The samples thus tested must be representative of machine-applied material similar to that which can be expected on the project.

D. Miscellaneous fire/sound barrier closures above partition tops to framing or decking above shall be constructed as shown with standard 3.4 lbs. per sq. ft. flat expanded metal lath as the backing material securely attached to wall and structure. Closures shall provide a fully sealed barrier to exclude the passage of smoke, flames or air borne sound waves. Sprayed fireproofing shall fill voids over beams created by corrugations at beams requiring fireproofing.

E. Fireproofing work shall be performed by a firm acceptable to the Sprayed Fireproofing Material Manufacturer.

F. All materials used in fireproofing shall be free of Asbestos and/or Mineral Fibers.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver all manufactured products to the job sites in their original unopened containers with all labels intact and legible at the time of use, fully identifying the manufacturer, brand or other identifying data, and bearing the proper UL labels for fire hazard and fire- resistance classification.
   1. Material shall be stored (above ground), under cover and in a dry location until ready for use. All bags that have been exposed to water before use shall be found unsuitable for use and discarded. Stock of material is to be rotated and used prior to its expiration date.

B. Do not permit scattering of materials or equipment but use all means necessary to ensure neatness of the site and structure at all times.

C. Perform all cleaning of tools and equipment only in the area designated for that purpose.

D. Use all means necessary to protect fireproofing materials before, during, and after installation and to protect the installed work and materials of all other trades.

E. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.6 PROJECT CONDITIONS

A. Temperature and Ventilation:
   1. When the outdoor temperature at the building site is less than 40 degrees F., an air and substrate temperature of 40 degrees F. shall be maintained for 24 hours before, during and 24 hours after application of fireproofing material. Provisions shall be made for natural ventilation to properly dry the fireproofing during and subsequent to its application. In enclosed areas or buildings lacking openings for natural ventilation, interior air shall be circulated and exhausted to the outside by use of temporary circulators, exhaust fans, or the air-conditioning system, and in accordance with the manufacturer's written recommendations for proper curing of the fireproofing.

1.7 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer:
      a. W.R. GRACE "MONOKOTE MK-6".
      b. Acceptable alternative manufacturers:
         1) ISOLATEK INTERNATIONAL "CAFCO 300".

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Sprayed Fireproofing Materials:
   1. All fire-resistive ratings referenced should be from <u>unrestrained</u> assemblies.
   2. Water shall be clean, fresh, suitable for domestic consumption, and free from such amounts of mineral or organic substance as would affect the set of the fireproofing material.
   3. Physical Properties: Minimum values, unless otherwise indicated, measured per standard test methods referenced with each property, as follows:
      a. Bond Strength: 200 psf.
         1) Per ASTM E 736 "Test method for Cohesion / Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members".
      b. Compressive Strength: The fireproofing shall not deform more than 10 percent when subjected to compressive forces of 1200 psf when tested.
         1) In accordance with ASTM E 761 "Test method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members".
      c. Corrosion Resistance: No evidence of corrosion.
         1) Per ASTM E 937 "Test method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members".
      d. Deflection: No cracking, spalling, delamination or the like.
         1) Per ASTM E 759 "Test method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members".
      e. Effect of Impact on Bonding: No cracking, spalling, delamination or the like.
         1) Per ASTM E 760 "Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members".
      f. Air Erosion: Maximum allowable weight loss of 0.005 grams per sq. ft.
         1) Per ASTM E 859 "Test Method for Air Erosion of Sprayed Fire-Resistive Material Applied to Structural Members".
      g. Dry Density: Values for average and individual densities as required for fire-resistance rating indicated, but not less than 15 lbs. Per cu. Ft. for Cementitious Fireproofing.

1) Per ASTM E 605 "Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members".

h. Hardness: 0.50 inch maximum penetration.

i. Surface Burning Characteristics: Maximum surface burning characteristics when subjected to testing in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":

1) Flame Spread: 0.

2) Smoke Developed: 0.

B. Other Materials:

1. All other materials, not specifically described but required for a complete and proper installation of sprayed fireproofing, shall meet or exceed the requirements of the referenced standards and shall be subject to approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspection:

1. Prior to all work of this Section the Contractor, Manufacturer's representative, and the installer will carefully inspect the installed work (including mechanical attachments of other finish work) of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that sprayed fireproofing may be installed in accordance with all pertinent codes and regulations, the original design, and the referenced standards.
3. Masonry or other surfaces subject to overspray which are to remain "exposed to view" once the project is completed, shall be protected as recommended by fireproofing installer in a manner that does not harm finishes.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been full resolved.

3.2 APPLICATION

A. General:

1. In accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Application of sprayed fireproofing shall be in accordance with the printed instructions of the material manufacturer and the fire test report information.

C. All surfaces to which sprayed fireproofing will be applied shall be free of oil, grease, dirt, paint, primers, mill scale or any other matter which would impair bond. Should painted steel surfaces occur, they will be treated in accordance with the latest edition of the UL Fire-Resistive Directory.

D. Application of sprayed fireproofing to the underside of the deck assemblies shall occur only after all concrete work is complete.
   1. All roofing applications shall be completed prior to application of fireproofing. All foot traffic shall be prohibited until manufacturer indicates the fireproofing material has fully cured.
   2. Ducts, piping, equipment or other suspended items which would interfere with the application of fireproofing materials, shall not be positioned until fireproofing work is complete and the fireproofing material has cured.

E. All clips, hangers, supports, sleeves and other attachments to the fireproofing substrates, as covered under other sections of the specifications, are to be placed by others prior to the application of the fireproofing material, where these attachments can be anticipated in advance.

F. All patching and repairing of sprayed fireproofing, due to cutting by other trades, shall be performed under this section and paid for by the trade(s) that performed the cutting. No additional costs to the Owner will be allowed due to trade coordination conflicts involving patching and repairing during the progress of the Work.

3.3 CLEANING

A. In accordance with Specification Section - PROJECT CLOSEOUT.

B. After completion of fireproofing work, equipment shall be removed and all exposed wall and floor areas will be scraped clean of deposits of sprayed fireproofing materials.

END OF SECTION

SECTION 078400 – FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Firestopping (a.k.a. Through-Penetration Firestop Systems) materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 05 12 00 STEEL AND FABRICATIONS
   6. 05 30 00 METAL DECK
   7. 06 10 00 ROUGH CARPENTRY
   8. 07 21 00 INSULATION
   9. 07 40 10 MCM PANELS
   10. 07 42 43 FIBER-CEMENT PANELS
   11. 09 22 16 METAL FRAMING
   12. 09 24 00 CEMENT PLASTER
   13. 09 29 00 GYPSUM BOARD
   14. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   15. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES:

A. Standards:
   1. In accordance with the following standards:
      a. UL Underwriters Laboratory Inc.
         1) Fire Resistance – Volume 2A.
         2) Fire Resistance – Volume 2B.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: It is the intention of this specification and the drawings to form a guide for a complete firestopping system that resists the spread of fire and the passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated, according to the requirements indicated herein. Any items not specifically noted but necessary for a complete and operable firestopping system shall be provided under this section.
   1. Provide only products that when securely installed and capable of maintaining its integrity when subjected to the time-temperature curve of CRSC, Table 12-7-3A.

a. Provide firestopping systems with F-ratings that comply with hourly wall, ceiling, floor or roof ratings indicated on the drawings, as determined per ASTM E 814 "Test Method for Fire Tests of Through-Penetration Fire Stops", but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated and UL 479..
b. Provide firestopping systems with T-ratings that comply with hourly wall, ceiling, floor or roof ratings indicated on the drawings, in addition to F-ratings, as determined per ASTM E 814 "Test Method for Fire Tests of Through-Penetration Fire Stops", and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas.
c. Provide joint sealants with fire-resistance ratings that comply with hourly wall, ceiling, floor or roof ratings as indicated on the drawings, as determined per ASTM E 119 "Test Method for Fire Tests of Through-Penetration Fire Stops", with hose stream test, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
d. For firestopping systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
e. For all firestopping, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials".
f. Comply with "L" Rating where penetrating Smoke Barrier for Walls & Floors, per CBC 714.5, and CBC 714.4.4 for penetrations in smoke barriers and meeting the requirements of UL 1479 for air leakage.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
   a. Provide the manufacturer's full-line of products showing the UL Number listings and the products associated for each UL Number Listing.
      1) The installer shall pick from the manufacturer selected for this Project the appropriate firestopping system from the manufacturer's full-line product catalog and compile a record of each penetration indicating compliance with the firestopping UL Number used.
2. Shop Drawings:
   a. For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.
      1) Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each firestopping system configuration for construction and penetrating items.
3. Quality Assurance/Control Submittals:
   a. Design Data.
   b. Test Reports:
      1) Product Test Reports: From a qualified testing agency indicating firestopping system complies with requirements, based on comprehensive testing of current products.
   c. Certificates:

1) Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's) and are nontoxic to building occupants.
2) Product Certificates: Signed by manufacturers of firestopping system products certifying that products furnished comply with requirements.

d. Manufacturer's Written Instructions:

4. Closeout Submittals in accordance with the following:
   a. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
      1) Record Documents shall consist of the the compilation of actual firestopping UL Numbers used along with the comparable Manufacturer's Product associated with that UL Number, indicating the actual location of the firestopping installation within this project.
   b. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. All products shall have UL Number Listings and be approved and listed by the California State Fire Marshal.
   2. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
   3. Manufacturer/Supplier Qualifications:
      a. Manufacturer shall demonstrate a full-line of firestopping products capable of meeting the conditions associated with the scope of this Project, that have UL numbers and be approved and listed by the California State Fire Marshal.
      b. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
   4. Regulatory Requirements:
      a. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
         1) CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.

1.6 DELIVERY, STORAGE, AND HANDLING

1. Packing, shipping, handling, and unloading:
   a. Products shall be individually wrapped.
   b. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted.
2. Acceptance at Site:
   a. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   b. Damaged products will not be accepted.
3. Storage and protection:

a. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
b. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
1. Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
2. Ventilate firestopping per firestopping manufacturers' written instructions by natural means or, where this is inadequate, forced air circulation.
3. Existing Conditions:
a. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
b. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.8 SEQUENCING AND SCHEDULING

A. Notify Owner's inspection agency at least one (1) week in advance of firestopping installations; confirm dates and times on days preceding each series of installations.

B. Do not cover up firestopping installations that will become concealed behind other construction until Owner's inspection agency and authorities having jurisdiction have examined each installation.

1.9 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified firestopping product manufacturer:
      a. 3M FIRE PROTECTION PRODUCTS.
      b. Acceptable alternative manufacturers:
         1) A/D FIRE PROTECTION SYSTEMS INC.
         2) HILTI CONSTRUCTION CHEMICALS, INC.
         3) SPECIFIED TECHNOLOGIES INC.
   2. Specified Safing Insulation product manufacturer:
      a. THERMAFIBER

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Compatibility: Provide firestopping systems from only one manufacturer per penetration protective, with the substrates, and provide firestopping systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating firestopping systems, under conditions of service and application, as demonstrated by firestopping system manufacturer based on testing and field experience.
   1. Firestopping of Fire-Rated Construction:
      a. Provide systems or devices listed in the UL Fire Resistive Directory under categories XHBN for Joint Systems and XHEZ for Firestops, providing those products conform to the construction type, penetrate type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall applications. Systems or devices must be asbestos-free.
      b. In addition, products must withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the UL system or device, and designed to perform this function.
   2. Construction-Gap Firestopping of Fire-Rated Construction: Provide products from the manufacturer listed in the Systems and Applications Schedule at the end of this section for the following conditions (if applicable):
      a. Firestopping at construction gaps between edges of floor slabs and exterior wall construction (Perimeter Fire Containment Systems).
      b. Firestopping at construction gaps between tops of partitions and underside of structural systems (Joint Systems).
      c. Firestopping at construction gaps between tops of partitions and underside of ceiling or ceiling assembly (Joint Systems).
      d. Firestopping of control joints in fire-rated masonry partitions.
      e. Firestopping of expansion joints not indicated by another proprietory expansion system manufacturer.

3. Smoke-Stopping at Smoke Partitions:
   a. Through-penetration smoke-stopping: Provide any system or devices complying with the requirements for firestopping in fire-rated construction listed in the Systems and Applications Schedule at the end of this section, provided that the system includes the specified smoke seal or will provide a smoke seal.
   b. Construction-gap smoke-stopping: Provide any system or devices complying with the requirements for construction-gap firestopping in fire-rated construction listed in the Systems and Applications Schedule at the end of this section, provided that the system includes the specified smoke seal or will provide a smoke seal.

B. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by firestopping system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
1. Permanent forming/damming/backing materials, including the following:
   a. Slag-/rock-wool-fiber insulation.
   b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
   c. Fire-rated form board.
   d. Fillers for sealants.
2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.
6. Identification Labels: Provide pressure-sensitive, self-adhesive, preprinted vinyl labels, with the following information on the labels:
   a. The words: "Warning--Firestopping System--Do Not Disturb. Notify Building Management of Any Damage."
   b. Contractor's name, address, and phone number.
   c. Firestopping system designation of applicable testing and inspecting agency.
   d. Date of installation.
   e. Firestopping system manufacturer's name.
   f. Installer's name.

C. Fill Materials:
1. General: Provide firestopping systems containing the types of fill materials indicated in the Firestopping System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
2. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
3. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
4. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
5. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
6. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
7. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

8. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
9. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
10. Safing Insulation: 2" minimum to 4" thick Safing Insulation, as required on the drawings. Provide manufacturer's recommended fasteners as required for the specific installation requirements.
    a. Flame Spread and Smoke Developed Index maximum as follows in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
        1) Unfaced Safing Insulation: Flame Spread Index 15, Smoke Developed Index 0.
        2) Foil Faced Safing Insulation: Flame Spread Index 25, Smoke Developed Index 5.
11. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
12. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
    a. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
    b. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.3 MIXES

A. For those products requiring mixing before application, comply with firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
    1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
    2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
    3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
    1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (laitance, form-release agents from concrete, oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
   3. Primers: Prime substrates where recommended in writing by firestopping system manufacturer using that manufacturer's written recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
   4. Masking Tape: Use masking tape to prevent firestopping systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 INSTALLATION

A. General:
   1. All firestop system installers shall be certified in writing for each firesafing and firestopping assembly by the product manufacturer.
   2. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   3. In accordance with approved submittals.
   4. In accordance with Regulatory Requirements.
   5. Set plumb, level, and square.
   6. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
   7. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
      a. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
   8. Install fill materials for firestop systems by proven techniques to produce the following results:
      a. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
      b. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
      c. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
   9. Identification Labels:
      a. Attach labels (see Part 2) permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.

B. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.
4. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements at no cost to the Owner.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.
3. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by firestopping system manufacturers and that do not damage materials in which openings occur.

3.6 PROTECTION

A. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

- REST OF PAGE LEFT INTENTIONALLY BLANK -

3.7 SCHEDULES

FIRESTOPPING SYSTEM SCHEDULE Firestop Systems Are Listed Using the Alpha-Alpha-Numeric Identification System Published in UL's Fire Resistance Directory, Vol. 2						
TYPE OF PENETRANT	CONSTRUCTION					
	FLOOR PENETRATION SYSTEMS (First Alpha Component = C or F)			WALL PENETRATION SYSTEMS (First Alpha Component = C or F)		
	Concrete Floors with a minimum Thickness Less Than or Equal to 5 inches	Concrete Floors with a minimum Thickness Greater Than 5 inches	Framed Floors	Concrete or Masonry Walls with a minimum Thickness Less Than or Qual to 8 inches	Concrete or Masonry Walls with a minimum Thickness Greater Than 8 inches	Framed Walls

FIRESTOPPING SYSTEM SCHEDULE Firestop Systems Are Listed Using the Alpha-Alpha-Numeric Identification System Published in UL's Fire Resistance Directory, Vol. 2						
TYPE OF PENETRANT	CONSTRUCTION					
	FLOOR PENETRATION SYSTEMS (First Alpha Component = C or F)			WALL PENETRATION SYSTEMS (First Alpha Component = C or F)		
	Concrete Floors with a minimum Thickness Less Than or Equal to 5 inches	Concrete Floors with a minimum Thickness Greater Than 5 inches	Framed Floors	Concrete or Masonry Walls with a minimum Thickness Less Than or Qual to 8 inches	Concrete or Masonry Walls with a minimum Thickness Greater Than 8 inches	Framed Walls
NO PENETRATING ITEMS	C-AJ-0001-0999 OR F-A-0001-0999	C-BJ-0001-0999		C-AJ-0001-0999 C-BJ-0001-0999 OR W-J-0001-0999		W-L-0001-0999
METALLIC PIPE, CONDUIT, OR TUBING	C-AJ-1001-1999 OR F-A-1001-1999	C-BJ-1001-1999 C-BK-1001-1999 OR F-B-1001-1999	F-C-1001-1999	C-AJ-1001-1999 C-BJ-1001-1999 OR W-J-1001-1999	C-BK-1001-1999 OR W-K-1001-1999	W-L-1001-1999
NON-METALLIC PIPE, CONDUIT, OR TUBING	C-AJ-2001-2999 OR F-A-2001-2999	C-BJ-2001-2999 OR F-B-2001-2999	F-C-2001-2999	C-AJ-2001-2999 C-BJ-2001-2999 OR W-J-2001-2999		W-L-2001-2999
ELECTRICAL CABLES	C-AJ-3001-3999 OR F-A-3001-3999	C-BJ-3001-3999 OR F-B-3001-3999	F-C-3001-3999	C-AJ-3001-3999 C-BJ-3001-3999 OR W-J-3001-3999		W-L-3001-3999
CABLE TRAYS WITH ELECTRICAL CABLES	C-AJ-4001-4999 OR F-A-4001-4999	C-BJ-4001-4999		C-AJ-4001-4999 C-BJ-4001-4999 OR W-J-4001-4999	W-K-4001-4999	W-L-4001-4999
INSULATED PIPES	C-AJ-5001-5999 OR F-A-5001-5999	C-BJ-5001-5999	F-C-5001-5999	C-AJ-5001-5999 OR W-J-5001-5999		W-L-5001-5999

FIRESTOPPING SYSTEM SCHEDULE Firestop Systems Are Listed Using the Alpha-Alpha-Numeric Identification System Published in UL's Fire Resistance Directory, Vol. 2						
TYPE OF PENETRANT	CONSTRUCTION					
	FLOOR PENETRATION SYSTEMS (First Alpha Component = C or F)			WALL PENETRATION SYSTEMS (First Alpha Component = C or F)		
	Concrete Floors with a minimum Thickness Less Than or Equal to 5 inches	Concrete Floors with a minimum Thickness Greater Than 5 inches	Framed Floors	Concrete or Masonry Walls with a minimum Thickness Less Than or Qual to 8 inches	Concrete or Masonry Walls with a minimum Thickness Greater Than 8 inches	Framed Walls
MISC. ELECTRICAL PENETRANTS	C-AJ-6001-6999 OR F-A-6001-6999			C-AJ-6001-6999		W-L-6001-6999
MISC. MECHANICAL PENETRANTS	C-AJ-7001-7999 OR F-A-7001-7999		F-C-7001-7999	C-AJ-7001-7999 OR W-J-7001-7999		W-L-7001-7999
GROUPINGS OF PENETRATIONS	C-AJ-8001-8999 OR F-A-8001-8999	C-BJ-8001-8999	F-C-8001-8999	C-AJ-8001-8999 C-BJ-8001-8999 OR W-J-8001-8999		W-L-8001-8999
For each location where a fire-resistance-rated floor or wall assembly is penetrated, provide a UL-listed throughpenetration firestop system selected from the applicable UL number range listed above that complies with this Specification Section - FIRESTOPPING, and is suitable for the penetration conditions indicated for the Project.						

END OF SECTION

SECTION 079200 – SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all joint sealant materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements: It is the intention of this specification section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.
   1. Provide elastomeric sealants for exterior applications that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.
   2. Provide sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water-resistant and cause no staining or deterioration of joint substrates.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product data from manufacturers for each joint sealant product required.
   2. Shop drawings:
      a. Provide full details of all sealants and accessories proposed for use for approval by the Architect. All materials and products proposed shall be compatible with each other and with the substrates and adjacent wall colors, and shall be non-staining and non-bleeding. Submit an affidavit from the manufacturer confirming the acceptance of the use of the selected products in the manner and on the substrates proposed.
   3. Samples.
      a. Samples for initial selection purposes in form of manufacturer's bead samples, consisting of strips of actual products showing full range of colors (standard, premium and custom) available, for each product exposed to view.
         1) Provide color chips of adjacent wall surface colors; to be used in evaluating the sealant color samples.

4. Quality Assurance/Control Submittals:
   a. Provide UL Assembly Classification appropriate for each fire rated penetration.
   b. Certificates:
      1) Submit three (3) copies of certificates.
         a) Certification by each joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.
         b) Certified test reports for elastomeric sealants on aged performance as specified, including hardness stain resistance, adhesion, cohesion or tensile strength, elongation, low temperature flexibility, compression set, modulus of elasticity, water absorption, and resistance (aging, weight loss, deterioration) and heat and exposure to ozone and ultra violet light. Adhesion data shall include long-term adhesion characteristics of all adhesion surfaces including silicone, aluminum and glass coatings and long term weathering test on the silicone on contact with similar materials.
         c) Certificate of Installation: Signed by the installer and sealant manufacturer stating that sealant installed complies with specifications, and that installation methods comply with manufacturer's printed instructions for each condition of installation and use on the project. The sealant installer shall have no less that five years of continuous experience in installing the specified products. Their experience shall include similar work to this subject project. In addition, the manufacturers will provide written approval of the material installers.
   c. Manufacturer's Written Instructions:
      1) Submit three (3) copies of manufacturer's written instruction
   d. Closeout Submittals in accordance with Specification Sections in Division One:
   e. Warranty in accordance with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.
   2. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   3. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units and colors without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. AAMA American Architectural Manufacturer's Association
         1) AAMA 800-92 - "VOLUNTARY SPECIFICATIONS AND TEST METHODS FOR SEALANTS.
      b. ASTM American Society for Testing and Materials.
         1) ASTM C 1193 - "STANDARD GUIDE FOR USE OF JOINT SEALANTS".

c. CA-CHPS California High Performance Schools

d. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

e. GANA Glass Association of North America, 1997 Edition of the Glazing Manual, and the most recent Edition of the Sealant Manual.

f. SWRI Sealant Waterproofing Restoration Institute - Types of standards as found in Chapter III "Sealants: The Professionals' Guide".

C. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with all other related work.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

1. Comply with the Sealant Requirements of the GANA Glazing Manual and GANA Sealant Manual.

B. Store and handle materials in compliance with manufacturer's written recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1. Store sealant containers in a protected location in accordance with their manufacturer's printed instructions until their use.

1.6 PROJECT CONDITIONS

A. Environmental requirements:

1. Apply materials within manufacturer's written recommended surface and ambient temperature ranges.
2. Apply materials when working joints are most likely to be normal size.
3. Do not install sealants under adverse weather conditions, or when temperatures are beyond manufacturer's written recommended limits.
   a. Proceed with the installation only when forecasted weather conditions are favorable for proper sealant cure, and development of early bond strength. Allow a minimum of three days after rain.

b. Where joint width is affected by ambient temperature variations, install sealants only when temperatures are in the lower third of manufacturer's written recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at low temperatures.

1.7 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with Specification Section - WARRANTIES.
2. Manufacturer shall warrant exterior joint sealant after substantial completion of work.
a. Warranty Period Ten (10) Years.

C. Installer's Warranty:
1. Sealant Contractor shall warrant sealants against defective materials and workmanship after substantial completion of work.
a. Warranty Period Five (5) Years.
b. Warranty shall further state that installed sealants are warranted against the following:
1) Water leakage through sealed joints.
2) Adhesive or cohesive failure of sealant.
3) Staining of adjacent surfaces caused by migration of primer or sealant.
4) Chalking or visible color change of the cured materials.
c. The installer shall make repairs during the warranty period at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified product manufacturer, or approved equivalent:
a. One-Part Neutral Cure Silicone Sealant:
1) PECORA "#890".
a) NOTE: For continual immersion in water conditions, provide PECORA "Dynatred".
b) If the water contains a chlorine content of 5ppm, then PECORA "Synthacalk GC2+" shall be used.
2) Acceptable alternative manufacturers for 1) only above:
a) BONDAFLEX "Sil 290".
b) DOW PERFORMANCE SILICONES "#790".
c) SONNEBORN "Sonolastic 150" or "Sonolastic 150 VLM".
b. One-Part Acid-Curing Silicone Sealant:
1) PECORA "#860".

2) Acceptable alternative manufacturers:
   a) BONDAFLEX "Sil 100 GP".
   b) DOW PERFORMANCE SILICONES "#999-A".
   c) SONNEBORN "Omniplus".

c. One-Part Mildew-Resistant Silicone Sealant:
   1) PECORA:
      a) White Color Only "#345".
      b) Available in multiple colors for selection "#898".
   2) Acceptable alternative manufacturers to 1), a), above:
      a) BONDAFLEX "Sil 100 WF".
      b) DOW PERFORMANCE SILICONES "#786".
      c) SONNEBORN "Omniplus".

d. One-Part Gun Grade Urethane Sealant:
   1) PECORA "Dynatrol I-XL".
   2) Acceptable alternative manufacturers:
      a) BONDAFLEX "Pur 25" or "Pur 25 Tex".
      b) SIKA "Sikaflex 1a" or "Sika Textured".
      c) SONNEBORN "NP1 Smooth" or "X1 Textured".
      d) VULKEM "#116".

e. Multi-Component Gun Grade Urethane Sealant:
   1) PECORA "Dynatred".
   2) Acceptable alternative manufacturers:
      a) BONDAFLEX "Pur 2 NS".
      b) SIKA "Sikaflex 2c NS".
      c) SONNEBORN "NP2".

f. Multi-Component Gun Grade Urethane Sealant (Fast Curing):
   1) PECORA "Dynatred".
   2) Acceptable alternative manufacturers:
      a) BONDAFLEX "Pur 2 NS".
      b) SIKA "Sikaflex 2c NS".
      c) SONNEBORN "NP2" with manufacturer's accelerator.
      d) VULKEM "#227".

g. One-Part or Multi-Component Gun Grade Urethane Sealant (Security Sealant) :
   1) PECORA "Dynaflex".
   2) Acceptable alternative manufacturers:
      a) BONDAFLEX "Pur 2 NS".
      b) SIKA "Sikaflex 2c NS TG".
      c) SONNEBORN "Ultra".

h. One-Part Pourable Self-Leveling Urethane Sealant:
   1) PECORA "Urexpan NR-201" or "Dynatred".
   2) Acceptable alternative manufacturers:
      a) BONDAFLEX "Pur 35 SL".
      b) SIKA "Sikaflex 1c SL".
      c) SONNEBORN "Sonolastic SL 1".
      d) VULKEM "#45".

i. Multi-Component Pourable Self-Leveling Urethane Sealant (Fast Curing):
   1) PECORA "Urexpan NR-200".
   2) Acceptable alternative manufacturers:
      a) BONDAFLEX "Pur 2 SL".
      b) SIKA "Sikaflex 2c SL".
      c) SONNEBORN "Sonolastic SL 2".
      d) VULKEM "#245/255".

j. Acrylic-Emulsion Sealant:

1) PECORA "AC-20".
2) Acceptable alternative manufacturers:
   a) BONDAFLEX "Sil-A 700".
   b) SONNEBORN "Sonolac".

k. One-Part Butyl Sealant:
1) PECORA "BC-158".
2) Acceptable alternative manufacturers:
   a) PTI (by H.B. FULLER) "#707".

l. Acoustical Sealant:
1) PECORA:
   a) Exposed and Fire Rated areas; Pecora "AC-20 FTR".
   b) Concealed areas: Pecora "AIS-919".
2) Acceptable alternative manufacturers:
   a) BONDAFLEX "Sil-A 700".
   b) OSI "GRABBER" #GSCS.
   c) TREMCO INC. 834.
   d) W.W. HENRY "#413".

m. Firestop Sealants: Use in designated Fire-Rated Assemblies in accordance with approved UL Classified Assemblies.
1) HILTI
2) Acceptable alternative manufacturers:
   a) 3M
   b) PECORA

n. Firestop Putty Pads: Use in Fire-Rated Assemblies where penetration holes are too large for caulk, in accordance with approved UL Classified assemblies:
1) HEVI-DUTY / NELSON "Putty Pads".

o. Glazing Tape Sealants:
1) Butyl Glazing Tape:
   a) PECORA "Extru-Seal".
   b) Acceptable alternative manufacturers:
   c) TREMCO, INC. "440 Tape".
2) Butyl Pressure Glazing Tape:
   a) PECORA "Dyna-Seal".

p. Pre-Compressed Foam Sealants:
1) EMSEAL CORP. "Emseal".

q. Sheet Caulking (Electrical Junction Box Sealers):
1) LOWRY "Electrical Box Sealer".
2) Acceptable alternative manufacturer:
   a) TREMCO INC. "Sheet Caulking".

r. EIFS preformed paintable Urethane Tape:
1) SIKA "Sikaflex PUR" Tape System.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:
1. Compatibility: Provide sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

a. Colors: Provide color of exposed sealants to comply with the following:
   1) Sealant colors shall match adjacent wall color.
   2) Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

B. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants (Silicones, Urethanes, and Acrylics) that comply with ASTM C 920 "Specification for Elastomeric Joint Sealants", and other requirements indicated on each Elastomeric Joint Sealant listed, including those requirements referencing ASTM C 920 "Specification for Elastomeric Joint Sealants", classifications for Type, Grade, Class, and Uses.
   1. Additional Movement Capability: Where additional movement capability is specified in Elastomeric Joint Sealant listed, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719 "Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)", to withstand the specified percentage change in the joint width existing at time of installation.

C. Acrylic-Emulsion Sealant: Provide product complying with ASTM C 834 "Specification for Latex Sealants", that accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.

D. Butyl Sealant: Manufacturer's standard one-part, non-sag, solvent-release-curing, polymerized butyl sealant complying with ASTM C 1311 "Standard Specification for Solvent Release Sealants", and formulated with minimum of 75 percent solids to be nonstaining, paintable, and have a tack-free time of 24 hours or less.

E. Acoustical Sealant: Manufacturer's non-drying, non-bleeding and non-hardening butyl sealant complying with ASTM C 834 "Specification for Latex Sealants", and the following requirements:
   1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90 "Test method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements".
   2. For fire rated conditions, use an acoustical sealant that has at least Class II Flame Spread and Smoke Developed ratings in accordance with ASTM E-84 "Test method for Surface Burning Characteristics of Building Materials", as follows:
      a. Flame Spread Rating 53.
      b. Smoke Developed Rating 117.

F. Firestop Pillows / Bags: In accordance with UL Classified systems. Reusable, heat-expanding pillows / bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.

G. Firestop Sealants: In accordance with ASTM E 814 "Specification for Latex Sealants", and ANSI/UL 1479 Classified systems.
   1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
   2. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.3 ACCESSORIES

A. Tape: Manufacturer's standard, solvent-free, butyl-based tape sealant with a solids content of 100 percent formulated to be nonstaining, paintable, and nonmigrating in contact with nonporous surfaces with or without reinforcement thread to prevent stretch and packaged on rolls with a release paper on one side.

B. Pre-compressed Foam: Manufacturer's standard preformed, pre-compressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellent agent; factory-produced in pre-compressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:
1. Properties: Permanently elastic, mildew-resistant, nonmigratory, nonstaining, and compatible with joint substrates and other sealants.
2. Impregnating Agent: Manufacturer's standard.
3. Density: Manufacturer's standard.
4. Backing: Pressure-sensitive adhesive factory applied to one side with protective wrapping.

C. Backing Rods (Joint Sealant Backing):
1. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
2. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
   a. Open-cell polyurethane foam.
   b. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
   c. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
   d. Any material indicated above.
3. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
4. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.
5. Acoustical Sheet Caulking for junction boxes: LOWRY'S Electrical Box Sealer, or TREMCO INC. sheet caulking

D. Miscellaneous Materials:
1. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.

2. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
3. Masking Tape: Non-staining, nonabsorbent material compatible with sealants and surfaces adjacent to joints. Use the type of masking tapes available that is compatible to the substrate being masked without damaging the surface material of finish when removed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which, affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form release agents from concrete.
4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of sealants.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
1. Masking Tape: Use the appropriate masking tape (type selected to the substrate so as not to mar the surface it is protecting) where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION

A. General:

1. Comply with joint sealant manufacturer's written installation instructions applicable to products and applications indicated, except where more stringent requirements apply. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 "Standard Guide for Use of Joint Sealants", for use of sealants as applicable to materials, applications, and conditions indicated.
   a. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 "Practice for Use of Sealants in Acoustical Applications", as applicable to materials, applications, and conditions indicated.
   b. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
      1) Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability
         a) Do not leave gaps between ends of joint fillers.
         b) Do not stretch, twist, puncture, or tear joint fillers.
         c) Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
      2) Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.
   c. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
      1) For normal moving joints not subject to traffic: Fill joints to a depth equal to 50% of joint width, but not less than 1/4" deep or more than 1/2" deep. In no case shall the applied sealant width exceed the sealant depth.
      2) Assure that the *bond line* surface is a minimum of 1/4" wide. Install approved backer material at a proper depth to provide sealant bead profiles as detailed on approved shop drawings. Backer material shall be of appropriate size and shape and shall be compressed between 25% and 50% when installed.
      3) Backer material may not be modified in-lieu of using the properly dimensioned material. Install, when required a polyethylene, or other approved, bond backer tape to provide sealant bead profiles as detailed on approved shop drawings.
   d. Do not allow sealants, primers, or other compounds to overflow, spill or migrate into voids of adjacent construction.
   e. Remove excess sealant spillage promptly as this work progresses. Clean adjacent surfaces by recommended means to remove sealant, but not damage the surfaces. Remove all cartons and debris from the site as the work progresses and at the end of each work day. Joints shall be prepared and sealed on the same working day.
   f. Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1) Provide concave joint configuration per Figure 5A in ASTM C 1193 "Standard Guide for Use of Joint Sealants", unless otherwise indicated.
2) Provide flush joint configuration, per Figure 5B in ASTM C 1193 "Standard Guide for Use of Joint Sealants", where indicated.
   a) Use masking tape to protect adjacent surfaces of recessed and tooled joints.
3) Provide recessed joint configuration, per Figure 5C in ASTM C 1193 "Standard Guide for Use of Joint Sealants", of recess depth and at locations indicated.

g. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's written directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's written recommendations.

h. Acoustical Sealant Applications:
   1) Provide acoustical sealant to form an airtight seal at all penetrations and perimeter of sound-rated partitions, floors and ceilings. Comply with requirements of specification section titled Gypsum Board. Use backer-rod where gaps to be sealed exceed 3/8 inches.
   2) Provide sheet caulking to seal the back and sides of all junction boxes (4 gang and smaller) recessed in acoustically-rated partitions.
   3) Provide acoustical sealant as a continuous bead along gypsum board face layer at all head and sill conditions of sound-rated partitions and around the perimeter of resilient ceilings.

i. Firestop Sealants: In accordance with applicable UL Classified numbers compatible with products provided.

3.4 CLEANING

A. Clean in accordance with Specification - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated sealants immediately so that and installations with repaired areas are indistinguishable from original work.

3.6 SCHEDULES

A. Sealant Schedule:

B. Sealants: Description of joint construction and location where sealant is typically applied
   1. One-Part Neutral Cure Silicone Sealant:
      a. Exterior and interior joints in vertical surfaces of concrete and masonry.

b. Between concrete masonry and stone.
c. Between metal and concrete, mortar, and stone.
d. Interior and exterior perimeter joints of metal frames in exterior walls.
e. Exterior overhead joints.
f. Use the applicable sealant for continual immersion in water applications, such as swimming pools, fountains and cooling towers – USDA Approved.

2. One-Part Acid-Curing Silicone Sealant:
   a. Exposed joints within glazed curtain wall framing systems, skylight framing systems, and aluminum entrance framing systems, if applicable.
3. One-Part Mildew-Resistant Silicone Sealant:
   a. White Grout Joints: Provide white silicone sealant material to match adjacent white grout joints in interior joints in vertical surfaces of ceramic tile in toilet rooms, showers, and kitchens.
   b. Colored Grout Joints: Provide colored silicone sealant material to match adjacent colored grout joints in interior joints in vertical surfaces of ceramic tile in toilet rooms, showers, and kitchens.
4. One-Part Gun Grade Urethane Sealant:
   a. Exposed joints in pre-cast, masonry, window frame perimeters and similar types of construction joints.
5. Multi-Component Gun Grade Urethane Sealant:
   a. Control joints and window and door perimeters.
6. Multi-Component Gun Grade Urethane Sealant (Fast Curing):
   a. Plaza Decks.
7. One-Part or Multi-Component Gun Grade Urethane Sealant (Security Sealant):
   a. Control joints and window and door perimeters where sealant is exposed to physical abuse.
8. One-Part Pourable Self-Leveling Urethane Sealant:
   a. Exterior and interior joints in horizontal surfaces of concrete.
   b. Exterior and interior joints in horizontal surfaces between metal and concrete, mortar, stone, and masonry surfaces.
9. Multi-Component Pourable Self-Leveling Urethane Sealant (Fast Curing):
   a. For use when walking surfaces require use within 24 hours of application without damage to joint surfaces.
   b. Exterior and interior joints in horizontal surfaces of concrete.
10. Acrylic-Emulsion Sealant:
    a. Paintable joints for the following surfaces expected to receive field painting:
       1) Interior joints in vertical and overhead surfaces at perimeter of elevator door frames and door frames (not requiring security grade sealant).
       2) Interior joints in gypsum board, plaster, concrete, and concrete masonry.
       3) All other interior field paintable joints not indicated otherwise.
11. One-Part Butyl Sealant:
    a. Primarily used for glazing seals where little or no movement is expected.
12. Acoustical Sealant:
    a. Joints to control dust, air, smoke and sound transmission, including under all exterior wall sill plates placed on top of Cast-In-Place Concrete slabs.
13. Firestop Sealants:
    a. In fire-rated walls, compatible with wall ratings and in accordance with applicable penetration types in walls and floors, and in accordance with UL Classified numbers.

END OF SECTION

SECTION 081100 – METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to fabricate and install all Custom Metal Doors and Custom Metal Frames materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Fire-Rated and Smoke-Rated Assemblies.
   2. Coordinate with the Contractor and the hardware supplier under Specification Section - HARDWARE.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 15 14 DRILLED ANCHORS
   4. 03 30 00 CAST-IN-PLACE CONCRETE
   5. 04 22 00 CONCRETE MASONRY UNITS
   6. 05 12 00 STEEL AND FABRICATIONS
   7. 06 10 00 ROUGH CARPENTRY
   8. 07 40 00 METAL PANELS
   9. 07 60 00 SHEET METAL
   10. 07 92 00 SEALANTS
   11. 08 14 16 WOOD DOORS
   12. 08 33 00 COILING DOORS
   13. 08 56 59 SERVICE WINDOWS
   14. 08 70 00 HARDWARE
   15. 08 80 00 GLASS
   16. 08 91 00 LOUVERS
   17. 09 22 16 METAL FRAMING
   18. 09 24 00 CEMENT PLASTER
   19. 09 29 00 GYPSUM BOARD
   20. 09 30 00 TILE
   21. 09 64 66 RESILIENT WOOD FLOOR
   22. 09 65 16 RESILIENT SHEET
   23. 09 65 19 RESILIENT TILE
   24. 09 67 23 RESINOUS FLOORING
   25. 09 68 40 CARPET
   26. 09 72 00 WALL COVERINGS
   27. 09 91 00 PAINTING
   28. 10 05 00 MISCELLANEOUS SPECIALTIES
   29. 10 14 00 IDENTIFYING DEVICES
   30. 10 26 00 WALL AND CORNER GUARDS
   31. DIVISION 13 SPECIAL CONSTRUCTION
   32. DIVISION 14 CONVEYING EQUIPMENT
   33. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICE SUBGROUP.

1.2 REFERENCES

A. Standards:
1. In accordance with the following standards:
a. ANSI American National Standards Institute
b. ASTM American Society of Testing and Materials
c. AWS American Welding Society
d. HMMA Hollow Metal Manufacturers Association (Division of NAAMM)
e. NAAMM National Association of Architectural Metal Manufacturers
f. NFPA National Fire Protection Association
g. NILECJ National Institute of Law Enforcement and Criminal Justice
h. UL Underwriter's Laboratory, Inc.
i. USSG U.S. Standard Gages
j. WH Warnock Hersey International

1.3 DEFINITIONS

A. Minimum Thickness: Base metal thickness without coatings.

B. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI / NAAMM-HMMA.

C. Glazing Molding: Portion of the assembly retaining glazing materials or in-fill panels in a hollow metal door which contain the integral glazing stop, or to which a glazing stop is attached.

D. Glazing Stop: A formed metal section used to secure glazing in a door or frame.

E. Prepared Opening: Existing opening or wall constructed prior to installation of frames.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:
1. Metal Doors, Metal Panels and Metal Frames Assemblies.
a. All Doors and Panels shall be custom in accordance to NAAMM-HMMA Standards for Hollow Metal Doors.
b. All Frames shall be custom in accordance to NAAMM-HMMA Standards for Hollow Metal Frames.
2. Fire Rated Assemblies:
a. Doors, Panels and Frames Assemblies shall be custom in accordance to NAAMM-HMMA Standards for Fire-Rated Hollow Metal Doors and Frames and shall comply with all of the requirements for Doors[, Panels] and Frames.
b. Conform to the requirements of CBC, Chapter 7 "Fire and Smoke Protection Features".
1) Fire-Rated Door Assemblies shall comply with NFPA 252 "Standard Methods of Fire Tests of Door Assemblies" and UL 10C "Positive Pressure Fire Tests for Door Assemblies".
2) Fire-Rated Window Assemblies shall comply with NFPA 257 "Fire Testes for Fire Window Assemblies and Glass Block Assemblies", NFPA 80 "Standard for Fire Doors and Other Opening Protectives", and UL 9 "Fire Tests of Window Assemblies".

3) Fire-Rated Door Assemblies shall also meet the requirements for a Smoke and Draft Control Door Assembly, complying with UL 1784 "Air Leakage Tests for Door Assemblies".
4) Fire-Rated Doors, Panels, and Frames shall be labeled by an DSA/FLSapproved agency and shall comply with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and UL 1784 "Air Leakage Test for Door Assemblies".

c. All Fire-Rated Doors are to be positive latching and self or automatic closing in accordance with NFPA 80 "Standard for Fire Doors and Other Opening Protectives".

d. All Fire-Rated Assemblies shall be provided with approved gasketing material, so installed as to provide a seal where the door meets the stop on both sides and across the top.
1) Continuous Hinges, Seals, etc. shall not obscure ratings of doors or door frames.

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.
1. Contractor shall check all drawings and verify all dimensions (including wall thickness) in the field prior to fabrication.
2. Contractor shall verify that shop drawings include all required materials and material clearances.

B. Product Data:
1. Include construction details, material descriptions, core descriptions, label compliance, fire-resistance ratings, temperature-rise ratings, and finishes for each type of product indicated.
a. Provide information indicating all the Structural Properties of the steel materials.

C. Shop Drawings:
1. Include, but not limited to, the following information:
a. Elevations of each door design and frame configuration.
b. Details of doors, including vertical and horizontal edge details.
c. Frame details for each frame type, including dimensioned profiles.
d. Details and location of reinforcement and preparations for hardware.
e. Details of each different wall opening condition.
f. Details of anchorages, joints, field splices, and connection.
g. Details of accessories.
h. Details of moldings, removable stops, and glazing.
i. Details of louvers, including sizes and location in doors, where required.
j. Details of conduit and preparations for power, signal, and control systems.
2. Provide a Schedule, prepared by or under the supervision of supplier for doors, panels, and frames using same reference numbers for details and openings as those on the Drawings.
a. Coordinate with door hardware schedule.
3. Provide setting drawings, templates, and directions for installing anchorage, including sleeves, concrete inserts, anchors, bolts, and items with integral anchors for installation coordination.
4. Manufacturer's printed instructions for preparation, installation and care requirements for installers and inspecting authorities.

D. Samples:

1. When factory applied color is indicated, provide manufacturer's full range of factory applied color finishes for selection.
2. Provide typical frame joint section and sample showing typical edge condition specified.
3. When Stainless Steel is indicated, provide samples of 3 inches by 5 inches for each type of exposed finish required.
   a. Frames: Provide fabrication samples of profile and corner joints.
   b. Doors: Provide fabrication sample of corner showing vertical edges and top.

E. Quality Assurance/Control Submittals:
1. Design Data.
2. Test Reports:
   a. Product Test Reports based on evaluation of comprehensive test performed by a qualified testing agency, for each type of fire-rated metal door, panel, and frame assembly.
   b. Water Tightness Test Reports.
3. Certificates:
   a. Oversized Construction Certification.
   b. Installer Certification for Temperature Rise Fire Rated Framing System.

F. Closeout Submittals in accordance with the following:
1. General Construction Warranty.
2. Workmanship and Materials Warranty.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
   a. Fire-Rated Doors, Panels, and Frames Assemblies shall be labeled by an DSA/FLS approved agency and shall comply with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and UL 1784 "Air Leakage Test for Door Assemblies".
   b. Oversized Door Assemblies required to be fire rated and exceeds the limitations of labeled assemblies, a certificate of inspection shall be furnished by an approved testing agency in lieu of an Oversized Fire Door Label.
2. Installer Qualifications:
   a. Installer shall be experienced and shall have successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   b. Installer(s) shall have participated in mock-up installation that was successfully tested for water tightness.
3. Manufacturer/Supplier Qualifications:
   a. Manufacturer/Supplier shall have successfully produced/supplied products similar to that required for this Project, and shall have sufficient production/supply capacity to produce/supply required units without causing delay in the work.
   b. Manufacturers must be members of the HMMA, who have been engaged for at least two years in the production for sale of swing steel doors and frames on a national basis.
      1) All doors, panels and frames shall be manufactured and supplied by the same manufacturer.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Certifications:
1. Oversized Construction Certification for Fire-Rated Door Assemblies shall state that the door conforms to the requirements of the design, materials and construction, but has not been subjected to the fire test.

D. Mock Ups:
1. Provide Mock-Ups prior to application of the final layer of the finished exterior wall material and prior to installation of any exterior wall cavity and interior materials.
2. Metal Frame Assembly:
   a. Mock-Ups shall be of each type of opening assembly in every type of exterior wall assembly in which an opening occurs, shall integrate all other related work assemblies and shall be representative of the intended end use configuration.
      1) Provide a Mock-Up with a minimum opening size of *24 inches square* for window opening.
   b. Mock Ups will be used for establishing construction sequence, and installation requirements of materials, and creating water tight assemblies.
   c. Mock-Ups may become part of the completed Work upon successful testing for water tightness.
3. Installation:
   a. The Project Inspector, the Architect, Contractor's Superintendent and Sub-contactor's Superintendent shall observe the installation of materials.
   b. Installation crew for the Mock-Ups shall be the installers of the metal frame systems for this project and installers, as necessary, of other related work assemblies.
   c. Mock Ups shall include the installation of integral flashing, glazing, louvers, sheet metal flashing, sealants, water barriers and penetration flashing of exterior material systems and other materials of related work that makes the openings watertight.
   d. Failed Mock Ups shall be removed and the assembly reinstalled until the water tightness test is successful.

E. Meetings:
1. Pre-Installation: Scheduled by Contractor prior to the start of work.
   a. Coordinate the work with all other related work.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Establish protection procedures to maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Doors, Panels, and Frames shall be palletized, wrapped, or crated to provide protection during transit and Project-Site storage. Do not use non-vented plastic.
      a. Provide additional protection to prevent dents, scratches and other damage.

B. Acceptance at Site:
   1. Do not deliver doors, panels, and frames to project site until Installer is ready and the site conditions will accommodate the installation of frames.
   2. Damaged products will not be accepted.

C. Storage and Protection:
   1. Storage and protection shall be in accordance with NAAMM-HMMA 840 Standard, "Installation and Storage of Hollow Metal Doors and Frames".
   2. Store Doors, Panels, and Frames under cover at Project Site. Stored on level platforms, minimum six (6) inches above ground, allowing air circulation under stacked units.
      a. Doors, Panels, and Frames shall be placed in the up-right position, spaced by blocking to allow ventilation between units.
      b. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
      a. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions for the fabrication of custom frames. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.9 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. Doors and Frames in accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.
   2. Provide the Temperature Rise Rated Framing system warranty against defective workmanship and materials.

C. Installer's Warranty:
   1. Issue to the Owner a warranty against defective workmanship and materials.
      a. Warranty period Four (4) Years.

b. In accordance with the terms of the Specification Section - WARRANTIES.
c. Warranty shall include the responsibility for the repairs of any failure that is the result of defects in materials and workmanship.
d. Warranty shall certify that the installation of all exterior Metal Doors and Frames were done in accordance with the method and procedures established with the successful Mock-Up for water tightness.
e. The Warranty shall be co-endorsed by the General Contractor, the Metal Door and Frame Material Manufacturer, the Metal Door and Frame Installer and Glazing Installer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Custom Metal Doors, Panels and Frames:
      a. SECURITY METAL PRODUCTS CORPORATION.
      b. Acceptable alternative manufacturers:
         1) CURRIES COMPANY.
         2) METAL MANUFACTURING CO., INC.
         3) STILES CUSTOM METAL, INC.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: Commercial Steel (CS), Type B, conforming with ASTM A 1008/A 1008M "Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable". Steel shall be suitable for exposed to view applications.

B. Hot-Rolled Steel Sheet: Commercial Steel (CS), Type B, conforming with ASTM A 1011/A 1011M "Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength". The steel shall be pickled and oiled, free of scale, pitting, coil-breaks or other surface defects.

C. Metallic-Coated Steel Sheet: Commercial Steel (CS), Type B, complying with ASTM A 653/A 653M "Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process". The steel shall have a minimum G60 (Z180) zinc (galvanized) or A60 (ZF 180) zinc-iron-alloy (galvannealed) coating designation.

D. Stainless Steel Sheet: Complying with ASTM A 666 "Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar."

E. Inserts, Bolts and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M "Standard Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware".

F. Grout:
1. Concrete Walls: Comply with ASTM C476 "Standard Specification for Grout for Masonry", with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M "Standard Test Method for Slump of Hydraulic-Cement Concrete".
2. Masonry Walls: Mortar comply with Specification Section - CONCRETE MASONRY UNITS.

G. Insulation:
1. Mineral-Fiber Insulation: ASTM C 665 "Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing", Type I (blankets without membrane facing): consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density: with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 "Test method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C", for combustion characteristics.
   a. Fire Rated Doors and Frames: Provide insulation that provides fire protection as indicated.
2. Expanded Foam Insulation suitable for injection into frame cavity.
   a. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
3. Exterior Doors: Provide core with thermal polyisocyanurate insulation cores.
4. Exterior Door Frames: Solidly packed mineral insulation.
5. Insulation for Miscellaneous work:
   a. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

I. Sealants: Comply with Specification Section – SEALANTS.
1. Sealants shall be compatible with glazing and frames.

2.3 MANUFACTURED UNITS

A. General:
1. Exterior Doors, and Frames: In accordance with NAAMM-HMMA Standard 862, "Guide Specifications for Commercial Security Hollow Metal Doors and Frames", Class IV Door in accordance with NILECJ-STD-0306.00.
2. Interior Doors, and Frames: In accordance with NAAMM-HMMA 861 Standard, "Guide Specifications for Commercial Hollow Metal Doors and Frames", unless otherwise indicated in the Contract Documents.
3. Stainless Steel Doors, [Panels,]and Frames: Shall comply with all requirements of Exterior and Interior Doors, Panels, and Frames, except as follows:
   a. Highly Corrosive: Shall be constructed using Type 316 Stainless Steel sheets for all internal and external components and parts.
   b. Moderately Corrosive: Doors, panels, and frames shall be constructed using Type 304 Stainless Steel sheet for all internal and external components and parts.

c. Aesthetic: doors, panels, and frame's external components and parts shall be constructed using Type 304 Stainless Steel sheets. Internal components and parts shall comply with all requirements of Exterior and Interior Doors, Panels, and Frames.

B. Doors:

1. Design shall be custom seamless hollow construction in the flush type variations as indicated.
   a. Thickness1-3/4 inch,
2. Face Sheets:
   a. Exterior Doors shall be fabricated from Metallic-Coated Steel Sheets with zinc-iron-alloy (galvannealed) coating designation.
      1) Exterior Doors 14 gage minimum.
   b. Interior Doors shall be fabricated from Cold-Rolled Steel Sheets.
      1) Interior Doors 18 gage minimum.
3. Core:
   a. Steel Stiffened with continuous vertical formed steel sections fabricated from same materials as face sheets.
      1) Exterior Door 18 gage minimum.
      2) Interior Door 22 gage minimum.
   b. Spaces between stiffeners shall be insulated the full height of the door.
4. Top and Bottom Edges:
   a. Close with continuous recessed and flush filler channels fabricated from same material as face sheets.
      1) Exterior Door 12 gage minimum.
      2) Interior Door 16 gage minimum.
   b. All doors shall have an additional flush filler channel at top and flush filler channel at bottom edges, unless recess channel at bottom is required for hardware.
   c. All channels shall be fabricated from same material as face sheets.
5. Jamb Edges:
   a. Reinforce with continuous "U" channels fabricated from same material as face sheets.
      1) Exterior Door 12 gage minimum.
      2) Interior Door 16 gage minimum.
   b. All channels shall be galvanized at exterior doors.
   c. Astragals shall be fabricated from same material as face sheets. 14-gage minimum.
6. Hardware Reinforcements:
   a. Exterior Doors: Reinforcing Plates shall be fabricated from the same material as the face sheets in the minimum thickness as follows:
      1) Hinges and Pivots 1/4" plate.
      2) Continuous hinges 14-gage.
      3) Mortise Hardware 7-gage.
      4) Locks, Exit Devices, Flush Bolts, Concealed Holders, Concealed Hardware or Surface-Mounted Closures 12-gage.
      5) Pull Plates, Bars and all other Surface-Mounted Hardware 12-gage.
   b. Interior Doors: Reinforcing Plates shall be fabricated from the same material as the face sheets in the minimum thickness as follows:
      1) Hinges and Pivots 7-gage.
      2) Continuous Hinges14-gage.
      3) Mortise Hardware 10-gage.
      4) Locks, Exit Devices, Flush Bolts, Concealed Holders, Concealed Hardware or Surface-Mounted Closures 12-gage.

5) Pull Plates, Bars and all other Surface-Mounted Hardware 16-gage.

7. Glazing Moldings and Stops:
   a. Fabricate from the same material as the door face sheets.
      1) Exterior Doors 16-gage minimum.
      2) Interior Doors 20-gage minimum.
8. Door Louvers: In accordance with NAAMM-HMMA Standard 810 "Hollow Metal Doors" and fabricate from the same material as the door face sheets.
   a. Exterior Doors:
      1) Internal Channels 12-gage minimum.
      2) Vanes 12-gage minimum.
         a) Reinforcement 0.25inch x 1.5 inch minimum.
      3) Insect Screens 12-gage minimum.
   b. Interior Doors:
      1) Internal Channels 16-gage minimum.
      2) Vanes 18-gage minimum.
         a) Reinforcement 0.25inch x 1.5 inch minimum.
   c. Fire-Rated Doors:
      1) Movable vanes closed by actuation fusible link and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated.
   d. Non-Rated Doors: Provide sightproof louver of stationary vanes of inverted "Y" Type blade construction with a 30 percent free area, unless noted otherwise.

C. Panels:
1. Metal Panels shall be made of the same materials, construction and finishes complying with all requirements for Metal Doors.
2. Attachment:
   a. Attach securely to frame with concealed anchorage and machine screws.
   b. Attachment including screws shall be fully concealed when door is closed.

D. Frames:
1. Design shall be custom seamless hollow construction in the variety of configurations as indicated.
2. Exterior Frames shall be fabricated from Metallic-Coated Steel Sheets with zinc-iron-alloy (galvannealed) coating designation.
   a. All Opening sizes 12-gage minimum.
3. Interior Frames shall be fabricated from Cold-Rolled Steel Sheets.
   a. Openings 4'-0" or less 16-gage minimum.
   b. Openings greater than 4'-0" 14-gage minimum.
4. Glazing Stops shall be fabricate from the same material as Frames.
   a. Exterior Frames 16-gage minimum.
   b. Interior Frames 20-gage minimum.
5. Internal Frame Stiffeners shall be fabricated from the same material as Frames.
   a. Head of Frames 12-gage.
6. Internal Reinforcing Tabs shall be fabricate from the same material and gage thickness as Frame.
7. Hardware Reinforcements:
   a. Exterior Frames: Reinforcing Plates shall be fabricated from the same material as the Frame in the minimum thickness as follows:
      1) Hinges and Pivots 1/4" plate full width of frame x 10".
      2) Continuous Hinges 14-gage full width of frame x entire frame length.
      3) Strike Hardware 7-gage.
      4) Flush Bolts 7-gage.
      5) Closers 7-gage.

6) Surface-Mounted Hardware 7-gage.
7) Hold-Open Arms 7-gage.
8) Surface Panic Devices 7-gage.

b. Interior Frames: Reinforcing Plates shall be fabricated from the same material as the Frame in the minimum thickness as follows:
1) Hinges and Pivots 7-gage full width of frame x 10".
2) Continuous Hinges 14-gage full width of frame x entire frame length.
3) Strike Hardware 12-gage.
4) Flush Bolts 12-gage.
5) Closers 12-gage.
6) Surface-Mounted Hardware 12-gage.
7) Hold-Open Arms 12-gage.
8) Surface Panic Devices 12-gage.

8. Grout Guards: Grout Guards shall be fabricated from the same material as the Frame in minimum 22-gage thickness.

E. Frame Anchors:
1. Exterior Frames: Frame Anchors shall be fabricated from Metallic-Coated Steel Sheets, unless indicated otherwise.
a. Masonry Wall not less that 2" wide x 10" long Anchors.
1) Non Grouted Frames 14 gage T-Strap Anchors.
2) Grouted Frames 14-gage perforated Adjustable Strap & Stirrup Anchors.
a) Wire Loop Anchors of 0.156" diameter steel wire may be used at non-fire-rated frames that are fully grouted.
b. Concrete Walls 14-gage Pour In Place Anchors.
c. Stud Frame Walls 16-gage Combination Wood/Steel Stud Anchors.
1) Anchor shall be not less than 2" wide x 10" long.
d. Jamb Base 14-gage Fixed Floor Anchors.
e. Floor Base 14-gage Existing Wall Anchors.
1) Where indicated 14 gage continuous Rough Buck Anchors.
f. Prepared Openings 14-gage Existing Wall Anchors.
1) Where indicated 14 gage continuous Rough Buck Anchors.
2. Interior Frames: Frame Anchors shall be fabricated from Cold-Rolled Steel Sheets or Hot-Rolled Steel Sheets, unless indicated otherwise.
a. Masonry Wall not less that 2" wide x 10" long Anchors.
1) Non Grouted Frames 16 gage T-Strap Anchors.
2) Grouted Frames 16 gage perforated Adjustable Strap & Stirrup Anchors.
a) Wire Loop Anchors of 0.156" diameter steel wire may be used at non-fire-rated frames that are fully grouted.
b. Concrete Walls 16 gage Pour In Place Anchors.
c. Wood Stud Frame Walls 18 gage Wood Stud Anchors.
1) Anchor shall be not less than 2" wide x 10" long.
d. Metal Stud Frame Walls 18-gage Metal Channel Stud Anchors.
e. Jamb Base 14-gage Fixed or Adjustable Floor Anchors.
f. Floor Base 16 gage Existing Wall Anchors.
1) Where indicated 16 gage Fixed Mullion Anchors.
g. Prepared Openings 16-gage Existing Wall Anchors.
1) Where indicated 16 gage continuous Rough Buck Anchors.

F. Fasteners:
1. Screws, bolts, washers, shields, spacers and other similar fastening devices:
a. Provide stainless steel vandal resistant screws when outside exterior face glass stops are indicated.

b. Furnish and install as required by frame installer.
c. Provide Stainless Steel fasteners at Stainless Steel Frames.

2.4 FABRICATION

A. Shop Assembly:
1. General:
a. Fabricate in accordance NAAMM-HMMA Standard 810 "Hollow Metal Doors" and NAAMM-HMMA Standard 820 "Hollow Metal Frames", and NAAM-HMMA Standard 850 "Fire-Rated Hollow Metal Doors and Frames".
b. Fabricate to the required size and profiles by accurately forming, welding edges straight, sharp and true. Corner bends shall be true and straight and of minimum radius for the gage of metal used.
c. All finish work shall be strong, rigid and neat in appearance with corners, hairline joints and surfaces free from warp, wave, buckle, tool marks, surface imperfections or other defects.
d. Welding to conform to applicable standards of AWS for high grade finished metal fabrication. All exposed welds shall be ground, filled and dressed smooth with no voids, tool marks, surface imperfections or ridges showing to make them invisible and provide a smooth flush surface.
e. Assemblies shall be shop fabricated and permanently assembled before shipment.
1) Where shipping limitations so dictate, frames for large openings shall be fabricated and prepared in section designated for assembly in the field and clearly identified.
2. Metal Door Fabrication:
a. General: All doors shall be of the types and sizes required and shall be fully welded seamless construction with smooth surfaces without visible joints of seams on exposed faces or edges.
1) Glazed Lites shall be factory cut openings in doors.
2) Provide weep-hole openings in the bottom of exterior doors to permit the escape of entrapped moisture.
b. Face Sheets: Door faces shall be joined at their vertical edges by a continuous weld extending the full height of the door.
c. Core: Stiffeners shall extending full-door height and spanning the full thickness of the interior space between door faces.
1) Space Stiffeners no more than 6" apart and securely attached to both face sheets by spot welds spaced a maximum of 5" o.c..
2) Solidly pack cavities the entire height of door with mineral-fiber insulation.
d. Top and Bottom Edges: Closing Channels shall extend the full width of the door at top and bottom edges.
1) All doors shall have recessed Closing Channels, spot welded to both faces. When left exposed, fill all gaps with epoxy sealer and filler, sand smooth with no tool marks or surface imperfections.
2) All doors shall have flush-filler Closing Channels in addition to recessed Closing Channels. Channels shall be continuously welded and ground smooth with no marks at all doors.
a) Flush-filler Closing Channel shall be omitted at bottom edge when recess channel is required for hardware.
e. Jamb Edges: Reinforcing Channels shall extend the full height of the door.
1) Edge profiles shall be provided on both vertical edges of doors as follows:
a) Single-Acting Swing Doors beveled 1/8" in 2".
b) Double-Acting Swing Doors rounded on 2-1/8" radius.

2) Astragal: Flat x 1-1/2 inch, continuous welded to panel, ground smooth with no tool marks or surface imperfections. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
   a) Provide overlapping astragal on one leaf of pairs of doors where required for fire-performance rating or where indicated.
   b) At exterior doors, provide overlapping astragal at strike. Cope astragal around strike plate.

f. Hardware Reinforcements: Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware contractor.
   1) Where surface-mounted hardware is to be applied, doors shall have reinforcing plates only under the face of door.

g. Glazing Moldings and Stops: Provide glazing moldings and stops to secure glazing material and louvers. Moldings and stops shall be flush with face sheets of door. Use the same trim profile on all Fire-Rated and Non Fire-Rated Openings.
   1) Fixed Glazing Moldings shall be securely welded to both face sheets of door.
   2) Removable Glazing Stops shall be channel shaped and have mitered hairline corner joints. Drill and dimple stop for countersinking and concealment of fasteners spaces equally at 9" o.c. maximum and a maximum of 2" from ends. Snap-on attachments will not be permitted.
   3) Metal surfaces underneath the glazing stops and the inside of the glazing stops shall be treated for maximum paint adhesion and painted with a with a rust inhibitive primer prior to installation in the door.
   4) Coordinate depth and rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

h. Louvers: Flush opening with all welded construction.
   1) Internal channels securely welded to the inside of both face sheets of door.
   2) Provide vertical reinforcement at midpoint when louver width exceeds 18" inches.

3. Metal Panel Fabrication: Comply with all requirements for Metal Doors.
   a. Attach securely to frame with concealed anchorage and machine screws.
      1) Attachment, including screws, shall be fully concealed when door is closed.

4. Metal Frame Fabrication:
   a. General: All frames shall be welded units of the sizes and profiles indicated and shall be of seamless hollow construction with smooth surfaces without visible joints of seams on exposed faces or edges.
      1) Metal Frame Spreaders shall be temporarily attached at bottom of all open frames for shipping and storage.
   b. Frame Sections: All frames are to be rolled and brake formed with integral nailing flanges, back bends, faces, rabbits, stops, and soffits, unless indicated otherwise.
      1) Provide 3 ½ inch wide integral Nailing Flanges at exterior frames. The flange shall be continuous all around the frame at head, jambs and wall sills without gaps at the corner joints. Coordinate flange length with height of concrete curb.
      2) Punch and Dimple frames at attachment points for countersinking and concealment of all through the frame anchorage fasteners.
   c. Frame Joints:
      1) Perimeter Corners: Head, Jamb and Wall Sills Members shall be saw-mitered and fully (continuously) welded along entire joint from the throat or the unexposed side at Flanges, Returns, Faces, Rabbet, Stops, and Soffits.

2) Perimeter Butts: Entire joint shall be fully (continuously) welded along entire joint at Flanges, Returns, Faces, Rabbet, Stops, and Soffits from the throat or the unexposed side of the frame.
   a) Interior Frames: Continuously weld only the Faces. Rabbits, Stops and Soffits shall to be tightly fitted and appear as a hairline seams.
   b) Vertical Mullions members shall extend through Floor Sill Members to floor. Floor Sill Members Stops are to be notched.
3) Internal Flush and Indented Butts: Vertical Mullions Members shall be continuous, butt to Head and Sill Members and extend through Horizontal Rail Members. Vertical Mullion Stops are to be notched at Head and Sill Members and the Horizontal Rail Stops are to be notched to Vertical Member. Continuously weld only the Faces.
   a) Exterior Frames: Body Putty continuously along entire joint at returns, rabbets, stops, and soffits creating a water tight joint. Sand flush and smooth with no voids or ridges.
   b) Interior Frames: Rabbits, Stops and Soffits shall to be tightly fitted and appear as a hairline seams.

d. Alignment and Reinforcing Tabs: Provide internal alignment and reinforcing tabs at each joint of field splices with a minimum overlap of 2".

e. Internal Frame Stiffeners: Provide additional continuous steel "U" Channel extending the full width of frame and shall be factory welded into head of frame.
   1) Grouted Frames with openings greater than 4'-0" width.
   2) Frames with openings greater than 12'-0" in width.

f. Hardware Reinforcements: Frame shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware contractor.
   1) Where surface-mounted hardware is to be applied, frames shall have reinforcing plates only under face of frame.

g. Grout Guards: Provide at all hardware preparations, tapped mounting holes, glazing stop screws, silencers, and electrical box preparations on frames that are to be grouted.
   1) Weld guards to inside of frame at throat.

h. Glazing Stops: Provide channel shaped removable Glazing Stops to secure glazing material or panels. Glazing Stops shall be continuous and have butted hairline corner joints.
   1) Coordinate stop depth and rabbit width between fixed and removable stops with type of glazing and type of installation indicated.
      a) Stop Depth 5/8" depth minimum.
   2) Drill and Dimple stops for countersinking and concealment of fasteners uniformly spaced at 9 inches o.c. maximum and not more that 2 inches maximum from each corner.
   3) Metal surfaces underneath the glazing stops and the inside of the glazing stops shall be treated for maximum paint adhesion and painted with a with a rust inhibitive primer prior to installation in the door.

5. Frame Anchors:
   a. Coordinate the type of frame anchors with the type of frame insulation or grout being used so that the frame is fully packed with no voids.
   b. All Frame Anchors shall be securely welded to the throat at inside of frames.
   c. Frame Anchor Spacing: All Frame Anchors at head, jamb and sill shall be placed a maximum of 8" from frame corners, and ends, with the remainder of the anchors to be equally spaced, not to exceed a maximum of 24" o.c. for all walls types unless indicated otherwise.

1) Masonry Walls: The spacing of anchors shall be equally spaced, not to exceed a maximum of 24" o.c.. Total number of anchors provided on each jamb shall be not less than the following:
   a) Frames up to 7'-6" height 4 anchors.
   b) Frames 7'-6" to 8'-0" height 5 anchors.
   c) Frames over 8'-0" height provide five (5) anchors plus one (1) additional anchor for each 2' -0" or fraction thereof in height over 8'-0".
2) Stud Framed Walls: The spacing of anchors shall be equal spaced, not to exceed a maximum of 18" o.c.. Total number of anchors provided on each jamb shall be not less than the following:
   a) Frames up to 4'-0" height 4 anchors.
   b) Frames 4'-0" to 7'-6" high 5 anchors.
   c) Frames 7'-6" to 8'-0" height 6 anchors.
   d) Frames over 8'-0" height provide six (6) anchors plus one (1) additional anchor for each 2'-0" or fraction thereof in height over 8'-0".
3) Jamb Base: Provide floor anchors for each jamb and mullion that extends to floor.
   a) When conditions do not permit the use of a floor anchor, an additional jamb anchor shall be substituted at a location not to exceed 8" from the base of the jamb.
4) Floor Base: When conditions do not permit the use of Existing Wall Anchors at floor sill members, provide continuous rough buck for frame anchorage.

6. Rubber Door Silencers: Except on weather/sound strip or fire gasket doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single Swing Door Frames Provide and install three (3) at strike jamb.
   b. Double Swing Door Frames Provide and install four (4) at head.

B. Fabrication Tolerances:
   1. General: Clearances and Tolerances shall be in accordance with NAAMM-HMMA Standard 862 for Exterior Assemblies and NAAMM-HMMA Standard 861 for Interior Assemblies.

2.5 FINISHES

A. Shop Priming:
   1. After fabrication, all tool marks and surface imperfections shall be dressed, filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities.
   2. Clean and chemically treat (phosphatize) the metal to insure maximum paint adhesion in preparation for primer paint.
   3. Apply rust-inhibitive primer paint to all surfaces, minimum dry thickness of 0.7 mils. Manufacturer to provide primer for prolonged exposure that are compatible with substrate and field-applied coatings.
      a. Coordinate primer used with field-applied paint finishes that are indicated and specified.
      b. Shop Primer shall not be considered as a substitution for any primer required as part of the field-applied paint finishes.
      c. Rust-inhibitive primer shall be fully cured before packaging and shipment.

B. Shop Finishes:

1. Exposed Metal Finishes:
   a. Stainless Steel Finish: Comply with NAAMM HMMA 802 Manufacturing of Hollow Metal Doors and Frames "Finishes for Stainless Steel." Refer to NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating stainless steel finishes.
      1) Unpolished Finish: No. 2B, bright cold rolled finish.
      2) Polished Finishes:
         a) No. 6 Soft Satin Finish, low reflectivity and produced by Tampico brushing the No. 4 finish using a medium abrasive.
         b) No. 8 Most Reflective Finish, produced by polishing with successively finer abrasive, then budding with a very fine buffing compound until free of grit lines caused by preliminary grinding.
      3) All grained finishes applied to frames and jambs shall be vertical. Finishes applied to the frame header and sills shall be horizontal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:
   1. Prior to the installation of the work under this specification section, examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work under this specification section.
   2. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
   3. Report conditions detrimental to performance of the work under this specification section. Proceed with installation only after unsatisfactory conditions have been corrected.
   4. Installation of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Protection:
   1. Protect all adjacent surfaces from damage from work under this specification section.

B. Surface preparation:
   1. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling and dressing, as required to repair area smooth, flush and invisible on exposed faces.
   2. Prior to installation, All frames with temporary spreaders removed, shall be checked for size, and swing, and corrected to installation tolerance for squareness, alignment, twist and plumbness. Securely brace frames and maintain installation tolerances within the following limits.
      a. Opening Width: Plus 1/16 inch, minus 1/32 inch, measured from rabbet to rabbet at top, middle and bottom of frame.
      b. Opening Height: Plus 1/16 inch, minus 1/32 inch, measured measured vertically between the frame head rabbet and top of floor or bottom of frame minus jamb extension at each jamb and cross the head.
      c. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

d. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
e. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines and perpendicular to plane of wall.
f. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

3. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General:
1. Install metal doors, panels and frames plumb, rigid, properly aligned and securely fastened in place; comply with NAAMM-HMMA Standard 840, "Installation and Storage of Hollow Metal Doors and Frames".
2. Install in accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
3. Install Fire-Rated and Smoke-Control Assemblies in accordance with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and NFPA 105 "Standard for the Installation of Smoke Door Assemblies and Other Openings".

B. Frames:
1. Set frames accurately in position, plumbed, aligned, and temporarily braced secure, until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
   a. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
      1) At exterior frames, Body Putty smooth entire joint continuously along returns, rabbets, stops, and soffits creating a watertight joint. Sand flush with no voids or ridges.
2. Solidly insulate within the throat of all non-grouted exterior and interior frames for the full depth, width and length of frame.
   a. Provide fire-rated mineral fiber insulation as required to provide fire-protection and temperature-rise ratings as indicated at Fire Rated Assemblies.
   b. Inject expanding foam insulation as required.
3. Jamb Base: Secure in place frame anchors to floor with post-installed expansion anchors.
4. Floor Base: Secure frames in place with post-installed expansion anchors to floor. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
5. Masonry and Concrete Walls: Coordinate installation of frames to allow the solidly fill the space between frames and masonry or concrete with grout. Take precautions, grout in lifts and brace frames, to ensure that frames are not deformed or damaged by grout forces.
   a. Field apply bituminous coating to backs of all frames that are filled with grout.
   b. Install door silencers in frames before grouting.
6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.

7. Stud Frame Walls: Secure frames in place with screw fasteners at frame anchors to wall framing.
8. In-Place Stud Frame Walls: Secure frames in place with screw fasteners at frame anchors to wall framing. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
9. Frame and Wall Joints: Provide joint sealants to maintain watertight and airtight continuous seals that aesthetically join dissimilar materials without causing staining or deterioration of joint substrates. Application of sealants shall be in strict compliance with manufacturer's instructions.
   a. Provide integral color sealants at exterior joints and paintable sealants at interior joints.
   b. Clean out joint between frames and masonry or concrete to a depth of 3/4 inch. Fill with rod and sealants.
10. Field-apply compatible and paintable sealant at all frame joints that are exposed to the exterior for the full depth of the frame at returns, rabbits, stops and soffits.

C. Doors: Fit doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Doors:
   a. Between door and frame at jambs and head 3/16 inch maximum.
   b. Between edges of pairs of doors 3/16 inch maximum.
   c. Door Sill Clearances: Coordinate with threshold conditions and floor materials.
      1) Between bottom of door and top of threshold 3/8 inch maximum.
      2) Between bottom of door and floor with no threshold 3/4 inch maximum.
2. Fire-Rated and Smoke-Control Doors: Install doors with clearances according to NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and NFPA 105 "Standard for the Installation of Smoke Door Assemblies and Other Openings".
   a. Between bottom of door and floor covering surface 1/2 inch maximum.

D. Glazing Stops:
1. Coordinate and comply with installation requirements for all glazing indicated and specified.
2. Secure Glazing Stops to frames and doors with corrosion resistant countersunk flat or oval-head machine screws.
   a. All exterior screws (head, jamb and sills) shall be attached with a bed of sealant at the penetration point into the frame for a positive seal against water intrusion.
   b. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
3. All exterior stops shall receive a full bed of sealant at back channel leg for the full length of opening, during final glazing installation for positive seal against water intrusion.
   a. Coordinate sealants with the requirements of the glazing specified.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.
2. Mock-Up Assemblies:
   a. Water Spray Test: Upon completion of the installation of the Mock-Up Assembly, conduct test for water penetration in according to AAMA 501.2 requirements.
      1) The Project Inspector, the Architect, Contractor's Superintendent and Sub-contractor's Superintendent shall visually inspect for water penetration.

2) A Thermal Imagining process conducted by a Owner's Testing Laboratory Service, shall be used for additional inspection for water penetration.
3) Cost of additional testing and inspection required due to failure for water tightness shall be borne by the Contractor.

b. Reports:
1) Project Inspector and/or Owner's Testing Laboratory Services shall provide a written report noting the installation and water tightness of the Mock-Up Assemblies tested.

B. Inspection:
1. Notification: Schedule all inspections. Notify the Architect, Project Inspector and any regulatory agencies of the time at least 48 hours prior to the inspection.
2. Regulatory Requirements: No work shall be excepted without the required inspections being performed.

3.5 ADJUSTING

A. Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operation condition. Coordinate with hardware suppliers for function and use.

B. Remove and replace defective work, including work that is warped, bowed, or other wise unacceptable.

3.6 CLEANING

A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS.
1. Immediately clean all adjacent surfaces from all foreign materials.
2. Immediately remove grout, sealants and any foreign materials from bonding to metal doors and frames.
3. In accordance with manufacturer's instructions and recommendations.

B. Metal Doors, Panels, and Frames finishes shall be clean and ready of application of any additional finishes after installation.
1. Prime-Coat Surfaces: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
2. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer’s written instructions.
3. Stainless Steel Surfaces: Scratched and marred surfaces (including field welding) shall be cleaned and promptly be finished smooth. Refinish to match original finish.

3.7 PROTECTION

A. Protect and maintain conditions that ensures the work is without damage or deterioration until the time of Completion has been executed.
1. Maintain in a manner acceptable to manufacturer's and installer's warranty.

END OF SECTION

SECTION 081416 – WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all wood door materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 05 12 00 STEEL AND FABRICATIONS
   5. 07 60 00 SHEET METAL
   6. 07 92 00 SEALANTS
   7. 08 11 00 METAL DOORS AND FRAMES
   8. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   9. 08 70 00 HARDWARE
   10. 08 80 00 GLASS
   11. 09 22 16 METAL FRAMING
   12. 09 24 00 CEMENT PLASTER
   13. 09 29 00 GYPSUM BOARD
   14. 09 91 00 PAINTING
   15. 10 14 00 IDENTIFYING DEVICES
   16. 10 26 00 WALL AND CORNER GUARDS
   17. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. AWS "Architectural Woodwork Standards", Latest Edition, including latest amendments, by the Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada, and the Woodwork Institute.
      b. BHMA Builders Hardware Manufacturers Association, Inc.
      c. CRSC California Referenced Standards Code, CCR, Part 12, Chapter 12-7-4 "FIRE-RESISTIVE STANDARDS - Fire Door Assembly Tests".
      d. NEMA National Electrical Manufacturers Association, LD-3, Latest Edition.
      e. NFPA National Fire Protection Association "Fire Doors and Windows" NFPA No. 80.
      f. UL Underwriter's Laboratories "Fire Tests of Door Assemblies" (UL 10 (b) - 1970).
      g. WDMA Window and Door Manufacturers Association.
      h. WDMA I.S. 1A-04 "Industry Standard for Architectural Wood Flush Doors".
      i. WI Woodwork Institute.

1.3 SYSTEM DESCRIPTION

A. Performance Duty Level: Extra Heavy Duty per ANSI /WDMA I.S.1A.

B. Acoustical Performance:
   1. Typical Wood Door Assemblies: STC 36.
   2. Sound Wood Door Assemblies: STC 42.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Submit manufacturer's literature describing products.
   2. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
      b. Submit door type, details and location with reference to Architect's door mark and hardware group.
   3. Samples.
      a. Provide samples of each door finish, in the species specified for the veneer.
   4. Quality Assurance/Control Submittals:
      a. Test Reports:
         1) Submit four (4) copies of testing laboratory's report indicating any fire labels that may be required.
      b. Manufacturer's Written Instructions:
         1) Submit three (3) copies of manufacturer's written instructions.
      c. Certificates:
         1) Submit three (3) copies of certificates.
            a) Upon completion of installation, a WI CERTIFIED COMPLIANCE CERTIFICATE shall be furnished for the installation.
            b) Submit three (3) copies of a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.
   5. Closeout Submittals in accordance with the following:
      a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
      b. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
   2. Manufacturer/Supplier Qualifications:

a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

3. Testing Agency Qualifications:
   a. Testing Agency shall be approved and recognized by enforcing agency and provide inspection of materials and workmanship during fabrication and assembly.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:
1. Pre-Installation: Schedule d by the Contractor prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be individually wrapped.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels (including any fire labels) indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental requirements:

1. Temperature: Maintain ambient temperature in space to receive products between sixty (60) degrees Fahrenheit and ninety (90) degrees Fahrenheit for seven (7) days prior, during, and seven (7) days minimum following installation. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.
2. Humidity: Maintain humidity in space to receive products between 25 percent to 55 percent at 60 degrees F to 90 degrees F, and EMU (Equilibrium Moisture Content) conditions between 6 percent to 8 percent for four (4) days minimum prior, during, and following installation in accordance with manufacturer's written recommendations. Inform the Owner of humidity requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.8 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. In accordance with manufacturer's written materials standard warranty:
   a. Warranty Period Life of Installation.
      1) Doors shall be warranted for life of installation against warp or twist in excess of 1/4" in any face including full diagonal.
      2) Replacement shall include finishing of new replacement door, hardware damaged by malfunction of original door, and hanging in satisfactory operating condition.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty period Five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified Wood Doors product manufacturer:
   a. LYNDEN DOOR or approved equivalent.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. Wood Doors:
1. Performance Duty Level: Extra Heavy Duty per ANSI /WDMA I.S.1A.
2. Pre-finished Wood Veneer, 1-3/4" Solid Core, with stain grade wood veneer faced doors, WI Premium Grade.
   a. Standard: Manufactured in accordance with Commercial Standards as amended and recognized by the AWS.
   b. Core:
      1) Non-Rated Solid Core Doors:
         a) 5-ply particle board core bonded under pressure to stiles and rails.
      2) Fire-Rated Solid Core Doors:
         a) Mineral composition core meeting requirements of specified standards.
   c. Face Veneers:
      1) AWS White Maple, plain sliced, with slip-matched veneer panels faces suitable for transparent finish.
      2) Pairs of doors shall be "Pair Matched".
   d. Edges:
      1) Same species of the face, sealed and matched for color with the face veneer.
   e. Finish:
      1) Premium Grade, clear System No. 5 (Catalyzed Polyurethane).
   f. Glass and Louver Frames:
      1) Molding and trim to be integral construction and flush with face sheet of door.
      2) Glass thickness is specified in Specification Section – GLASS.
3. Pre-finished Wood Veneer, Solid Core, with opaque paint grade wood veneer faced doors, WI Premium Grade.
   a. Standard: Manufactured in accordance with Commercial Standards as amended and recognized by the AWS.
   b. Core:
      1) Non-Rated Solid Core Doors:
         a) 5-ply particle board core bonded under pressure to stiles and rails.
      2) Fire-Rated Solid Core Doors:
         a) Mineral composition core meeting requirements of specified standards.
   c. Face Veneers:
      1) AWS Birch, rotary cut, flitches suitable for opaque finish.
   d. Edges:
      1) Same species of the face, sealed and matched for color with the face veneer.
   e. Finish:
      1) Field Painted Paint Grade.
      2) Refer to Interior Finished Schedule.
   f. Color:
      1) Refer to Interior Color Schedule.
4. Laminate-Faced, 1-3/4" Solid Core, WI Premium Grade.

The following indicates "White Maple" as the finish desired. This is the typical finish DA has requested over the years, but we have also used "Oak" when we wish to match existing wood species, or we have a new design theme. Same comment for the "Cut" of the species of wood.

a. Finish:

5. Glass and Louver Frames:
   a. Metal frames: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled sheet. Finish to match door frame.
   b. All cutouts for vision panels should be a minimum of 6 inches from the edge of door and/or other cutouts for louvers, locks, closers, or other hardware.
   c. Fire Rated Doors: Provide clips, intumescent material, and accessories as required to meet required fire rating. Maintain cutout distances as required for fire label and warranty.
   d. Glass thickness is specified in Specification Section – GLASS.
   e. Stiles:
      1) 6" where occurs at vision lites in doors

B. Hardware:
   1. Finish Hardware shall be furnished under Specification Section – HARDWARE.
      a. Coordinate the hardware templates with the Contractor for field fitting and installation into the doors.
   2. Doors shall be pre-fit in field and provided with cut outs for hardware according to templates and AWS.

2.3 FABRICATION

A. Shop Assembly:
   1. All doors marked for opening numbers shown on the drawings and with protective wrapping.
      a. Doors shall be Type I adhesive doors regardless of exposure.
   2. Rated Doors:
      a. Comply with NFPA 80 requirements for fire-rated doors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

2. Examine opening and hardware schedules to verify proper coordination.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.

C. Non-Rated Doors:
1. Clearance at jambs and heads: 1/8-inch.
2. Per leaf clearance at meeting stiles for pairs of doors: 1/16-inch.
3. Clearance from bottom of door to top of decorative floor finish or covering: 1/8-inch.
4. Where threshold is shown or scheduled, provide 1/4-inch clearance from bottom of door to top of threshold.

D. Fire-Rated Doors:
1. Comply with NFPA 80 for fitting clearances for fire-rated doors.
   a. Threshold Clearances: Consistent Undercut.
      1) Door in fire-rated openings shall not be undercut more than is allowed by CRSC, CCR, Part 12, Chapter 12-7-4 "FIRE-RESISTIVE STANDARDS - "Fire Door Assembly Tests".
   b. Conform to the requirements, for assemblies and fire tested in accordance with CRSC, CCR, Part 12, Chapter 12-7-4 "FIRE-RESISTIVE STANDARDS - Fire Door Assembly Tests".
      1) All 20 minute rated assemblies shall be provided with approved gasketing material so installed as to provide a seal where the door meets the stop on both sides and across the top.
      2) All rated doors are to be positive latching and self-closing.
   c. Continuous Hinges shall not obscure rating of doors and frames.

E. Install all finish hardware in strict accordance with the manufacturers written recommendations, eliminating all hinge-bound conditions and making all items smoothly operating and firmly anchored into position.

3.4 REPAIR / RESTORATION

A. Defective Work:
   1. Replace, rework or otherwise make good as required doors, finish, frames or hardware found broken, damaged, disfigured or defaced.
   2. Incomplete, misaligned, or incorrectly located products will not be accepted.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. Finish shall be clean and ready for the application of any additional finishes.
   3. In accordance with manufacturer's written instructions and recommendations.

3.6 PROTECTION

A. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Completion.

END OF SECTION

SECTION 083113 – ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all materials, labor, equipment and services necessary to furnish and install Equipment Access Doors, accessories and other related items necessary to complete Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 06 10 00 ROUGH CARPENTRY
   4. 08 11 00 METAL DOORS AND FRAMES
   5. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   6. 09 22 16 METAL FRAMING
   7. 09 24 00 CEMENT PLASTER
   8. 09 29 00 GYPSUM BOARD
   9. 09 30 00 TILE
   10. 09 91 00 PAINTING
   11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   12. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
      b. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
   2. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Closeout Submittals in accordance with Specification Sections in Division One:
      a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
      b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
      c. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
      d. Warranty in accordance with Specification Section - WARRANTIES.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
   a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
2. Manufacturer/Supplier Qualifications:
   a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.4 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer:
      a. MILCOR INCORPORATED, INC.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Access Doors:
   1. Design: Equal to Style AP, DW, AT, K or M Access Door as manufactured by MILCOR INCORPORATED, Lima, Ohio.
      a. Design shall match material conditions present in each specific location.
      b. In Cement Plaster locations, provide not less than 16 gage frames with a minimum of 24 gage expanded or perforated metal wings designed to finish flush with plaster.
   2. Size: Refer to Architectural, Plumbing, Mechanical, and Electrical Drawings.
   3. Material: Steel Frame and Door.
   4. Operation: Manual
   5. Lock: Key operated cylinder lock
   6. Finish: Shop Primed, unless otherwise noted.
      a. In Shower, Toilet, or Locker Rooms all exposed portions shall be brushed stainless steel.
   7. Fire Rating: To match wall or ceiling assembly in which doors are located in accordance with Underwriters Laboratories ratings.
      a. Continuous Hinges shall not obscure rating of doors and frames.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
   2. Coordinate access doors with related items specified under other Sections to ensure proper and adequate interface of work. Particular attention is called to all Plumbing, Mechanical, and Electrical Specifications and drawings and the full cooperation required with that subcontractor's needs and work.

3.2 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

END OF SECTION

SECTION 083300 – COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Coiling Doors, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Types of Overhead Doors:
         1) Service Doors (Insulated and Rated and Non-Rated).
         2) Counter Shutters (Non-Insulated and Non-Rated).
         3) Grilles (Non-rated).

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 05 12 00 STEEL AND FABRICATIONS
   6. 06 10 00 ROUGH CARPENTRY
   7. 07 40 00 METAL PANELS
   8. 08 11 00 METAL DOORS AND FRAMES
   9. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   10. 08 70 00 HARDWARE
   11. 09 22 16 METAL FRAMING
   12. 09 24 00 CEMENT PLASTER
   13. 09 29 00 GYPSUM BOARD
   14. 09 91 00 PAINTING
   15. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   16. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. FMG Factory Mutual Global.
      b. ITS Intertek Testing Services.
      c. NEMA National Electrical Manufacturers Association.
      d. NFPA National Fire Protection Association.
         1) Provide assemblies, when applicable, complying with NFPA 80 that are identical to door and frame assemblies tested for fire-response characteristics per UL 10b and NFPA 252, and that are listed and labeled for fire-ratings indicated by UL, FMG, ITS, or another testing and inspection agency acceptable to DSA/FLS.

2) Provide certification by a testing agency acceptable to DSA/FLS that oversized fire-rated door assemblies, when applicable, comply with all standard construction requirements of tested and labeled fire-rated doors assemblies except for size.
3) Provide electrical components, devices and accessories, when applicable, that are listed and labeled as defined in NFPA 70, Article 100.

e. UL Underwriters Laboratories Inc.

1.3 DEFINITIONS

A. The following definitions apply to the products of this Specification Section:
1. Astragal: Weatherstripping attached to the Bottom Bar.
2. Barrel: The assembly containing the counterbalancing springs of the unit.
3. Between Jamb Mounted: Unit installed between the jambs of the opening.
4. Bottom Bar: Bottom element of a coiling door or grille that rests on the sill or floor.
5. Bracket: Plates at each end of the door that are bolted to the guides to support the barrel and curtain assembly.
6. Curtain: The main body of the door that can be made up of slats, rods or links.
7. End Locks: Metal pieces attached to the ends of the slats to prevent lateral shifting.
8. Face Of Wall Mounted: Unit installed at the face of the jamb either inside or outside the structure.
9. Guide: The side track of the door.
10. Guide Weatherstrip: Vinyl or Neoprene material secured to the inside angle of the guide to prevent air infiltration.
11. Hood: The sheet metal cover attached to the brackets to enclose the barrel assembly.
12. Hood Baffle: A piece of waterproof canvas attached to the interior of the hood to prevent air infiltration.
13. Inside Angle: Interior angle forming the channel in which the door goes up and down.
14. Insulated Door: Door constructed with a double-slated curtain filled with insulation.
15. Service Door: Large, slatted doors used to close large openings in industrial and commercial applications.
16. Slat: Interlocking metal shapes that comprise the curtain of the door.
17. Stop: Metal pieces attached to the guide to prevent the bottom bar from going up into the hood.
18. Torsion Springs: Springs wound clockwise or counter clockwise position to counterbalance weight.
19. Wall Angle: The angle of the door guide attached to the wall that supports the bracket.
20. Windlocks: Metal pieces attached to the ends of the slats that interlock with the windlock bar in the guide to prevent the curtain from blowing out of the guides.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
   a. Submit manufacturer's standard color range for selection by the Architect.
   b. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
   c. Include description of fire-release system including testing and resetting instructions.
2. Shop Drawings.

a. Submit shop drawings prepared by, or under the supervision of a registered Civil or Structural Engineer in the State of California, detailing fabrication and assembly-- as well as procedures and diagrams-- of the work under this section. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as unit of work of other related sections.

b. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.

1) Where installed products are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and stamped by a registered Civil or Structural Engineer in the State of California.

c. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.

3. Quality Assurance/Control Submittals:

a. Manufacturer's Written Instructions.

b. Manufacturer's Field Reports.

c. Engineering Calculations.

1) Submit engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.

4. Closeout Submittals in accordance with the following:

a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.

c. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:

a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.

2. Manufacturer/Supplier Qualifications:

a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.6 OWNER'S INSTRUCTIONS

A. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below:

1. Test and adjust controls and any safeties. Replace damaged or malfunctioning controls and equipment.

1.7 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period Five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified Overhead Coiling Door and Grille products manufacturer, or approved equivalent:
      a. CORNELL/COOKSON COMPANY.
      b. Acceptable alternative manufacturers:
         1) OVERHEAD DOOR CORPORATION.
         2) WAYNE DALTON.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. Overhead Coiling Service Doors :
   1. Door Curtain Materials and Construction:
      a. Verify the size of this overhead door with the operation.
      b. Door Curtains: Fabricate overhead coiling door curtain of interlocking slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
         1) Steel Curtain Slats (If applicable): Zinc-coated (galvanized), cold-rolled structural steel (SS) sheet; complying with ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron, Alloy-Coated (Galvanealed) by the Hot-Dip Process," G90 (Z275) coating designation.

a) Minimum Specified Thickness: Not less than 22 Gage (0.0299").
b) Flat profile slats.

2) Stainless-Steel Curtain Slats (If applicable): ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar," Type 304, #4 finish.
a) Minimum Specified Thickness: Not less than 20 Gage (0.0375").
b) Flat profile slats.

3) Aluminum Curtain Slats (If applicable): ASTM B 209 "Specification for Aluminum and Aluminum-Alloy Sheet and Plate" or ASTM B 221 "Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes," alloy and temper recommended by aluminum producer and finisher for type of use with a mill finish.
a) Aluminum Extrusion Thickness: Not less than 16 Gage (0.050").
b) Flat profile slats.

4) Wood Curtain Slats: Interconnected select vertical grain solid stock.

c. Curtain Insulation (If applicable): Fill slat with manufacturer's standard rigid cellular polystyrene or polyurethane-foam-type thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials." Provide an "R" Value of at least 6.29. Enclose insulation completely within metal slat faces.

1) Inside Curtain Slat Face: To match material of outside metal curtain slat.

2. Endlocks:

a. Service Door Endlocks and Windlocks: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

b. Counter Shutter Endlocks: Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

3. Bottom Bars:

a. Service Door: Consisting of 2 angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; galvanized, stainless-steel, or aluminum extrusions to suit type of curtain slats.

1) Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene; for placement between angles or fitted to shape, as a cushion bumper for interior door.

b. Counter Shutters: Manufacturer's standard continuous channel or tubular shape, either stainless-steel or aluminum extrusions to suit type of curtain slats.

1) Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene; for placement between angles or fitted to shape, as a cushion bumper for interior door.

4. Curtain Jamb Guides:

a. Service Door: Fabricate curtain jamb guides of steel angles or channels and angles, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Build up units with not less than 3/16-inch thick galvanized steel sections complying with ASTM A 36 "Specification for Carbon Structural Steel" and ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products." Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.

b. Counter Shutter: Fabricate curtain jamb guides of angles or channels and angles of material and finish to match curtain slats, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

5. Seals:
   a. Smoke Seals: Provide UL-listed and -tested smoke-seal perimeter gaskets when applicable.
   b. Weatherseals: Provide replaceable, adjustable, continuous, compressible weather-stripping gaskets fitted to bottom and top of all doors (to minimize sound of operation regardless of weatherstripping requirements). At door head, use 1/8-inch thick, replaceable, continuous sheet secured to inside of hood.
      1) Provide motor-operated doors with combination bottom weatherseal and sensor edge.
      2) In addition, provide replaceable, adjustable, continuous, flexible, 1/8-inch thick seals of flexible vinyl, rubber, or neoprene at door jambs for a weathertight installation.

B. Coiling Grilles
1. Grille Curtain Materials and Construction:
   a. General: Fabricate overhead coiling grille curtain consisting of a network of 5/16-inch minimum diameter horizontal rods, or rods covered with tube spacers, spaced as indicated. Interconnect rods by vertical links approximately 5/8 inch wide, spaced as indicated and rotating on rods.
   b. Space rods at approximately 1-1/2 inches o.c.
      1) Space links approximately 9 inches apart in a straight in-line pattern.
   c. Stainless-Steel Grille Curtain: ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar," Type 300 series.
2. Endlocks:
   a. Continuous end links, chains, or other devices at ends of rods; locking and retaining grille curtain in guides against excessive pressures, maintaining grille curtain alignment, and preventing lateral movement.
3. Bottom Bar:
   a. Manufacturer's standard continuous channel, tubular shape, or two angles, finished to match grille.
   b. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene; for placement between angles or fitted to shape, as a cushion bumper for grille.
   c. Provide motor-operated grilles with combination bottom astragal and sensor edge.
4. Grille Curtain Jamb Guides:
   a. Manufacturer's standard extruded-aluminum shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.
   b. Removable Posts and Jamb Guides: Manufacturer's standard.

C. Hoods:

1. Form round hoods to act as weatherseal and entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods, and provide fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sagging.
    a. Fabricate hoods for steel doors of minimum 0.028-inch thick, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron, Alloy-Coated (Galvanealed) by the Hot-Dip Process."
    b. Fabricate hoods for stainless-steel doors of minimum 0.025-inch thick stainless-steel sheet, Type 304, complying with ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar."
    c. For fire-rated assemblies, include automatic drop baffle to guard against passage of smoke or flame. Fabricate hoods for stainless-steel grilles of minimum 0.025-inch- (0.65-mm-) thick stainless-steel sheet, Type 300 series, complying with ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar."
2. Counter Shutter Integral Frame, Hood, and Fascia: Provide welded assemblies of the following sheet metal:
    a. Fabricate from minimum 0.0625-inch thick stainless-steel sheet, Type 304, complying with ASTM A 240 "Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications" or ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar."

D. Counterbalancing mechanism:
1. General: Counterbalance curtain by means of adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
2. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of curtain and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
3. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.
4. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
5. Brackets: Provide mounting brackets of manufacturer's standard design, either cast iron or cold-rolled steel plate, galvanized.

E. Operators:
1. Push-up: Design counterbalance mechanism so required lift or pull for door operation does not exceed 25 lbf (111 N).
2. Chain-Hoist: Provide manual chain-hoist operator consisting of endless steel hand chain, chain pocket wheel and guard, and gear-reduction unit with a maximum 35-lbf (155-N) force for door operation. Provide alloy steel hand chain with chain holder secured to operator guide.
    a. Provide through-wall shaft operator.

3. Crank-Hoist: Provide crank-hoist operator consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit. Size gears to require no more than 35-lbf (155-N) force to turn the crank. Fabricate gearbox to be oil tight and completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.
   a. Provide manufacturer's standard removable operating arm for each crank-gear unit.
   b. Provide through-wall shaft operator.
4. Electric Motor:
   a. Provide electric door operator assembly of size and capacity recommended andprovided by door manufacturer for door specified complying with NFPA 70, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
   b. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging chain and sprocket operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
   c. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
   d. Door-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft-type door operator unit consisting of electric motor drive, and chain and sprocket secondary drive.
   e. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors complying with NEMA MG 1; with overload protection; sized to start, accelerate, and operate door in either direction from any position, at not less than 2/3 fps and not more than 1 fps, without exceeding nameplate ratings or service factor.
      1) Voltage.
      2) Amps.
      3) Horse Power.
      4) Type: Polyphase, medium-induction type.
      5) Service Factor: According to NEMA MG 1, unless otherwise indicated.
      6) Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
      7) Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.
   f. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2-control circuit, maximum 24-V, ac or dc.
   g. Remote-Control Station: Provide momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
   h. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
   i. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
      1) Sensor Edge, "Phantom Featheredge," or approved equivalent: Provide each motorized door with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward door travel.
      2) Connect to control circuit using manufacturers wireless technology.
      3) Provide electrically actuated automatic bottom bar.
   j. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

k. Provide safety interlock switch to disengage power supply when curtain is locked.

F. Hardware:

1. Locking Devices: Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
   a. Locking Bars, full-disc cremone type, both sides, operable from inside only.
   b. Power-operated doors: If door unit is power-operated, provide safety interlock switch to disengage power supply when door is locked.
   c. Fire-Rated doors shall not have mechanical device to lock doors in "Open" position.
2. Push/Pull Handles: For push-up-operated or emergency-operated curtains, provide manufacturer's standard lifting handles on each side of curtains. Maximum effort shall not exceed 30 pounds to pull/push up or down.
   a. Provide pull-down straps or pole hooks for curtains more than 84 inches (2130 mm) high.
3. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from coil side.

2.3 ACCESSORIES

A. Fire Door Product Systems, complying with NFPA 80 and UL:

1. Auto-Test:
   a. "Test-A-Fire Logic" System, or approved equivalent:
      1) Allows connection of doors to building alarm system.
      2) Prevents mechanical closing during momentary power outages.
      3) Permits testing of door without resetting.
      4) Automatically reverses door if obstruction is contacted.
      5) Door closes at a constant rate of speed.
2. Simple Test:
   a. "FireFly III Plus Time Delayed Release" System, or approved equivalent:
      1) Built-in 4-amp hour battery backup.
      2) Time delayed door closing to meet code requirements.
      3) Prevents mechanical closing due to momentary power outages.
      4) Visual and audible remote warning annunciator to warn that the door will be closing.
      5) Automatic resetting of door if alarm system activation is cancelled within ten seconds.
      6) Power outages of less than ten seconds will not affect the closing of the door.

2.4 FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel and Galvanized Steel Finishes:

1. Zinc-Coated (Galvanized) Steel: ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron, Alloy-Coated (Galvanealed) by the Hot-Dip Process," G90 coating designation; structural quality.
2. Powder Coated: Manufacturer's "ColorCote" powder color coating system.
   a. Hot dipped galvanized G-90 coating consistent with ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron, Alloy-Coated (Galvanealed) by the Hot-Dip Process," G90 coating designation; structural quality.
   b. Bonderized coating for prime coat adhesion
   c. Factory applied Thermosetting Powder Coating applied with a minimum thickness of 2 mils.
   d. The color shall be selected by the architect and shall be chosen from custom color selection.

D. Stainless-Steel Finishes:
1. Remove or blend stretch lines and tool and die marks into finish.
   a. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
2. Bright, Directional Polish: No. 4 finish.
3. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

E. Aluminum Finishes:
1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
   a. Manufacturer's standard mill finish.

F. Wood Finishes:
1. Finish in accordance with Specification Section - PAINTING.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
   a. Install fire-rated doors to comply with NFPA 80.
4. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.

3.4 ADJUSTING

A. Lubricate bearings and sliding parts; adjust doors to operate easily, free of warp, twist, or distortion and with weathertight fit around entire perimeter.

B. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
1. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.
3. In accordance with manufacturer's written instructions and recommendations.

3.6 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.
1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
   a. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.
   b. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance.
   c. Review data in "Operating and Maintenance Manuals." Refer to Specification Section - PROJECT CLOSEOUT.

3.7 PROTECTION

A. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.8 SCHEDULES

A. Coiling Door Manufacturer, as described herein: CORNELL/COOKSON

BUILDING L

Model Number: ESD10
Mounting: Face of Wall, E-Guide.
Operation: Model MG motor operator with auxiliary hand chain.
Controls: Three-button push button station OPEN-CLOSE-STOP.
Electrical Loads: 120V, single phase, 60 Hz.
Slat Type: Insulated Slat #5 (Flat).
Curtain Gage: 22 ga. (0.0299”).
Curtain Finish: AtmoShield, Textured Powder Coat, custom RAL color
Bottom Bar: Aluminum, polyester powder coated.
Guides: Structural steel, polyester powder coated.
Hood: Galvanized steel, phosphatized, polyester powder coated.
Locking Device: Master keyable cylinder lock, operable from both sides of the bottom bar. Provide Schlage mortise cylinders. Keyway to match building keying. Provide Interlock switches on motor-operated units.
Remarks: Verify the size of the motor with door size requirements.
Accessories: Weather Seals

Model Number: ERD20 Insulated Fire Door
Rating: See Opening Schedule for Rating
Mounting: Face of Wall, E-Guide.
Operation: Model MG motor operator with auxiliary hand chain.
Controls: Three button push button station OPEN-CLOSE-STOP.
Electrical Loads: 120V, single phase, 60 Hz.
Slat Type: Insulated steel slat #6M face slat with steel back cover
Curtain Gage: 22 ga.(0.0299”).
Curtain Finish: AtmoShield, Textured Powder Coat, custom RAL color
Bottom Bar: Structural Steel Angles. 2 structural steel angles minimum 2”x2”x1/8”.
Guides: Structural steel, polyester powder coated.
Hood: Galvanized steel, phosphatized, polyester powder coated.
Locking Device: Master keyable cylinder lock, operable from both sides of the bottom bar. Provide Schlage mortise cylinders. Keyway to match building keying. Provide Interlock switches on motor-operated units.
Remarks: Verify size of motor with door size requirements.
Performance Requirements: Provide doors with Underwriters' Laboratories, Inc. label for the fire rating classification. Comply with NFPA 105 air leakage requirements. Pass UL test procedure 1784.
Mineral Wool Insulated Door Material: 7/8 inch (22 mm) thick fire-retardant mineral wool, ASTM C665-95 or ASTM C612-93. Flame Spread Index of 0 and a Smoke Developed Index of 0 as tested per ASTM E84.

R-value: Minimum R-Value 5.3 (U-value of 0.189) as calculated using the ASHRAE Handbook of Fundamentals.
STC-Rating: 27

Combination Weather/Smoke Seals: Two, replaceable, UL listed, nylon brush smoke seals
Motor Operated Doors: Combination smoke seal/sensing edge
Fire Specific Options: Firefly BB (Backup Battery) AR-D Release Device

BUILDING M

Model Number: ESC10 Counter Shutter
Rating: See Opening Schedule for Rating
Mounting: 3" Shaft Face geared reduction unit. Fabricate the gear box to completely enclose the operating mechanism and be oil-tight.
Slat Type: Stainless steel - 300 series in #4 finish
Curtain Gage: 22 Gauge
Curtain Finish: No. 1F, interlocked flat-faced slats, 1-1/2 " high by ½" deep. AISI Type 304 #4 finish stainless steel with stainless steel angle bottom bar with lift handles and vinyl astragal
Guides: Stainless steel 12 gauge formed shape.
Shaft Assembly: Spring Balanced, oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs. Provide adjusting wheel for applying spring torque.
Hood: Stainless steel in a #4 finish
Locking Device: Master keyable cylinder lock, operable from both sides of the bottom bar. Provide Schlage mortise cylinders. Keyway to match building keying.
Remarks: Auto reset release device integral to the operator, accepts 24vdc, 115 or 24 vac input power
Performance Requirements:
Combination Weather/Smoke Seals:
Fire Specific Options: Firefly BB (Backup Battery) AR-D Release Device
Battery Back Up: Model R-BBU.
Accessories: Fire Door Testing Station recessed and keys to match District Schlage keyway; to allow the testing of the door without the use of a ladder or tools to test and reset the door.

Model Number: ESD10
Mounting: Face of Wall, E-Guide.
Operation: Model MG motor operator with auxiliary hand chain.
Controls: Three-button push button station OPEN-CLOSE-STOP.
Electrical Loads: 120V, single phase, 60 Hz.
Slat Type: Insulated Slat #5 (Flat).
Curtain Gage: 22 ga. (0.0299").
Curtain Finish: AtmoShield, Textured Powder Coat, custom RAL color
Bottom Bar: Aluminum, polyester powder coated.
Guides: Structural steel, polyester powder coated.
Hood: Galvanized steel, phosphatized, polyester powder coated.
Locking Device: Master keyable cylinder lock, operable from both sides of the bottom bar. Provide Schlage mortise cylinders. Keyway to match building keying. Provide Interlock switches on motor-operated units.
Remarks: Verify the size of the motor with door size requirements.
Accessories: Weather Seals

Model Number: ESD20; duplicate Building Q. See Opening Schedule for size.

BUILDING Q

Model Number: ESD20
Mounting: Face of Wall, E-Guide.

Operation: Model MG motor operator with auxiliary hand chain.
Controls: Three-button push button station OPEN-CLOSE-STOP.
Electrical Loads: 120V, single phase, 60 Hz.
Slat Type: Insulated Slat #5 (Flat).
Curtain Gage: 22 ga. (0.0299”).
Curtain Finish: AtmoShield, Textured Powder Coat, custom RAL color
Bottom Bar: Aluminum, polyester powder coated.
Guides: Structural steel, polyester powder coated.
Hood: Galvanized steel, phosphatized, polyester powder coated.
Locking Device: Master keyable cylinder lock, operable from both sides of the bottom bar. Provide Schlage mortise cylinders. Keyway to match building keying. Provide Interlock switches on motor-operated units.
Remarks: Verify the size of the motor with door size requirements.
Accessories: Weather Seals
Options: Failsafe wireless sensing edge kit w/transmitter & receiver.

END OF SECTION

SECTION 083473 – ACOUSTICAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. The phrases "Acoustical Doors and Frames" and "Sound Retardant Door Assemblies" are used synonymously throughout these documents.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 05 12 00 STEEL AND FABRICATIONS
   4. 06 10 00 ROUGH CARPENTRY
   5. 07 92 00 SEALANTS
   6. 08 11 00 METAL DOORS AND FRAMES
   7. 08 14 16 WOOD DOORS
   8. 08 31 13 ACCESS DOORS AND FRAMES
   9. 08 33 00 COILING DOORS
   10. 08 41 00 STOREFRONTS
   11. 08 56 59 SERVICE WINDOWS
   12. 08 70 00 HARDWARE
   13. 08 80 00 GLASS
   14. 09 22 16 METAL FRAMING
   15. 09 24 00 CEMENT PLASTER
   16. 09 29 00 GYPSUM BOARD
   17. 09 91 00 PAINTING
   18. 10 05 00 MISCELLANEOUS SPECIALTIES
   19. 10 14 00 IDENTIFYING DEVICES
   20. 10 21 13 TOILET PARTITIONS
   21. 10 26 00 WALL AND CORNER GUARDS
   22. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   23. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
      b. Submit manufacturer's standard color range for selection by the Architect.
   2. Shop Drawings.

a. Submit shop drawings prepared by, or under the supervision of a registered Civil or Structural Engineer in the State of California, detailing fabrication and assembly of the work under this section, as well as procedures and diagrams. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as unit of work of other related sections.

b. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.

1) Where installed products are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and stamped by a registered Civil or Structural Engineer in the State of California.

c. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.

3. Quality Assurance/Control Submittals:

a. Test Reports:

1) Submit four (4) copies of reports form a certified independent acoustical laboratory indicating the Sound Transmission Classification (STC) rating of each door, tested in accordance with ASTM E 90 "Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements", and classified in accordance with ASTM E 413 "Classification for Rating Sound Insulation".

b. Certificates:

1) Submit three (3) copies of certificates that the door construction utilized has been tested in accordance with ASTM E 90 "Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements", and that the STC determined in accordance with ASTM E 413 "Classification for Rating Sound Insulation" is not less than that shown and scheduled on the Drawings.

a) Show laboratory name, test report number and date of test.

b) Substitution of tests not in accordance with ASTM E 90 "Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements", and ASTM E 413 "Classification for Rating Sound Insulation" will not be acceptable.

c. Manufacturer's Written Instructions:

1) Submit three (3) copies of manufacturer's written instructions.

4. Closeout Submittals in accordance with Specification Sections in Division One:

a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.

c. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

d. Warranty in accordance with Specification Section - WARRANTIES.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Material Qualifications:

a. Fire Rating:

1) Wherever a fire-resistance classification is indicated or required, provide fire rated doors and frames investigated and tested as a fire door assembly.

2) Identify each door and frame with UL Labels, indicating applicable fire rating of both the door and frame.
3) Fire-rated frame construction shall conform to NFPA 252 and UL 10B.
4) Fabricate and install frame and door assembly to conform to NFPA 80 for fire-rated classification indicated on the drawings.
5) Acoustical doors shall bear manufacturer's label designating sound-rated construction and indicating the acoustical rating of the door assembly.

b. STC rating:
1) Provide assemblies with a minimum STC rating as indicated in the Drawings.

2. Installer Qualifications:
a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.

3. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
b. ASTM American Society of Testing Materials tests as follows:
c. NAAMM-HMMA National Association of Architectural Metal Manufacturers-Hollow Metal Manufacturer's Association recommendations as follows:
1) NAAMM-HMMA 830: Hardware Preparation and Locations for Hollow Metal Doors and Frames.
2) NAAMM-HMMA 840: Installation and Storage of Hollow Metal Doors and Frames.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored vertically above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units, in accordance with NAAMM-HMMA 840.
a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.5 PROJECT CONDITIONS

A. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.6 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project, or approved equivalent. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified product manufacturer:
a. OVERLY DOOR COMPANY.
b. Acceptable alternative product manufacturer:
1) KRIEGER STEEL PRODUCT COMPANY.
2. Specified grout manufacturers:
a. USG.
b. GOLD BOND.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Hot Rolled Steel Sheets:
1. Commercial quality carbon steel, complying with ASTM A 1008 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, high-Strength Low-Alloy with Improved Formability, and Ultra High-Strength," and ASTM 568 "Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for."

B. Cold Rolled Steel Sheets:
1. Commercial quality carbon steel, complying with ASTM A 1008 "Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened," and ASTM A 568 "Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for."

C. Galvanized Steel Sheets:
1. Zinc coated carbon steel sheet of commercial quality, complying with ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process," with 1.25 ounce commercial zinc coating, mill phosphatized.

D. Glass:
1. Annealed Float Glass: ASTM C 1036 "Specification for Flat Glass," Type I, and and ASTM C 1048 "Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass," Type (transparent glass, flat), Quality q3 (glazing select), of Class indicated.
2. Heat-Treated Float Glass: ASTM C 1048 "Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass," Type I (transparent glass, flat), Quality q3 (glazing select), of class, kind and condition indicated.
   a. Fabrication Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option, except provide horizontal process where indicated as tongless or free of tong marks.
   b. Provide Kind HS (Heat-Strengthened) float glass in place of annealed float glass where needed to resist thermal stresses indicated by differential shading of individual glass lites and to comply with glass design requirements.
   c. Uncoated Glass: Comply with the requirements for Condition A.
   d. Coated Glass: Comply with the requirements for Condition C.
   e. Tempered: Provide Kind FT (Fully Tempered) float glass in place of annealed or Kind HS (Heat Strengthened) float glass where safety glass is indicated.
3. Laminated Glass: ASTM C 1172 "Specification for Laminated Architectural Blast Glass," laminated glass indicated and compliance with other requirements specified, and with the following:
   a. Refer to annealed and heat-treated glass requirements relating to properties of glass products comprising laminated glass products.
   b. Interlayer: Of material and thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
      1) Clear Interlayer: When no color is required, provide clear 0.015" (0.38 mm) polyvinyl butyral interlayer in autoclave with heat plus pressure for glass areas less than 9 sq.ft. For areas larger than 9 sq.ft, provide 0.030" (0.76 mm) interlayer.

c. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:
   1) Laminate lites with interlayer film in autoclave with heat plus pressure.

E. Inserts, Bolts, and Fasteners:
1. Manufacturer
2. Standard units for the required application.
3. Hot dipped galvanize items to be embedded in or in contact with concrete foundation wall or slab-on-grade.

F. Primer-coordinate with paint systems specified in Specification Section - PAINTING.
1. Manufacturer's written recommended primer for interior application, compatible with paint products utilized.

2.3 ACCESSORIES

A. Provide manufacturer's standard cam lift hinges, perimeter and bottom seals, astragals, door bottoms, and miscellaneous fasteners and accessories, as required, to achieve the STC rating as scheduled and/or shown on the drawings.
1. Cam Lift Hinges: "Overly MCL-500."
2. Perimeter Seals: "Overly Single "H" Gasket."
3. Bottom Seals: "Overly Super "H" Door Bottom."
4. Vision Lights:
   a. As recommended in writing by manufacturer for STC rating required.
   b. Provide glazing gaskets as recommended in writing by manufacturer for STC rating required.

B. Door Frame Grout:
1. "Structo-Lite" by USG.
2. "Gypsoite" by GOLD BOND.

2.4 FABRICATION

A. General:
1. Fabricate sound retardant metal doors and frames to be rigid, neat in appearance, and free form deflects, warp, buckle, or surface imperfections.
   a. Accurately form metal to required sizes and profiles.
   b. Fit and assemble units in the manufacturer's plant.
   c. Weld expose joints continuously, grind, dress, and make smooth, flush, and invisible.
2. Unless otherwise shown on the drawings, provide countersunk flat Phillips heads for exposed screws and bolts.
3. Prepare doors and frames to receive finish hardware, including cutouts, reinforcing, drilling, and tapping in accordance with the final finish hardware schedule and templates provided by the hardware supplier.
   a. Comply with applicable requirements of NAAMM-HMMA 830.
   b. Drilling and tapping for surface mounted hardware items shall be done at the job site by the installer.
   c. Door with vision lights shall be prepared for double glazing with the outer moldings fabricated or not less than 10 gage steel, the corner s mitered and attached with counter sunk screws.

1) Stops between the glass shall be 1-3/8" acoustical foam as recommended in writing by manufacturer.

4. Clean steel surfaces of mil scale, rust, oil, grease, dirt, and other foreign materials before the application of the shop coat of primer.
   a. Apply a smooth coat of primer in even consistency to provide a uniform dry-film thickness of not less than 2.0 mils.

B. Fabrication of Sound Retardant Metal Doors:
1. Provide 1-3/4" thick (or thicker where required or indicated on the drawings) flush-design doors fabricated of two outer stretcher-leveled steel sheets not less than 16 gage.
   a. Provide cold-rolled sheet for interior and galvanized sheet for exterior doors as indicated on the drawings.
2. Provide sound-insulation filler solidly packed full door height to fill the voids between inner core reinforcing members.
3. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges. Reinforce tops, rails, and bottoms of doors with 16 gage horizontal steel channels welded continuously to the outer sheets.
4. Reinforce tops, rails, and bottoms of doors with 16 gage horizontal steel channels welded continuously to the outer sheets.
   a. For exterior doors, close top and bottom edges to provide weather seal as integral part of door construction or by addition of inverted steel channels.
5. Reinforce doors as a minimum for required finish hardware as follows:
   a. Can-Lift Hinges:
      1) As required by door manufacturer.
   b. Lockset and Bolts:
      1) 14 gage steel sheet, secured with not less than two spot welds.
   c. Surface-Applied Closers:
      1) 12 gage steel sheet, secured with not less than six spot welds.
   d. Push Plates and Bars:
      1) 16 gage steel sheet (except when through bolts are shown or specified), secured with not less than two spot welds.
   e. Surface panic Devices:
      1) 14 gage sheet steel (except when through bolts are shown or specified), secured with not less than four spot welds.
   f. Automatic-Door Bottoms:
      1) Reinforce for mortised-type units with minimum 12 gage steel.
      2) Provide recess required for units.
6. Provide door manufacturer's acoustically matching astragals at pair of doors.
7. Fabricate and fit sound retardant metal doors accurately in their respective frames to accommodate the required acoustical edge seals and threshold flush with the finish floor.

C. Fabrication of Acoustical Frames: Fabricate sound control frames with corners mitered, reinforced, and continuously welded the full depth and width of frame. Fabricate according to NAAMM-HMMA 865.
1. Weld frames according to NAAMM-HMMA 820.
2. Exterior Frames: Fabricate from metallic-coated steel sheet 0.079-inch nominal thickness or thicker as required to provide STC rating indicated.
3. Interior Frames: Fabricate from cold-rolled steel sheet unless otherwise indicated, 0.075-inch nominal thickness or thicker as required to provide STC rating indicated.
4. Hardware Reinforcement: Fabricate according to NAAMM-HMMA 865 of same material as face sheets.

5. Head Reinforcement: Metallic-coated steel channel or angle stiffener, 0.108-inch nominal thickness.
6. Jamb Anchors:
   a. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.064-inch nominal-thickness metallic-coated steel with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.156 inch thick.
   b. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.048-inch nominal-thickness uncoated steel unless otherwise indicated.
   c. Post installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter, metallic-coated steel bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
7. Floor Anchors: Not less than 0.079-inch nominal-thickness metallic-coated steel, and as follows:
   a. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
   b. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.
8. Ceiling Struts: Minimum 3/8-inch-thick by 2-inch- wide uncoated steel unless otherwise indicated.
9. Plaster Guards: Metallic-coated steel sheet, not less than 0.026 inch thick.

D. Fabrication of Sound Control Window Assembly:
1. General:
   a. Frames: In accordance with "Fabrication of Acoustical Frames."
   b. Assembly Sound Rating: STC 52, minimum.
   c. Operation: Fixed.
2. Glass Type -- Clear Float + Clear Float:
   a. Thickness 4-1/2" nominal overall.
   b. Acoustical Glazing Unit System:
      1) Lite One, Laminated: Approximately 1/4".
         a) 1/8" Clear Float.
         b) Interlayer: 0.76 mm clear PVB interlayer.
         c) 1/8" Clear Float.
      2) Interspace: 4 Inches.
         a) Spacer Material: Manufacturer's standard.
         b) Content: Air.
      3) Lite Two: Approximately 1/4".
         a) 1/8" Clear Float.
         b) Interlayer: 0.76 mm clear PVB interlayer.
         c) 1/8" Clear Float.
   c. Visible Light Transmittance N/A.
   d. Solar Heat Gain Coefficient (SHGC) N/A.
   e. "U" Factor:
      1) Winter Night-time N/A.
      2) Summer Daytime N/A.

2.5 FINISHES

A. Shop Priming:

1. Manufacturer's written recommended primer for interior applications, compatible with paint products utilized for this Project.
2. Manufacturer's written recommended primer for exterior applications on galvanized surfaces, compatible with paint products utilized for this Project.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work specified under this specification section.
   a. Coordinate setting of frames with wall construction for anchor placement.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   a. Install all sound-rated doors, frames, and gasket assemblies in accordance with final approved manufacturer's written instructions and shop drawings.
   b. Where frames are anchored with bolts through the face of the frame, fill with metal putty, grind smooth, and touch-up with prime paint.
2. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set.
   a. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
3. Place fire-rated frames in accordance with CRSC 12-7-2, and in accordance with manufacturer's test report installation data.

4. Grout door frames with lightweight gypsum plaster or concrete grout, as recommended in writing by the manufacturer to achieve the required STC rating.
5. Hang doors and adjust to freely swinging operation without binding, sticking, sagging, or excessive clearances, and to achieve the STC ratings as scheduled
6. Install and/or adjust sound seals, door bottoms and accessories in accordance with the manufacturer's printed instructions.
   a. Install thresholds flush with the finish floor.
      1) Do not mount any hardware on the head or jamb seat covers.
      2) Manufacturer shall supply special accessory brackets for mounting those items which would normally be attached to the door frame stops.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's field services:
   1. Provide the services of a factory-authorized service representative to supervise the field assembly of components and installation of products or systems and related connections specified within this section, and to report the results in writing to the Architect.
   2. The Contractor shall pay such costs as are required and secure a visit to the project site by a qualified representative of the manufacturer of the sound retardant door system, and shall:
      a. Inspect the completed installation.
      b. Put all components of the work of this section through at least ten complete cycles of operations, verifying that each component is properly installed and properly operating and making required adjustments to achieve optimum operation.
      c. Using a mechanic's stethoscope and providing an appropriate cassette noise tape, or other load sound source, direct the efforts of the Contractor in adjusting sound seals for optimum efficiency and correcting improper installation of the work of this section.
      d. State in a signed letter to the Architect, prior to the Architect's final inspection, that the work of this section has been installed in complete accordance with the Contract Documents.

B. Inspection:
   1. Schedule inspections and notify the Architect, Owner's Inspector and any regulatory agencies of the time at least 48 hours prior to the inspection.
   2. Doors may be selected for on-site verification testing of the acoustical performance in accordance with ASTM E 336 "Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings."
      a. The cost of the first test (if required) will be paid for by the Owner.
         1) If the initial test proves to be deficient, then the cost shall be backcharged to the Contractor.
         2) The cost of all subsequent testing shall be paid for by the Contractor.
         3) Retesting will be required by the Owner until a rating within 3 points of the manufacturer's certified rating is achieved.
      b. If a field installation yields an Noise Isolation Classification (NIC) rating of more than 3 points lower than the manufacturer's certified STC rating, the Contractor shall make necessary adjustments to improve the rating in order to meet the field performance test.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
2. Clean any soiled surfaces immediately.
3. Clean any soiled surfaces at the end of each day, minimum.
4. Finish shall be clean and ready for the application of any additional finishes.
5. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 084100 – STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
   2. Coordinate with the Contractor and the hardware supplier under Specification Section - HARDWARE.
      a. Storefront trade contractor shall install the continuous hinge and hang the door. The contractor shall determine and coordinate the balance of the hardware installation.
   3. Coordinate with the Contractor and the hardware supplier under this specification section.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 05 12 00 STEEL AND FABRICATIONS
   6. 06 10 00 ROUGH CARPENTRY
   7. 07 60 00 SHEET METAL
   8. 07 92 00 SEALANTS
   9. 08 11 00 METAL DOORS AND FRAMES
   10. 08 14 16 WOOD DOORS
   11. 08 41 23 STOREFRONT TEMPERATURE RISE
   12. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   13. 08 70 00 HARDWARE
   14. 08 80 00 GLASS
   15. 09 22 16 METAL FRAMING
   16. 09 24 00 CEMENT PLASTER
   17. 09 29 00 GYPSUM BOARD
   18. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
      a. Coordinate Storefront System to receive internal cabling for Facility Service Systems, including but not limited to:
         1) Electrical System.
         2) Intrusion Detection System.
         3) Access Control System.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. AA Aluminum Association
      b. AAMA American Architectural Manufacturers Association
      c. ADA Americans with Disabilities Act

d. ADAAG Americans with Disabilities Act Accessibility Guidelines – "For Buildings and Facilities".
e. ANSI American National Standards Institute
f. ASCE American Society of Civil Engineers
g. AWS American Welding Society
h. BHMA Builders Hardware Manufacturers Association
i. GANA Glass Association of North America
j. NAAMM National Association of Architectural Metal Manufacturers
k. NFRC National Fenestration Rating Council
l. SSPC The Society for Protective Coatings (formerly the Steel Structures Painting Council)

1.3 DEFINITIONS

A. Exterior and Interior Storefront Systems – indicated on the drawings as SF.

B. Exterior Window Wall Systems – indicated on the drawings as CW.
1. Also known as the Curtain Wall System.

1.4 SYSTEM DESCRIPTION

A. General: Provide aluminum systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
1. Air infiltration and water penetration exceeding specified limits.
2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Design Requirements: In accordance with allowable values and properties assigned and approved by CBC.
1. Wind Loads: Provide aluminum systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineer's ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Design Procedure," whichever are more stringent.
a. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch, whichever is smaller, unless otherwise indicated.
b. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330 "Test Method for Structural performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference".
1) Wind Load: See Drawings.
a) Comply with CBC Section 1609A.
2) Test Pressure: 150 percent of inward and outward wind-load design pressures.
3) Duration: As required by design wind velocity; fastest 1 mile of wind for relevant exposure category.

2. Seismic Loads: Provide aluminum systems, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of authorities having jurisdiction or ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Chapter 13, Section 13.5.9 "Glass in Glazed Walls, Glazed Storefronts, and Glazed Partitions", whichever are more stringent.
3. Dead Loads: Provide aluminum system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.
   a. Provide a minimum 1/8-inch clearance between members and top of glazing or other fixed part immediately below.
   b. Provide a minimum 1/16-inch clearance between members and operable windows and doors.
4. Live Loads: Provide aluminum systems, including anchorage, that accommodate the supporting structure's deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
5. Air Infiltration: Provide aluminum systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 "Test method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen", at a static-air-pressure difference of 1.57 lbf/sq. ft.
6. Water Penetration: Provide aluminum systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 "Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Aire Pressure Difference", at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft.. Water leakage is defined as follows:
   a. Uncontrolled water infiltrating systems or appearing on system's normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.
7. Thermal Movements: Provide aluminum systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.
   a. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
8. Structural-Support Movement: Provide aluminum systems that accommodate structural movements including, but not limited to, sway and deflection.
9. Condensation Resistance: Provide aluminum systems with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.
10. Average Thermal Conductance: Provide aluminum systems with average U-values of not more than 0.63 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.1.
11. Dimensional Tolerances: Provide aluminum systems that accommodate dimensional tolerances of building frame and other adjacent construction.
12. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code – Aluminum".

1.5 DEFERRED APPROVAL:

A. All openings exceeding 10 feet in width or 10 feet in height will require DSA review and approval.
   1. The plans and specifications shall be prepared and stamped by a structural engineer licensed in the State of California.
   2. The drawings shall clearly establish the loading and performance criteria; Title 24, Part 1, 4-317 (g).
   3. Anticipate the DSA review and approval process to take 6 months in duration.

1.6 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
      b. Submit manufacturer's standard color range for selection by the Architect.
   2. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
         1) For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.
         2) Where storefront installed products are indicated to comply with certain design loading, include structural computations, material properties, and other information needed for structural analysis that has been signed and stamped by a registered Civil or Structural Engineer in the State of California.
   3. Samples.
      a. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
      b. Cutaway Sample: Of each vertical-to-horizontal framing intersection of systems, made from minimum 6-inch lengths of full-size components and showing details of the following:
         1) Joinery.
         2) Anchorage.
         3) Expansion provisions.
         4) Glazing.
         5) Flashing and drainage.
   4. Quality Assurance/Control Submittals:
      a. Test Reports:
         1) Submit four (4) copies of reports.
         2) Sealant Compatibility and Adhesion Test Reports:
            a) From sealant manufacturer, indicating that materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with sealants; include joint sealant manufacturers' written interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

3) Field Test Reports:
   a) Indicate and interpret test results for compliance with storefront system's performance requirements.
   b) Submit the Engineered Transition Assembly Tests from the manufacturer.
   c) Submit results of the Water Spray Test.
4) Product Test Reports:
   a) Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of entrance and storefront systems with requirements based on comprehensive testing of current systems.

b. Certificates:
   1) Submit three (3) copies of certificates.
   2) NFRC Certificates for each frame type, by each glass type.

c. Manufacturer's Written Instructions:
   1) Submit three (3) copies of manufacturer's written instructions.

d. Manufacturer's Field Reports:
   1) Submit three (3) copies of manufacturer's field reports.

5. Closeout Submittals in accordance with the following:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
   c. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
   d. Warranty in accordance with Specification Section - WARRANTIES.

1.7 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
   a. Obtain each type of aluminum system through one source from a single manufacturer.
   b. Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirement. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.
2. Installer Qualifications:
   a. Engage an experienced installer to assume engineering responsibility and perform work of this section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable of manufacturer.
      1) Engineering Responsibility: Prepare data for aluminum systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
   b. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   c. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
3. Testing Agency Qualifications:

a. Demonstrate to Architect's satisfaction, based on Architect's evaluation of criteria conforming to ASTM E 699 "Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components", that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. ADA Americans with Disabilities Act
b. ADAAG Americans with Disabilities Act Accessibility Guidelines
c. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Mockups: Before installing aluminum systems, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed Work.
1. Locate mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before proceeding with installation of systems.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
a. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.9 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. In accordance with manufacturer's written standard warranty:
2. Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period.
a. Warranty Period: 2 years from date of Substantial Completion.
b. Failures include, but are not limited to, the following:
1) Structural failures including, but not limited to, excessive deflection.
2) Adhesive sealant failures.
3) Cohesive sealant failures.
4) Failure of system to meet performance requirements.

5) Deterioration of metals, metal finishes, and other materials beyond normal weathering.
6) Failure of operating components to function normally.
7) Water leakage through fixed glazing and frame areas.

3. Manufacturer's Special Warranty on Door Components: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of door systems that fail at the Door Corners within the specified warranty period.
   a. Warranty Period: Lifetime on Door Corners.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES.
2. Workmanship Warranty:
   a. Warranty Period: Five (5) years.
   b. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.
   c. The subcontractor shall warranty to maintain the entrance and storefront system conditions for the period of years specified from the date of acceptance and shall be responsible for the repair of any failure that is the result of defects in materials and workmanship.
   d. The subcontractor shall obtain from the manufacturer and the General Contractor a co-endorsement of the Warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project, or approved equivalent. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified product manufacturer:
   a. KAWNEER COMPANY, INC., utilizing the following products:
      1) SF – Storefront System: TRI-FAB VG 451, Shear Block Construction.
         a) Front Pane, Outside Glazed.
         b) Front Pane, Inside Glazed, at exterior louver locations.
         c) Vertical Structural Silicone Glazed (SSG), where occurs.
      2) CW – Window Wall System 1600 WALL, SYSTEM 1.
         a) Dual Glazed, 7 1/2" deep sections.
         b) SW - Sliding Wall Partition 1010 Sliding Mall Front
      3) CW - Window Wall System 1600UT SYSTEM 2 CURTAIN WALL
         a) Dual Glazed, 7 1/2" deep sections.
         b) Vertical Structural Silicone Glazed (SSG)
      4) Entrance Doors 500 HEAVY WALL.
         a) Dual Glazed, 7 1/2" deep sections
         b) Refer to drawings for location.
      5) 500 Standard Entrance, 10" bottom stile (added for the double Egress Door).
2. Accessories:
   a. Engineered Transition Assembly:
      1) TREMCO "Pro Glaze ETA" series.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
   1. Sheet and Plate:
      a. Per ASTM B 209 "Specification for Aluminum and Aluminum-Alloy Sheet and Plate".
   2. Extruded Bars, Rods, Shapes, and Tubes:
      a. Per ASTM B 221 "Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes".
   3. Extruded Structural Pipe and Tubes:
      a. Per ASTM B 429 "Specification for Aluminum-Alloy Extruded Structural Pipe and Tube".
   4. Bars, Rods, and Wire:
      a. Per ASTM B 211 "Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire".
   5. Welding Rods and Bare Electrodes:
      a. Per AWS A5.10.

B. Steel Reinforcement: Complying with ASTM A 36 "Specification for Carbon Structural Steel", for structural shapes, plates, and bars; ASTM A 1008 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable", for cold-rolled sheet and strip; or ASTM A 1011 "Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength", for hot-rolled sheet and strip.

C. Glazing as specified in Specification Section - GLASS.
   1. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended in writing by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended in writing by gasket manufacturer.
   2. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended in writing by manufacturer, compatible with sealants, and suitable for system performance requirements.

D. Sealant and Joint Fillers for joints at perimeter of aluminum systems as specified in Specification Section – SEALANTS.
   1. Sealant: For use as weatherseal, compatible with other system components with which it comes in contact, and that accommodates a 50 percent increase or decrease in joint width at the time of application when measured according to ASTM C 719 "Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)".
      a. Framing system gaskets, sealants, and joint fillers as recommended in writing by manufacturer for joint type.

E. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil thickness per coat.

2.3 ACCESSORIES

A. Hardware:

1. Coordinate with the Contractor and the hardware supplier under Specification Section - HARDWARE.
2. Coordinate with the Contractor and the hardware supplier under this specification section.

B. Engineered Transition Assembly ("Proglaze ETA"):

1. Performance Requirements:

TEST	TEST METHOD	VALUE
Water Vapor Transmission	ASTM E 96	2.59 Perms
Air Infiltration 75 Pa 300 Pa	ASTM E 283	 Less than 0.05 L/s/m2 Less than 0.05 L/s/m2
Water Resistance	ASTM E 547 / ASTM E 331	No Leakage
Uniform Load Deflection	ASTM E 330	No Damage
Uniform Load Structural	ASTM E 330	No Damage

2. Pre-Engineered, finished aluminum and silicone materials used as a transition assembly. The system assembly is mechanically attached to the window assembly to assure a durable seal is achieved. The engineered transitions assembly is comprised of the following components:
   a. "Silicone Rubber Sheet": Extruded, 40 durometer, translucent silicone, with lock-
   b. in-dart, 6 inch width.
   c. "Silicone Rubber Corners": Pre-molded, 40 durometer, translucent silicone, with lock-in-dart, 6 inch width, offset 1.5" to allow lap joint to be made with the Silicone Rubber Extrusion.
   d. "Extruded Aluminum Adapter": Alodine finished, pre-engineered race for receiving silicone lock-in-dart, supplied in five (5) foot lengths with pre-drilled holes every 6" on center.
   e. Tape: "440 TAPE": Solid polyisobutylene-cross linked butyl preformed sealant.
   f. Silicone Sealant: "Spectrem 1": Single-component, neutral-curing silicone sealant, complying with ASTM C 920 "Specification for Elastomeric Joint Sealants".

2.4 COMPONENTS

A. Aluminum Framing: Provide manufacturer's framing compatible with the Manufacturer's Model Numbers specified within the MANUFACTURER's article above. All components shall comply with the Aluminum standards listed under the MATERIALS article above, and wall thicknesses and finish shall comply with Manufacturer's Model Numbers and FINISHES article within this specification section.
   1. Construction:
      a. Thermally broken at exterior locations.
      b. Non-thermally broken at interior locations.

B. Aluminum Doors:
   1. Standard Doors: Provide manufacturer's standard 1-3/4 inch thick glazed doors with minimum 0.1875 inch thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.
      a. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
      b. Stile Design: Wide Stile, 5 inch nominal width.
   2. Heavy Doors: Provide manufacturer's Heavy-Duty Entrance Doors that are 2 inch thick glazed doors with minimum 3/16 inch thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.
      a. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
      b. Stile Design: Wide Stile, 5 inch nominal width.

C. Structural Silicone Glazing (SSG) systems.
   1. Designed to meet the requirements of 2019 CBC Section 2410.1.1.
   2. Test the SSG system per the requirements of 2019 CBC Section 2410.1.2

D. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide non-staining, nonferrous shims for aligning system components.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding, flashing, compatible with adjacent materials, and of type recommended in writing by manufacturer.

F. Weatherstripping: Manufacturer's standard replaceable weatherstripping as follows:
1. Compression Weatherstripping: Molded neoprene complying with ASTM D 2000 "Classification System for Rubber Products in Automotive Applications" requirements or molded PVC complying with ASTM D 2287 "Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds" requirements.

2.5 FABRICATION

A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
1. Fabricate storefront system components for screw-spline frame construction.
2. Fabricate window wall system and entrance door components for shear-block frame construction.
3. Fabricate components for head- and sill-receptor frame construction with shear-block construction at intermediate horizontal components.

B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

C. Prepare components to receive concealed fasteners and anchor and connection devices.

D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

F. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."
1. Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."
2. Provide minimum clearances for thickness and type of plastic sheet indicated according to plastic sheet manufacturer's written instructions.
3. Provide minimum clearances for thickness and types of Translucent Panels according to Translucent Panel manufacturer's written instructions.

G. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

H. Curtain Wall and Storefront: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

I. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.
   1. Exterior Doors: Provide compression weather stripping at fixed stops.
   2. Interior Doors: Provide ANSI/BHMA A156.16 silencers at stops to prevent metal to metal contact. Provide 3 silencers on strike jamb of single-door frames and 2 silencers on head of double-door frames.

2.6 FINISHES

A. Aluminum:
   1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
   2. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
   3. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
   4. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

B. Steel Priming:
   1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.
   2. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.
   3. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

2.7 SOURCE QUALITY CONTROL

A. Tests, Inspection:
   1. Pre-Construction Sealant Testing: Perform sealant manufacturer's standard tests for compatibility and adhesion of sealants with each material that will come in contact with sealants and each condition required by system.
      a. Test a minimum of 8 samples of each metal, glazing, and other material.
      b. Prepare samples using techniques and primers required for installed systems.
      c. Perform tests under environmental conditions that duplicate those under which systems will be installed.
      d. For materials that fail tests, determine corrective measures required to prepare each material to ensure compatibility with and adhesion of sealants, including, but not limited to, specially formulated primers. After performing these corrective measures on the minimum number of samples required for each material, retest materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
   2. Metal Protection:
      a. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
      b. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
   1. All vertical storefront mullions are continuous, horizontal mullions shall frame into the vertical mullions.
   2. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
      a. Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems.
   3. In accordance with approved submittals.
   4. In accordance with Regulatory Requirements.
   5. Set plumb, level, and square.
   6. Do not install damaged components.
   7. Fit frame joints to produce hairline joints free of burrs and distortion.
   8. Rigidly secure non-movement joints.

9. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
10. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated.
11. Install Silicone Engineered Transitions in accordance with manufacturer's written instructions.
12. Seal joints weathertight.

B. Layout:
1. Lines shall be straight and true.
   a. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.
   b. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
      1) Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.
   c. Install glazing as follows:
      1) Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion.
         a) Preparation includes, but is not limited to, cleaning and priming surfaces.
      2) Install structural silicone sealant according to sealant manufacturer's written instructions.
      3) Mechanically fasten glazing in place until structural sealant is cured.
      4) Remove excess sealant from component surfaces before sealant has cured.
      5) Install sealant weatherseal according to sealant manufacturer's written instructions to provide weatherproof joints.
         a) Install joint fillers behind sealant as recommended in writing by sealant manufacturer.
      6) Install perimeter sealant to comply with requirements of Specification Section - SEALANTS unless otherwise indicated.

C. Assistance:
1. Application shall be in direct consultation and review of manufacturer's representative.

3.4 FIELD QUALITY CONTROL

A. Installation Tolerances:
1. Install aluminum systems to comply with the following maximum tolerances:
   a. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet; 1/4 inch over total length.
   b. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Site Tests:
1. As required by Regulatory Requirements.
2. Water Spray Test: After completing the installation of test areas indicated (which includes all exterior finishes, glazing, and sealants down to the exterior face of studs, but no cavity insulation or interior finishes), test storefront system for water penetration according to AAMA 501.2 requirements.
   a. Provide report of the result of all testing.

3. Repair or remove and replace Work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

C. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.
4. Engineered Transition Assembly inspection by a qualified manufacturer's representative of 20 percent of the entire installation shall take place as installation proceeds to determine compliance of installed assemblies with specified acquirements.

3.5 ADJUSTING

A. Adjust doors and hardware to provide tight fit at contact points and weatherstripping, smooth operation, and weathertight closure.

3.6 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.
3. In accordance with manufacturer's written instructions and recommendations.

3.7 PROTECTION

A. Protection from traffic:
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.
2. Immediately after cleaning, neatly apply four (4) mil thick, minimum, polyethylene film over finished surfaces at traffic areas. Fasten film firmly to surface.

3.8 TESTING OF SSG SYSTEMS

A. Structural Silicone Glazing (SSG) systems.
1. Test the SSG system per the requirements of 2019 CBC Section 2410.1.2

END OF SECTION

SECTION 084226 - ALL-GLASS ENTRANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Interior swinging and sliding all-glass entrance doors.
2. All-glass sidelights.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. 03 11 01 CONCRETE FORMWORK
4. 03 30 00 CAST-IN-PLACE CONCRETE
5. 08 41 23 STOREFRONT TEMPERATURE RISE
6. 08 70 00 HARDWARE
7. 08 80 00 GLASS
8. 09 22 16 METAL FRAMING
9. 09 29 00 GYPSUM BOARD
10. 09 50 00 ACOUSTICAL CEILINGS
11. 09 6X XX FLOORING SECTIONS

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for all-glass system.

B. Shop Drawings: For all-glass entrances.
1. Include plans, elevations, and sections.
2. Include details of fittings and glazing, including isometric drawings .
3. Door hardware locations, mounting heights, and installation requirements.

C. Samples for Initial Selection: For each type of exposed finish indicated.

D. Samples for Verification: For each type of exposed finish indicated, prepared on Samples of size indicated below.
1. Metal Finishes: 6-inch- long sections of patch fittings and rail fittings, accessory fittings, and other items.
2. Glass: 6 inches square, showing exposed-edge finish and film.
3. Door Hardware: For exposed door hardware of each type, in specified finish, full size.

E. Fabrication Sample: Patch fitting at sill on pivot side only Continuous rail fitting at bottom, made from 12-inch lengths of full-size components and showing details of the following:

1. Joinery.
2. Anchorage.
3. Glazing.

F. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors sidelights, transoms, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

G. Qualification Data: For Installer.

H. Product Test Reports: For all-glass systems, for tests performed by manufacturer and witnessed by a qualified testing agency.

I. Sample Warranty: For special warranty.

J. Maintenance Data: For all-glass systems to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

C. Testing Criteria for Door Rail: the door rail must be tested to perform 1,000,000 cycles without any failures. The door rail should also be subject to a temperature pull-off test at temperatures from -10 degrees F to 150 degrees F. The rail shall remain stationary throughout this test while a 500 pound pressure is applied.

1.5 MOCKUPS

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of typical all-glass system as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 WARRANTY

A. Special Warranty: Installer agrees to repair or replace components of all-glass systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   b. Failure of operating components.
2. Warranty Period: Two years from date of Substantial Completion.
   a. Concealed Floor Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of all-glass entrances representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Structural Loads:
   1. Deflection Limits: Deflection normal to glazing plane is limited to 1/175 of clear span or 3/4 inch, whichever is smaller.

C. Seismic Performance: All-glass entrances shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

D. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 MANUFACTURERS

A. Products specified are from companies listed below, or approved equivalent. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers must still comply with the requirements of the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified All Glass Sliding Door product manufacturer:
      a. MODERNUS LAMA Series STC 38.
         1) LAMA Single Glaze Telescopic.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - Substitution Procedures.

2.3 METAL COMPONENTS

A. Fitting Configuration:
   1. Manual-Sliding, All-Glass Entrance Doors Sidelights and Transoms: Continuous rail fitting at top and bottom.

B. Patch Fittings: Aluminum and Stainless-steel-clad aluminum.

C. Rail Fittings:

1. Material: Match patch-fitting metal and finish Aluminum and Stainless-steel-clad aluminum.
2. Height:
   a. Top Rail: As shown..
   b. Bottom Rail: As shown..
3. Profile: Square.
4. End Caps: Manufacturer's standard precision-fit end caps for rail fittings.
5. Acoustical Gaskets.

D. Sliding Door Roller Assembly

E. Sliding Door Track Guide

F. Accessory Fittings: Match patch-fitting rail-fitting patch- and rail-fitting metal and finish for the following:
1. Floor Closer.
2. Push / Pull Units.
3. Glass-support-fin brackets.
4. Polycarbonate H-channel at all glass - to - glass transitions to maintain STC rating.

G. Anchors and Fastenings: Concealed.

H. Materials:
1. Aluminum: ASTM B 221, with strength and durability characteristics of not less than Alloy 6063-T5.
   a. Color: Clear Anodized. Match Architect's sample.
2. Stainless-Steel Cladding: ASTM A 666, Type 304.
   a. Finish: No. 4 directional satin finish.

2.4 GLASS

A. Glass: Laminated Glass 1/2" Type 0.030 PVB Safety Glazing. STC 38.
1. Exposed Edges: Machine ground and flat polished.
2. Butt Edges: Flat ground.
3. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:
4. Laminate lites with interlayer film in autoclave with heat plus pressure.
   a. Decorative Graphic Interlayer: DU PONT SENTRY GLAS EXPRESSIONS, custom graphic, with clear backer layer, 0.060" (1.52 mm) minimum overall.
5. Image: coordinate with Architect’s graphic design department.

2.5 ENTRANCE DOOR HARDWARE

A. General: Heavy-duty entrance door hardware units in sizes, quantities, and types recommended by manufacturer for all-glass entrance systems indicated. For exposed parts, match metal and finish of rail fittings.

B. Door Rail Systems: Profide door rail systems matching metal and finish of door fittings. The system shall include, but not be limited to door rails and housings. comply with GANA guidelines and hardware manufacturer requirements for size restrictions.

C. Threshold: None (Flush).

D. Manual-Sliding Entrance Door Hardware: Manufacturer's standard for sliding action indicated and with twin rollers.
   1. Type: Top-hung, stacking partition.

2.6 ACCESSORIES

A. Clear Sealant - See Specification Sections - SEALANTS.

2.7 FABRICATION

A. Provide holes and cutouts in glass to receive hardware, fittings, and accessory fittings before tempering glass. Do not cut, drill, or make other alterations to glass after tempering.
   1. Fully temper glass using horizontal (roller-hearth) process, and fabricate so that when glass is installed, roll-wave distortion is parallel with bottom edge of door or lite.

B. Factory assemble components and factory install hardware and fittings to greatest extent possible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Conduct a pre-construction job site conference and determine the desired tolerances requires for the concrete floor and the supporting steel beam. Inform the trade contractors of what is required for this system to be operation. General Contractor LLB shall discuss the findings at the job site meeting and provide updates when required.

B. Prior to installing the materials determine the concrete flatness and levelness, and the support beam levelness with the floor. Determine if the needed tolerances are acceptable for a functional system.

C. Install all-glass systems and associated components according to manufacturer's written instructions.

D. Set units level, plumb, and true to line, with uniform joints.

E. Maintain uniform clearances between adjacent components.

F. Lubricate hardware and other moving parts according to manufacturer's written instructions.

G. Set, seal, and grout floor closer cases as required to suit hardware and substrate indicated.

3.3 ADJUSTING AND CLEANING

A. Adjust all-glass entrance doors and hardware to produce smooth operation and tight fit at contact points.

B. Remove excess sealant and glazing compounds and dirt from surfaces.

3.4 SCHEDULE

A. Hardware by ALL GLASS ENTRANCES Manufacturer.

B. HARDWARE GROUP NO. 23 - INTERIOR SLIDING DOOR (PER LEAF).

1.	QTY	DESCRIPTION
2.	1 EA	ROLLER ASSEMBLY
3.	1 EA	DOOR STOP
4.	1 EA	TOP RAIL
5.	1 EA	PUSH/PULL UNIT "LADDER PULL"
6.	1 EA	BOTTOM RAIL
7.	1 EA	TRACK GUIDE
8.	ALL FINISHES TO MATCH	
9.	OTHER COMPONENTS AS REQUIRED	

END OF SECTION

SECTION 085659 – SERVICE WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to furnish and install Service Windows, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 08 11 00 METAL DOORS AND FRAMES
   4. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   5. 08 70 00 HARDWARE
   6. 08 80 00 GLASS
   7. 10 05 00 MISCELLANEOUS SPECIALTIES
   8. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. AAMA American Aluminum Manufacturer's Association

1.3 SUBMITTALS:

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data:
      a. Submit manufacturer’s standard color range for selection by the Architect.
      b. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
   2. Shop Drawings:
      a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
      b. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Samples:
      a. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
      b. Provide 12 inch long samples of each type of glazing sealant, gasket or glazing tape. Install sealant or glazing material sample between two strips of material representative in color of the adjoining framing system.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's written warranty requirements.
2. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

1.5 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Horizontal Sliding Service Windows manufacturer:
a. C.R. LAURENCE CO.
b. Approved Equivalent manufacturer:
1) FYRE-TEK
2) HORTON AUTOMATICS
3) READY ACCESS

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 HORIZONTAL SLIDING SERVICE WINDOWS - **TYPE SW1**

A. Specified product manufacturer, or approved equivalent: C.R. LAURENCE CO.

1. Acceptable alternative manufacturer, subject to compliance with requirements:
   a. FYRE-TEK
   b. HORTON AUTOMATICS
   c. READY ACCESS

B. Model: SW2412A sliding service window XO or OX format with 1/2" insulated glass with screen.

C. Size: See Opening schedule for special insert sizes. Verify opening widths with Storefront Frame submittal.

D. Frame Construction:
   1. Material: Heavy type 6063-T5 aluminum channel extrusions.
   2. Finish: 204R-1 Clear Aluminite.

E. Operation:
   1. Top hung on nylon track.
   2. No obstructions or grooves in counter top serving area.
   3. Bottom of sash equipped with wool pile cushion.
   4. Screw lock.

F. Glass: PreGlazed with 1/2" tempered insulated glass with screen.

G. Glazing Bead Extruded vinyl bead.

2.3 HORIZONTAL SLIDING SERVICE WINDOWS - **TYPE SW2**

A. Specified product manufacturer, or approved equivalent: ST CLOUD WINDOW INC.

B. Model "640" sliding service window XOX format.

C. System Properties:
   1. Operation: Side slide.
   2. Non-thermal.
   3. Acoustical Information: STC 35, OITC 31.
   4. Low-profile sill.

D. Glass:
   1. Thickness: 1/2".
   2. Tint: Clear.
   3. Type: Laminated.
   4. Coating: anti-reflective.

E. Finish: Custom Kynar Painted. Refer to Interior Color Schedule.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:
   1. Coordinate service windows with related items specified under other Sections to ensure proper and adequate interface of the Work.

B. Layout:
   1. Lines shall be straight and true.

3.2 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.
   5. Attach to metal frame by concealed stainless steel screws through channel wall.
      a. Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended in writing by manufacturer or fabricator.

B. Layout:
   1. Lines shall be straight and true.

3.3 CLEANING:

A. In accordance with Specification Section – PROJECT CLOSEOUT.
   1. Clean any soiled surfaces at the end of each day, minimum.
   2. Finish shall be clean and ready for the application of any additional finishes.
   3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 086301 - TRANSLUCENT PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all materials, labor, equipment and services necessary to furnish and install Insulated Translucent Panels, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
      a. Wall Panel System.
      b. Wall Unit System.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 05 12 00 STEEL AND FABRICATIONS
   5. 05 30 00 METAL DECK
   6. 07 51 13 BUILT-UP ROOFING
   7. 07 60 00 SHEET METAL
   8. 07 72 00 ROOF ACCESSORIES
   9. 07 92 00 SEALANTS
   10. 08 80 00 GLASS
   11. 09 29 00 GYPSUM BOARD
   12. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   13. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. CSFM California State Fire Marshal
      b. ICC International Code Council

1.3 SUBMITTALS

A. Submit in accordance with Project Manual Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data:
      a. In accordance with Specification Section - SUBMITTAL PROCEDURES.
      b. Submit manufacturer's standard color range for selection by the Architect.
   2. Material Lists:
      a. In accordance with Specification Section - SUBMITTAL PROCEDURES
   3. Shop Drawings:
      a. In accordance with Specification Section - SUBMITTAL PROCEDURES
   4. Quality Assurance/Control Submittal:

a. Engineering Calculations: Submit five copies of calculations showing Skylight System, Wall Panel System, and Wall Unit System to have strength required to resist forces applied to it. Calculations in accordance with regulatory agencies and computed and signed by a professional engineer registered in the State of California.
b. CSFM Listing: Evidence of listing with the California State Fire Marshal or test data from an acceptable testing laboratory for use in Class A fire retardant roofs.
c. Manufacturer's ICC-ES Report or equivalent per DSA IR A-5.

5. Closeout Submittals in accordance with the following:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

1.4 DEFERRED APPROVAL:

A. All openings exceeding 10 feet in width or 10 feet in height will require DSA review and approval.
   1. The plans and specifications shall be prepared and stamped by a structural engineer licensed in the State of California.
   2. The drawings shall clearly establish the loading and performance criteria; Title 24, Part 1, 4-317 (g).
   3. Anticipate the DSA review and approval process to take 6 months in duration. .

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer's Qualifications:
      a. Material and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least ten consecutive years and which can show evidence of those materials being satisfactorily used on at least six projects of similar size, scope and location. At least three of the projects shall have been in successful use for ten years or longer.
      b. Panel system must be listed by an ANSI accredited Evaluation Service, which requires quality control inspections and fire, structural and water infiltration testing of sandwich panel systems by an accredited agency.
      c. Quality control inspections shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components and production sandwich panels for conformance with AC177 "Translucent Fiberglass Reinforced Plastic (FRP) Faced Panel Wall, Roof and Skylight Systems" as issued by the ICC-ES.
   2. Installer Qualifications:
      a. Installation shall be by an experienced installer, which has been in the business of installing specified panel systems for at least two consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type..

B. Regulatory Requirements:
   1. In accordance with Specification Section - Regulatory Requirements, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Design Criteria: The drawings and specifications are based on catalog data, specifications and products of listed manufacturers.

D. ICC listing of sandwich panel construction.

E. Meetings:
1. Pre-Construction:
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems, which may impede planned progress and proper construction of work.
   c. Review structural load limitations of existing structure.
   d. Review areas where existing construction is to remain and requires protection.
2. Pre-Installation:
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems, which may impede planned progress and proper installation of work.
   c. Review structural load limitations of existing structure.
   d. Review areas where existing construction is to remain and requires protection.
3. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper work progress.
   b. Identify any problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
4. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems.
   b. Establish method and procedures to maintain protections while progressing to project completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be delivered on manufacturer's trucks, and protected from damage in transporting to the project site.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored in a dry, protected area.
2. Products shall be stored in locked storage building.
3. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period Five (5) Years.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period Five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products specified are from companies listed below, or approved equivalent. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers listed as acceptable alternative manufacturers must still comply with the requirements of the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable manufacturers listed are not approved during the Submittal Process due to non-compliance with the written documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer, or approved equivalent:
      a. KALWALL CORPORATION, ESL-1473, ESR-2464.

B. Products from other manufacturers not listed must submit in accordance with Project Manual Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS (GENERAL)

A. Face Sheets:
   1. Translucent faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.
      a. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.
      b. Face sheets shall not deform, deflect or drip when subjected to fire or flame.
   2. Interior face sheets:
      a. Flame spread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flame spread rating no greater than 50 and smoke developed no greater than 250 when tested in accordance with UL 723.
         1) Exterior translucent face shall comply with CC2 material.
         2) Interior translucent face shall comply with CC1 material.
         3) Overall Panel shall comply with CC1 material.
      b. Burn extent by ASTM D 635 shall be no greater than 1".
   3. Exterior face sheets:

a. Color stability: Full thickness of the exterior face sheet shall not change color more than 3 CIE Units DELTA E by ASTM D 2244 after five (5) years outdoor South Florida weathering at 5° facing south, determined by the average of at least three white samples with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.

b. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact minimum of 70 ft. lbs. without fracture or tear when impacted by a 3-1/4” diameter, 5 lb. free-falling ball per UL 972.

4. Appearance:

a. Exterior face sheets: Smooth, 0.070" thick and "crystal" in color.

b. Interior face sheets: Smooth, 0.045" thick and "white" in color.

c. Face sheets shall not vary more than ± 10% in thickness and be uniform in color.

B. Grid Core:

1. Aluminum I-beam grid core shall be of 6063-T6 or 6005-T5 alloy and temper with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I-beam shall be no less than 7/16".
2. I-Beam Thermal Break: Minimum 1", thermoset fiberglass composite.
3. Panel Core: Translucent fiberglass insulation.

C. Laminate Adhesive:

1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council "Acceptance Criteria for Sandwich Panel Adhesives".
2. Minimum tensile strength of 750 PSI when the panel assembly is tested by ASTM C 297 after two exposures to six cycles each of the aging conditions prescribed by ASTM D 1037.
3. Minimum shear strength of the panel adhesive by ASTM D 1002 after exposure to four separate conditions:

a. 50% Relative Humidity at 68° F: 540 PSI

b. 182° F: 100 PSI

c. Accelerated Aging by ASTM D 1037 at room temperature: 800 PSI

d. Accelerated Aging by ASTM D 1037 at 182° F: 250 PSI

D. Sealant: Silicone Rubber Construction sealant applied as recommended in writing by the manufacturer.

2.3 MANUFACTURED UNITS

A. Design:

1. Deflection shall be limited to L/180 under fully loaded conditions.

a. Standard panels shall deflect no more than 1.9" at 30 psf in 10'-0" span without a supporting frame by ASTM E 72.

2. Structural fasteners shall provide a 4:1 safety factor when fully loaded.
3. Panels shall be 2-3/4" thermally broken grid thick; panel faces bonded to gridcore.
4. Gridcore shall be "Shoji Pattern" 12" x 24" nominal.
5. "U" factor 0.29.
6. Light transmission 20%.
7. Shading coefficient 0.27.
8. Thermally Broken Panels:

a. Minimum Condensation Resistance Factor of 80 by AAMA 1503 measured on the bond line.

B. Battens and Perimeter Closure System:
   1. Closure System:
      a. Extruded aluminum 6063-T6 and 6063-T5 alloy and temper clamp-tite closure system.
      b. Perimeter closures at curbs shall be factory sealed to panels.
   2. Sealing Tape:
      a. Manufacturer's standard, pre-applied to closure system at the factory under controlled conditions.
   3. Fasteners:
      a. 300 series stainless steel screws for aluminum closures, excluding final fasteners to the building.
   4. Finish:
      a. Wall Panel and Wall Unit Panel Finish:
         1) Manufacturer's factory applied finish, which is a KALWALL Corrosion Resistant #79 "Aluminum" Finish similar to Clear Anodized Aluminum.

2.4 FABRICATION

A. Shop Assembly:
   1. Translucent Panels shall be factory fabricated and pre-assembled in largest size assemblies consistent with economic considerations for shipping to and handling at the jobsite.
   2. Extruded Aluminum frames shall be mitered and heliarc welded watertight at corners.
   3. Panel rafter bars and structured reinforcements shall be properly fitted and jointed to perimeter frame by welded or mechanical connections as determined by design and fabricating conditions.

2.5 FINISHES

A. Shop Finishing:
   1. Pre-finished Translucent Framing and Flashing: KALWALL (Acrylic Urethane Polymer) from manufacturer's standard range of colors.
      a. Exterior Panel Color "Crystal".
      b. Interior Panel Color "White".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Field Measurements - Take and be responsible for field measurements as required. Prior to performing work, report any significant differences between field dimensions and Drawings to Architect.
   2. Prior to installation of Translucent Panels, inspect the installed work executed under other Sections which affect the installation of all panels.
   3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   4. Installation of panels shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under Translucent Panels with work specified under other sections to ensure proper and adequate interface of work.

B. Protection from Dissimilar Surfaces:
   1. Isolate aluminum surface and masonry, concrete or steel surfaces with heavy coat of Electrolytic Insulation to prevent galvanic or corrosive action.

3.3 INSTALLATION

A. General
   1. In accordance with regulatory agencies.
   2. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   3. In accordance with approved shop drawings.
   4. As required for a watertight assembly.

B. Thermal Movement:
   1. Precautions shall be taken during erection to accommodate thermal movement with a minimum ambient air temperature shift of 100 degrees Fahrenheit without causing undue stresses in fasteners, sealants, accessories, glazing materials or structural system.
   2. Movement noises, buckling, distortion or twisting of any member shall cause rejection.
   3. Expansion sleeves, set in Sealant, shall be provided and installed as required.

C. Install all systems in accordance with the following:
   1. Install in accordance with the manufacturer's suggested written installation recommendations and approved shop drawings.
      a. Anchor component parts securely in place by permanent mechanical attachment system.
      b. Accommodate thermal and mechanical movements.
      c. Set perimeter framing in a full bed of sealant compound, or with joint fillers or gaskets to provide weather-tight construction.
   2. Install joint sealants at perimeter joints and within the panel systems in accordance with manufacturer's written installation instructions.

3.4 FIELD QUALITY CONTROL

A. Water Test:
   1. Installer to test skylights according according to procedures in AAMA 501.2.
   2. Repair or replace work that does not pass testing or that is damaged by testing and retest work.

3.5 CLEANING:

A. Clean in accordance with Project Manual Specification Section - PROJECT CLOSEOUT.

B. Clean the systems interior and exterior, immediately after installation.
   1. Refer to manufacturer's written recommendations.

END OF SECTION

SECTION 087000 – HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Building Hardware materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 05 12 00 STEEL AND FABRICATIONS
   5. 06 10 00 ROUGH CARPENTRY
   6. 06 22 00 MILLWORK
   7. 06 41 23 MODULAR CASEWORK
   8. 07 92 00 SEALANTS
   9. 08 11 00 METAL DOORS AND FRAMES
   10. 08 14 16 WOOD DOORS
   11. 08 33 00 COILING DOORS
   12. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   13. 08 56 59 SERVICE WINDOWS
   14. 09 67 23 RESINOUS FLOORING
   15. 09 91 00 PAINTING
   16. 10 05 00 MISCELLANEOUS SPECIALTIES
   17. 14 24 23 HYDRAULIC ELEVATORS
   18. 32 19 19 ORNAMENTAL METAL
   19. 32 31 13 CHAIN LINK
   20. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
      a. Alarm Systems and Power Interface.
   21. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ADA-S Americans with Disabilities Act 2010 Standards.
      b. ASAHC American Society of Architectural Hardware Consultants.
      c. BHMA Builders Hardware Manufacturers Association.
      d. DHI Door and Hardware Institute.
      e. HMMA Hollow Metal Manufacturer's Association.
      f. NFPA National Fire Protection Association.
      g. UL Underwriter’s Laboratories.
      h. WHI Warnock Hersey Incorporated.

1.3 DEFINITIONS

A. The following definitions apply to this Specification Section:
1. AFF Above Finished Floor.
2. "LABEL" Shall mean "FIRE DOOR ASSEMBLY" as defined in CBC Section 702.
3. LDW Less Door Width.
4. NRP Non Removable Pin.
5. POT Path of Travel (as defined by DSA/ACS and the CBC).

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Coordination Drawings:
   a. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
2. Product Data.
   a. Submit manufacturer's technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish (including any custom colors), and other information necessary to show compliance with requirements.
   b. Provide Key Control System submittal for review prior to fabrication or ordering. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
   c. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled
3. Shop Drawings – (Hardware Schedule):
   a. Submit shop drawings (Hardware Schedule) showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work. Include the following information:
      1) Type, style, function, size and finish of each Hardware Item.
      2) Name and manufacturer of each item.
      3) Fastenings and other pertinent information.
      4) Location of each hardware set cross-referenced to indications on the drawings both on the floor plans and in door and frame (opening) schedule as prepared by the Architect.
      5) Explanation of all abbreviations, symbols, and codes contained in schedule.
      6) Mounting locations for hardware.
      7) Door and frame sizes and materials.
      8) Keying information.
   b. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
   c. Furnish as-built/as-installed schedule with close-out documents, including keying schedule, wiring/riser diagrams, manufacturers' installation, adjustment and maintenance information.
4. Quality Assurance/Control Submittals:
   a. Certificates:

1) Submit three (3) copies of certificates.
2) Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.
   a) Provide a statement on the certificate that all hardware has been furnished in accordance with the Contract Documents.
   b) Provide a statement on the certificate that all hardware has been installed correctly and in proper working order.

5. Closeout Submittals:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
   c. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
   d. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
      b. Firm must be a recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project, and that employs an experienced Architectural Hardware Consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
         1) Responsible for detailing, scheduling and ordering of finish hardware.
         2) Supplier shall meet with the Owner to finalize keying requirements and to obtain final instructions in writing.
         3) Stock parts for products supplied and be capable of repairing and replacing hardware items found defective within warranty periods.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.
      b. CBC General Requirements:
         1) Buildings on a K-12 Public School Campus shall be provided with locks which allow doors to classrooms and any room with an occupant load of five or more persons to be locked from the inside per CFC 1010.1.11.
            a) Locks shall conform to the specification and requirements of Section 1010.1.9.
            b) Exceptions include doors which are normally locked from the outside, relocatable moved within the same campus, and reconstruction projects.

2) Adjust closers so that beginning from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum, per CBC Section 11B-404.2.8.1.
3) Where Flush Bolts occur in the POT, they shall be Automatic Flush Bolts (accessible).
4) Lever handles shall return to within 1/2 inch off door face.
5) Hand-activated hardware shall be mounted between 34" to 44" AFF; lever-type hardware, panic bars, push-pull activating and lever for thumb-turn dead bolt hardware shall comply with CBC Section 11B-308 Reach Ranges and 11B-404.2.7 Door and Gate Hardware.
   a) All hand activated hardware shall be easy to operate with one hand, without tight grasping, pinching, or twisting of the wrist to operate; the force required to activate operable parts shall be 5 pounds maximum, per 11B-309.4.
6) Force for pushing or pulling doors shall be a maximum of 5 lbs at exterior and interior doors per CBC Section 11B-404.2.9.
7) Thresholds in the POT shall be in conformance with CBC Section 11B-404.2.5.
8) All rated doors are to be positive latching and self-closing.
9) All 20 minute rated assemblies shall be provided with approved gasketing material so installed to provide a seal where the door meets the stop on both sides and across the top.
10) Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.
   a) Where emergency exit devices are required on fire-rated doors, (with supplementary marking on door's UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".
11) Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

C. Certificates:
1. Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.

D. Meetings:
1. Pre-installation Conference: Scheduled by the Contractor prior to the start of work.
   a. Review hardware schedule, products and installation procedures.
   b. Review Owner's keying standards.
   c. Coordinate the work with all other related work.
   d. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress Meetings: Scheduled by the Contractor during the performance of the work.
   a. Review proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Final Inspection: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.

b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be individually wrapped.
2. Packaging of door hardware shall be the responsibility of the supplier.
a. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule.
1) Two or more identical sets may be packaged in same container.
3. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted at final inspection.

B. Acceptance at Site:
1. Products shall be labeled also with model numbers, catalog numbers, function and finish, identification related to final hardware schedule, and include basic installation instructions with each item or package.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
2. Provide secure lock-up for door hardware delivered to the Project, but not yet installed.
a. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.7 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Closers:
1) Warranty Period Ten (10) Years.
a) Exception: Electronic Closers shall be Two (2) Years.
b. Exit Devices:
1) Warranty Period Ten (10) Years.
c. All other hardware:
1) Warranty Period Ten (10) Years.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period One (1) Year.

1.8 MAINTENANCE

A. Extra Materials:
1. Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The products listed establish size, pattern, color range and function selected by the Architect for this Project. Acceptable alternatives and substitutions must comply with the requirements of this project. If the acceptable alternatives or substitutions are not approved due to non-compliance with the contract documents, then the Contractor shall submit the specified product.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:
1. Base Metals: Produce hardware units of basic metal and forming method indicating using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified within this specification section for applicable hardware units for finish designations indicated.
2. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
3. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
4. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners.
   a. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely.
   b. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

2.3 MANUFACTURED UNITS

A. Hinges:
1. General:
   a. Templates: Provide only template-produced units.

b. Provide Phillips flat-head screws complying with the following requirements:
   1) For metal doors and frames, install machine screws into drilled and tapped holes.
   2) Finish screw heads shall match surface of hinges or pivots.

2. Butt:
   a. Provide hinge pins as follows:
      1) Out-Swing Exterior Doors — Nonremovable pins.
      2) Out-Swing Corridor Doors with Locks — Nonremovable pins.
      3) Interior doors — Nonrising pins.
      4) Tips: Provide flat button and matching plug, finished to match leaves.
   b. Provide the number of hinges indicated, but not less than the following guidelines:
      1) Doors with heights up to 60 inches — 2 Hinges.
      2) Door with heights 61 to 90 inches — 3 Hinges.
      3) Doors with heights 91 to 120 inches — 4 Hinges.
      4) For doors with heights more than 120 inches, provide four hinges, plus one additional hinge for every 30 inches of door height greater than 120 inches.
   c. Hinges shall be sized in accordance with the following:
      1) Height:
         a) Doors up to 41" wide — 4-1/2 inches.
         b) Doors 42" to 48" wide — 5 inches.
      2) Width: Sufficient to clear frame and trim when door swings 180 degrees.

3. Continuous:
   a. Continuous hinges shall be UL rated as required.
   b. Continuous hinges shall not obscure fire-rating labels of doors or door frames.

B. Lock Cylinders and Keying:
   1. Lock Cylinders:
      a. Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
   2. Keying:
      a. Review the keying system with the Owner and provide the type required (Master, grandmaster or great-grandmaster), either new or integrated with the Owner's existing keying system.
         1) The Owner's existing Grandmaster System is "Classic" SCHLAGE Keyways:
            a) Contractor to verify keyway.
            b) See hardware schedule of related information.
         2) Equip locks with cylinders for construction-core pin tumbler inserts. Provide only temporary inserts for the construction period, and remove these when directed.
            a) Provide final cores and keys prior to Architect's initial punch list.
      b. Key Blanks: Provide Standard "6" pin bow key blank; tag to identify.
      c. Provide keys manufactured from nickel silver only.
      d. Supply keys and blanks as follows:
         1) Supply 2 cut change keys for each different change key code.
         2) Supply 1 uncut key blank for each change key code.
         3) Supply 6 cut master keys for each different master key set.
         4) Supply 4 uncut key blanks for each master key set.
      e. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
         1) Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."

3. Deadlocks: Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of 1/4" diameter steel and protected by drill- resistant ball bearings. Steel alloy deadbolt with hardened steel roller. Strike alloy deadbolt with reinforcer and two 3" long screws. ANSI A156.5, 1992 Grade 1 certified.

C. Key Control System:
1. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended in writing by system manufacturer, with capacity for 150 percent of the number of locks required for the Project.
   a. Provide hinged-panel type cabinet for wall mounting, or multiple-drawer type cabinet. Coordinate location with the Architect. Provide submittal for review before fabrication or ordering.

D. Locks, Latches, and Bolts:
1. All doors shall be operable from within, without the use of a key by merely rotating the latching handle.
2. The levers shall be Schlage Sparta "SPA" style.
3. All doors in areas used by students shall be self-releasing type, operable from within without the use of a key or special knowledge or effort.
4. Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.
5. Lock Protectors:
   a. Lock astragals shall be provided with internally threaded fasteners for flat head machine screws. No hex head or carriage bolt fasteners will be permitted.
   b. Must be through bolted to door.
6. Provide 5/8 inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on fire rated fire openings.
   a. Provide 1/2 inch minimum throw of latch for other bored and preassembled types of locks
   b. Provide 3/4 inch minimum throw of latch for mortise locks.
   c. Provide 1 inch minimum throw for all dead bolts.
7. Provide flush bolt heads a minimum of 1/2 inch diameter rods of brass, bronze, or stainless steel with minimum 12 inch long rod for doors up to 7'-0" in height.
   a. Provide longer rods as necessary for doors exceeding 7'-0" in height.
   b. Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.
   c. Manual Flush Bolts only permitted on storage or mechanical openings as scheduled.
   d. Provide dust-proof strikes at openings using bottom bolts.
8. Provide keyed dogging devices on doors equipped with exit devices.
   a. Do not provide keyed exit devices on fire rated doors equipped with exit devices.
9. Where rabbeted door stiles are indicated, provide special rabbeted front on lock and latch units and bolts.
10. Locksets and Latchsets in Acoustical Doors And Frames require a 3-3/4" backset; verify and coordinate.
11. All egress doors shall comply with AB 211 (2009-2010).

E. Exit / Panic Devices:
1. Panic hardware shall comply with CCR Title 24, Part 12, Chapter 12-10-302 (a).

a. The release mechanism shall be so designed that a horizontal force of 15 lbs. or less will actuate the release bar and latches applied in the direction of travel.

2. No surface mounted vertical rods are allowed.
3. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 standards.
4. Device shall bear UL label for fire and or panic as may be required.
5. Removable Mullions:
   a. Removable with single turn of building key, and securely reinstalled without need for key.
   b. All removable mullions shall be steel or aluminum clad steel whether or not the opening is fire-rated or not.
6. No manual Flush Bolts on egress doors.

F. Push / Pull Units:
1. Provide manufacturer's standard exposed fasteners for installation, thru-bolted for matched pairs but not for single units.

G. Closers and Door Control Devices:
1. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation.
   a. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory.
   b. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
2. Except as otherwise specifically indicated, comply with manufacturer's written recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use.
   a. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.
   b. Effort to operate shall conform to CBC Section 11B-404.2.9 accessibility requirements as follows:
      1) Exterior/Interior doors 5.0 pounds maximum.
         a) The Authority having Jurisdiction may increase the maximum effort to operate Fire Doors to achieve positive latching, but not to exceed 15 lbs maximum.
3. Where manual closers are indicated for doors required to be accessible, provide adjustable units complying with ANSI A 117.1 and CBC Section 11B-404.2.8 provisions for door opening force and delayed action closing.
4. Where combination door closers and holders are indicated, provide units designed to hold door in an open position under normal usage and to release and close door automatically under fire conditions.
   a. Incorporate an integral electromagnetic holder mechanism designed for use with UL listed fire detectors, provided with normally closed switching contacts.
   b. When indicated, provide integral smoke detector device in combination door closers and holders complying with UL 228, Second Edition.
5. Provide gray resilient parts for exposed bumpers.
6. Closures indicated for use on Acoustical Doors and Frames shall allow for a minimum 1/2" up-down movement due to the Cam-Lift hinges.

H. Floor Closers:
1. Shall be equipped with compression springs, cam and roller operating mechanism and a one piece spindle-cam for maximum operating performance and longevity.

I. Kickplates:
   1. Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
   2. Fabricate edge trim of stainless steel to fit door thickness in standard lengths or to match height of protection plates.
   3. Fabricate protection plates not more than 1-1/2 inches less than door width on hinge side and not more than 1/2 inch less than door width on pull side by height indicated.
      a. Protection plates shall be stainless steel, 0.050 inch (18 gage).

J. Door Stops:
   1. At all Toilet Room Partition Doors, provide stops at adjacent walls or partitions. Stops shall be aligned with the top and bottom of Toilet Partition Doors, and shall be installed on both the Door and the adjacent wall or partition.
      a. Provide neoprene spring rubber rod, 1-1/2" diameter, as manufactured by McMASTER CARR CO., or approved equivalent. Polish exposed surfaces. Secure with Stainless Steel Fasteners.
   2. Coordinate the installation of backing in walls with the door supplier, aligned with the top and bottom of doors.
   3. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
   4. All Floor Stops shall be installed within four (4) inches maximum from the face of wall, bollard or partition.
   5. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.

K. Hardware for interior sliding doors:
   1. Operating hardware for pocket doors:
      a. Provide manufacturer's complete set consisting of extruded aluminum or galvanized steel overhead track, adjustable hangers (carriages), galvanized steel split-jambs and split-studs, wood nailers for head track, jambs and studs, galvanized steel brackets for assembly and attachment to floor and wall framing, bumpers, and nylon floor guides designed to accommodate the number (single or biparting), size, thickness, and weight of door leaves indicated.
      b. Provide flush pull and edge pull for each door leaf.

L. Seals:
   1. Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled.
      a. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
      b. Provide silicone gasket at all rated and exterior doors, in accordance with ASTM E 283 "Test method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen".
   2. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.
   3. Provide silencers for hollow metal frames, 3 for single doors, 2 for pairs of doors.
      a. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

M. Thresholds:
   1. Provide standard metal threshold unit of type, size, and profile as shown or scheduled.

2. Exterior Doors: Provide units not less than 4 inches wide, formed to accommodate change in floor elevation, fabricated to accommodate door hardware and to fit door frames.

N. Door Shoes & Door Top Caps: Provide galvanized door shoes at all exterior wood doors and galvanized top caps at all exterior out-swing doors.

O. Fasteners:
1. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
2. Screws for butt hinges shall be flathead, countersunk, full-thread type.
3. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
4. Provide expansion anchors for attaching hardware items to concrete or masonry.
5. All exposed fasteners shall have a phillips head.
6. Finish of exposed screws to match surface finish of hardware or other adjacent work.
7. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

2.4 FINISHES

A. Hardware finishes:
1. General:
   a. All hardware shall be satin chromium (US26D – 626) unless otherwise noted.
   b. Provide push plates, pull plates and kick or armor plates in satin stainless steel (US32D – 630) unless otherwise noted.
   c. Door closers shall be powder-coated to match other hardware, unless otherwise noted.
   d. Aluminum items shall be finished anodized aluminum (US28 – 628), except thresholds which can be furnished as standard mill finish.
2. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).
3. Provide finishes that match those established by BHMA or, if none established, match Architect's sample.
4. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
5. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer".
6. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes", including coordination with the traditional U.S. Finishes shown by certain manufacturers for their products.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.

a. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed in writing by the manufacturer.

2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
   a. Coordinate electrical power needs for those hardware items requiring electrical interface.
   b. Coordinate electrical alarm needs (security, fire/smoke detection) for those hardware items requiring electrical alarm interface.
2. Provide all required hardware templates.

B. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Coordinate the blocking required for all wall mounted hardware.
3. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   a. Hardware distributor shall assist and advise installer in correcting field problems arising during installation of hardware.
   b. Hardware distributor shall be on the Project within 48 hours upon being notified by the Contractor.
   c. Hardware distributor shall assist installer in the proper adjustment of all door closers, and other operating devices.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by the Architect.
   a. Steel Doors and Frames: "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
   b. Door opening devices shall be installed at 34" minimum to 44" AFF maximum height per CBC Section 11B-404.2.7.
5. Install each hardware item in compliance with the manufacturer's written instructions and recommendations. Where indicated and where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 09 Sections.
   a. Do not install surface-mounted items until finishes have been completed on the substrate involved.

6. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
7. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
8. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Specification Section - SEALANTS.
9. Weatherstripping and seals shall comply with manufacturer's written instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Inspection:
1. Contractor shall inspect all hardware to assure that it was installed correctly and is in proper working order.
2. The Contractor shall schedule an inspection prior to substantial completion, and notify the Owner's Inspector and any regulatory agencies of the time 48 hours prior to the inspection.
   a. The inspection shall cover checking all locks and verifying that they have been installed in accordance with the hardware schedule and the keying schedule.

3.5 DJUSTING

A. Adjusting:
1. Adjust and check each operating item of hardware and each door to ensure proper operations or function of every unit.
   a. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
      1) Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area.
      2) Clean operating items as necessary to restore proper function and finish of hardware and doors.
      3) Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.6 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.

3.7 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.
1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
   a. Provide the services of a factory-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.
      1) Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.

END OF SECTION

SECTION 08 70 00.01 – HARDWARE SCHEDULE

1.1 SCHEDULES

A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.

B. The Door Schedule on the Drawings indicates which hardware set is used with each door.

Manufacturers Abbreviations (Mfr.)

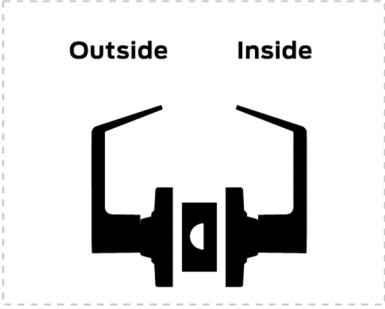
GLY	=	Glynn-Johnson Corporation	Overhead Door Stops
GRR	=	Grainger	Magnetic Door Holder
HAG	=	Hagar	Continuous Hinges
IVE	=	Ives	Hinges, Pivots, Bolts, Coordinators, Dust Proof Strikes, Push-Pull & Kick Plates, Door Stops & Silencers
LOC	=	Locinox	Gate closers
NGP	=	National Guard Products	Thresholds, Gasketing & Weather-stripping
NOR	=	Norton	Door closers
PEM	=	Pemko	Thresholds, Gasketing & Weather-stripping
SCE	=	Schlage Electronics	Electronic Door Components
SCH	=	Schlage Lock Company	Locks, Latches & Cylinders; Accessible Levers: Schlage Sparta Levers.
TRI	=	Trimco	ADA Pocket Door Pulls & Flush Pulls
VON	=	Von Duprin	Exit Devices
ZER	=	Zero	Smoke Seals & Weatherstripping

Schlage ANSI

ND10S **F75**

Passage latch

- Both levers always unlocked.



HARDWARE GROUP NO. 10 – PASSAGE LATCH - INTERIOR / VESTIBULES

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER (see note)	SR64	GRY	IVE

HARDWARE GROUP NO. 10-A – ACOUSTICAL, PASSAGE LATCH - INTERIOR / VESTIBULES

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	ACOUSTICAL GASKETING	319CN	-	PEM

HARDWARE GROUP NO. 10C – PASSAGE LATCH - INTERIOR / VESTIBULES

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 10E – PASSAGE LATCH - EXTERIOR / ROOF DOORS

EACH TO HAVE:

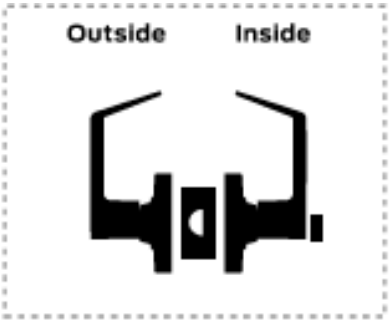
QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HW HINGE	5BB1HW 4.5 X 4.5	630	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	**LOCK GUARD**	LG12	630	IVE
1	EA	WEATHERSTRIPPING	188S-BK	S-BK	ZER
1	EA	WALL STOP / HOLDER	FS42 W/ 1268 TRIMCO PLATE ANCHOR	626	IVES
1	EA	DOOR BOTTOM	216AFG	AL	PEM
1	EA	DOOR BOTTOM SWEEP	345A	AL	PEM

Schlage ANSI

ND40S **F76**

Bath/bedroom privacy lock

- Push-button locking.
- Can be opened from outside with a small screwdriver.
- Turn inside lever or close door to release button.



HARDWARE GROUP NO. 40 - INTERIOR / INFIRMARY TOILET, COACH RR

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	ND40S SPA	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 40C - INTERIOR / INFIRMARY TOILET, COACH RR

EACH TO HAVE:

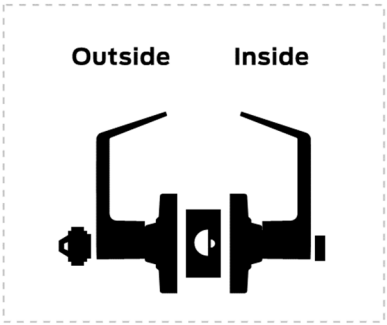
QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	ND40S SPA	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	SILENCER	SR64	GRY	IVE
1	EA	SURFACE CLOSER	7500M	689	NOR

Schlage ANSI

ND50PD **F82**

Entrance/office lock

- Push-button locking.
- Push-button locks outside lever until it is unlocked with key or by turning inside lever.



HARDWARE GROUP NO. 50-A – OFFICE LOCK – INTERIOR/OFFICE/CONFERENCE

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	ACOUSTICAL GASKETING	319CN	-	PEM

HARDWARE GROUP NO. 50C – OFFICE LOCK – INTERIOR/OFFICE/CONFERENCE WITH CLOSER

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	SILENCER	SR64	GRY	IVE
1	EA	SURFACE CLOSER	7500M	689	NOR

HARDWARE GROUP NO. 50R – OFFICE LOCK - RATED INTERIOR/OFFICE/CONFERENCE

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER
1	EA	SURFACE CLOSER	7500M	689	NOR

HARDWARE GROUP NO. 50E-S – OFFICE LOCK - EXTERIOR STOREFRONT/OFFICE/CONFERENCE

EACH TO HAVE:

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

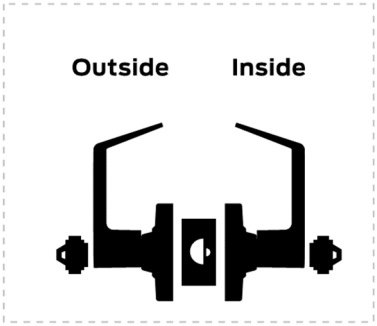
QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	EA	ENTRANCE/OFFICE LOCK	ND50PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	DOOR BOTTOM	222APK	AL	PEM
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		

Schlage ANSI

ND66PD **F91**

Store lock†

- Key in either lever locks or unlocks both levers.



HARDWARE GROUP NO. 66 – STORE LOCK - INTERIOR / COMMUNICATING DOOR

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	DBL CYL STORE LOCK	ND66PD SPA	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 66-AA STORE LOCK WITH ACOUSTICAL DOUBLE GASKETS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND66PD SPA	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	ACOUSTICAL GASKETING	S773 (MATCH FRAME PAINT)	-	PEM
3	EA	ACOUSTICAL GASKETING	S44 (MATCH FRAME PAINT)	-	PEM
1	EA	AUTO DOOR BOTTOM	360AA	-	ZERO
1	EA	SADDLE THRESHOLD	151 (verify color)	-	PEM
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 66C – STORE LOCK - INTERIOR / COMMUNICATING DOOR

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	DBL CYL STORE LOCK	ND66PD SPA	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	SILENCER	SR64	GRY	IVE
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 66R – STORE LOCK - RATED INTERIOR / COMMUNICATING

EACH TO HAVE:

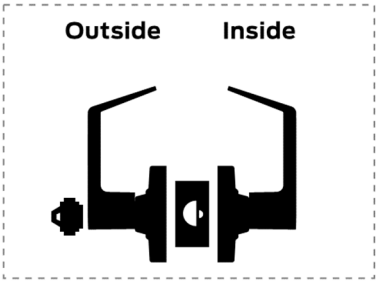
QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	DBL CYL STORE LOCK	ND66PD SPA	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER
1	EA	SURFACE CLOSER	7500M	689	NOR`
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

Schlage ANSI

ND70PD **F84**

Classroom lock

- Outside lever locked and unlocked by key.
- Inside lever always unlocked.



HARDWARE GROUP NO. 70 – CLASSROOM LOCK - INTERIOR / OFFICE VESTIBULE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70PD SPA ~~14-028~~ RFI-006	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 70C-A – CLASSROOM LOCK - INTERIOR / LIGHT DUTY ACOUSTICAL

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70PD SPA ~~14-028~~ RFI-006	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	ACOUSTICAL GASKETING	319CN	-	PEM
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 70-AA - CLASSROOM LOCK WITH ACOUSTICAL DOUBLE GASKETS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND70PD SPA	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	ACOUSTICAL GASKETING	S773 (MATCH FRAME PAINT)	-	PEM
3	EA	ACOUSTICAL GASKETING	S44 (MATCH FRAME PAINT)	-	PEM
1	EA	AUTO DOOR BOTTOM	412CSL	-	PEM
1	EA	SADDLE THRESHOLD	151 (verify color)	-	PEM
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 70AXD – CLASSROOM LOCK - INTERIOR / HEAVY DUTY ACOUSTICAL

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70PD SPA ~~14-028~~ RFI-006	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	EA	JAMB GASKETING	350CSR	-	PK
1	EA	HEAD GASKETING	350CSR	-	PK
1	EA	DOOR BOTTOM GASKETING	4301CPKL	-	PK
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
			BALANCE OF HARDWARE BY DOOR MANUFACTURER		

HARDWARE GROUP NO. 70ADF – ACOUSTICAL DOOR AND FRAME WITH CLASSROOM LOCK

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CLASSROOM LOCK	ND70PD SPA ~~14-028~~ RFI-006	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	EA	SURFACE CLOSER	7500M	689	NOR
			BALANCE OF HARDWARE BY DOOR MANUFACTURER		

NOTES:
Hinges, Sound Seals, and Auto Door Bottom provided by Acoustical Door Mfg.
Prepare the door for a 3-3/4" lock backset.
Use the Door Mfg "Z" Bracket for the parallel mount closer.
Coordinate the Z-Bracket and lock backset with the Acoustical Supplier/installer.

HARDWARE GROUP NO. 70C – CLASSROOM LOCK - INTERIOR / MULTI-STALL RESTROOM / DRESSING / EXAM / WAITING

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70PD SPA ~~14-029~~ RFI-006	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	SILENCER	SR64	GRY	IVE
1	EA	SURFACE CLOSER	7500M	689	NOR

HARDWARE GROUP NO. 70E – CLASSROOM LOCK - EXTERIOR / MULTI-STALL RESTROOM

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	120-600XHD 6063-T6	AL	HAG
1	EA	CLASSROOM LOCK	ND70PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	**LOCK GUARD**	LG12	630	IVE
1	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	EA	WEATHERSTRIPPING	188S-BK	S-BK	ZER
1	EA	DOOR BOTTOM	222APK	AL	PEM
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		

HARDWARE GROUP NO. 70R – CLASSROOM LOCK - RATED INTERIOR / MULTI-STALL RESTROOM / VESTIBULE

QTY		DESCRIPTION		CATALOG NUMBER	
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	1214CK & 1268CK	626	TRI
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER

HARDWARE GROUP NO. 70S – CLASSROOM LOCK - INTERIOR STOREFRONT DOOR

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	WEATHERSTRIPPING	188S-BK	S-BK	ZER

HARDWARE GROUP NO. 702C – CLASSROOM LOCK - INTERIOR PAIR / STORAGE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUSTPROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND70PD SPA 14-042	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	7500M	689	NOR
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
2	EA	SILENCER	SR64	GRY	IVE
1	EA	MEETING STILE	328AA	AA	ZER

HARDWARE GROUP NO. 702R – CLASSROOM LOCK - RATED INTERIOR PAIR

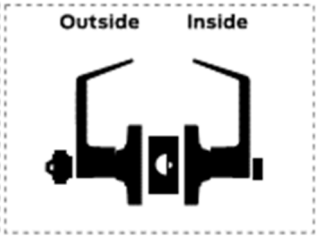
QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUSTPROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	ND70PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	7500M	689	NOR
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18S	BLK	IVE

Schlage ANSI

ND73PD **F90**

Corridor lock

- Locked or unlocked by key from outside.
- Push-button locking from inside.
- Turn inside lever or close door to release button.
- When outside lever is locked by key it can only be unlocked by key.
- Inside lever is always unlocked.



HARDWARE GROUP NO. 73 – CORRIDOR LOCK

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CORRIDOR LOCK	ND73PD SPA	626	SCH
1	EA	FSIC CORE	23-0301	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 73-A – OFFICE LOCK – INTERIOR/OFFICE/CONFERENCE

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND73PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	ACOUSTICAL GASKETING	319CN	-	PEM

HARDWARE GROUP NO. 73C – CORRIDOR LOCK WITH CLOSER

EACH TO HAVE:

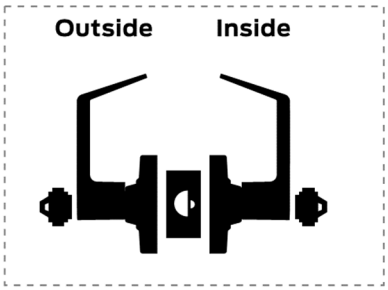
QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CORRIDOR LOCK	ND73PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	SILENCER	SR64	GRY	IVE
1	EA	SURFACE CLOSER	7500M	689	NOR

Schlage ANSI

ND75PD -

Classroom security lock

- Key in either lever locks or unlocks outside lever.
- Inside lever is always unlocked.



HARDWARE GROUP NO. 75 – CLASSROOM SECURITY LOCK – INTERIOR CLASSROOMS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY	ND75PD SPA XN12-035	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 75C – CLASSROOM SECURITY LOCK - INTERIOR / CLASSROOM

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY	ND75PD SPA XN12-035	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	SILENCER	SR64	GRY	IVE
1	EA	SURFACE CLOSER	7500M	689	NOR

HARDWARE GROUP NO. 75E – CLASSROOM SECURITY LOCK - EXTERIOR / CLASSROOM

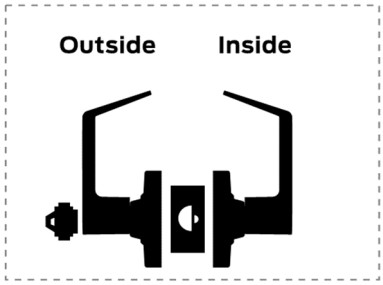
RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	120-600XHD 6063-T6	AL	HAG
1	EA	CLASSROOM SECURITY	ND75PD SPA XN12-035	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	**LOCK GUARD**	LG12	630	IVE
1	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	EA	WEATHERSTRIPPING	188S-BK	S-BK	ZER
1	EA	DOOR BOTTOM	222APK	AL	PEM
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		

HARDWARE GROUP NO. 75R – CLASSROOM SECURITY LOCK - RATED INTERIOR / CLASSROOMS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY	ND75PD SPA XN12-035	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER

Schlage ANSI
ND80PD **F86**
Storeroom lock
- Outside lever is fixed.
- Entrance by key only.
- Inside lever always unlocked.



HARDWARE GROUP NO. 80 – STOREROOM LOCK - INTERIOR STORAGE, TECHNOLOGY IDF, EQUIPMENT, JANITOR

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 80-A – STOREROOM LOCK - INTERIOR MECHANICAL CLOSET, SOUND GASKETS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	WALL STOP	409 1/2	B26D	IVES
1	EA	ACOUSTICAL GASKETING	319CN	-	PEM
1	EA	AUTO DOOR BOTTOM	411ASL	-	PEM

HARDWARE GROUP NO. 80-AA - STOREROOM LOCK WITH ACOUSTICAL DOUBLE GASKETS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	ACOUSTICAL GASKETING	S773 (MATCH FRAME PAINT)	-	PEM
3	EA	ACOUSTICAL GASKETING	S44 (MATCH FRAME PAINT)	-	PEM
1	EA	AUTO DOOR BOTTOM	412CSL	-	PEM
1	EA	SADDLE THRESHOLD	151 (verify color)	-	PEM
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 80C – STOREROOM LOCK - INTERIOR STORAGE, WATER HEATER, JANITOR, ELEVATOR, ELECTRICAL

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 80E – STOREROOM LOCK - EXTERIOR ELEVATOR EQUIPMENT

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	120-600XHD 6063-T6	AL	HAG
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	**LOCK GUARD**	LG12	630	IVE
1	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	EA	WEATHERSTRIPPING	188S-BK	S-BK	ZER
1	EA	DOOR BOTTOM	222APK	AL	PEM
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		

HARDWARE GROUP NO. 80P – SINGLE DOOR AT POOL CHEMICAL ROOMS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	SILENCER	SR64	GRY	IVE
0	EA	LESS DOOR BOTTOM	¾" UNDERCUT FOR DRAINAGE		

HARDWARE GROUP NO. 802P – PAIR OF DOORS AT POOL CHEMICAL ROOMS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUSTPROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
6	EA	SILENCER	SR64	GRY	IVE
1	EA	MEETING STILE	328AA	AA	ZER
0	EA	LESS DOOR BOTTOM	¾” UNDERCUT FOR DRAINAGE		

HARDWARE GROUP NO. 80R – STOREROOM LOCK - RATED INTERIOR / STORAGE, WATER HEATER, JANITOR, ELEVATOR, ELECTRICAL

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80**PD** SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER

HARDWARE GROUP NO. 802 – STOREROOM LOCK - INTERIOR PAIR / MECHANICAL CLOSET

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUSTPROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
2	EA	SILENCER	SR64	GRY	IVE
1	EA	MEETING STILE	328AA	AA	ZER

HARDWARE GROUP NO. 802A – STOREROOM LOCK - INTERIOR MECHANICAL CLOSET, SOUND GASKETS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUSTPROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	DOOR STOP	FS18S	BLK	IVE
1	SET	PERIMETER SEALS	770	AA	ZER
1	SET	MEETING STILE	1840/41 ASTRAGALS	AA	ZER
2	EA	AUTO DOOR BOTTOM	360AA	AA	ZER

DOOR STOP NOTE: Drill 1 ½” Diameter x 2 1’2” deep hole and set into Non-Shrink Grout

HARDWARE GROUP NO. 802C – STOREROOM LOCK - INTERIOR PAIR / MECHANICAL CLOSET

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUSTPROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	7500M	689	NOR
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
2	EA	SILENCER	SR64	GRY	IVE
1	EA	MEETING STILE	328AA	AA	ZER

HARDWARE GROUP NO. 802E – STOREROOM LOCK - EXTERIOR PAIR / MECHANICAL CLOSET

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUSTPROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	**LOCK GUARD**	LG12	630	IVE
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES

HARDWARE GROUP NO. 802R – STOREROOM LOCK - RATED INTERIOR PAIR / STORAGE

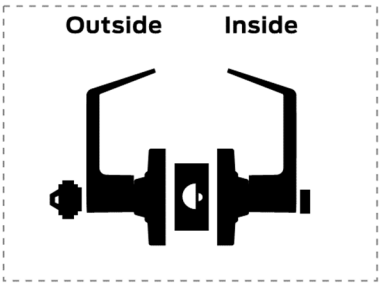
QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUSTPROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER
1	EA	MEETING STILE	328AA	AA	ZER

Schlage ANSI

ND85PD -

Faculty restroom lock

- Outside lever is fixed.
- Entrance by key only.
- Push-button in inside lever activates visual occupancy indicator, allowing only emergency master key to operate.
- Turn inside lever or close door to release visual occupancy indicator.
- Rotation of inside spinner-button provides lock-out feature by keeping indicator thrown.



HARDWARE GROUP NO. 85 – FACULTY RESTROOM LOCK – INTERIOR/FACULTY RESTROOM

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	FAC RESTRM W/IND CYL	ND85PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	**EA**	**DEADBOLT**	**B571 WITH IN-USE INDICATOR**	**626**	**SCH**
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 85C – STOREROOM LOCK – INTERIOR/FACULTY RESTROOM

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	FAC RESTRM W/IND CYL	ND85PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	**EA**	**DEADBOLT**	**B571 WITH IN-USE INDICATOR**	**626**	**SCH**
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	SILENCER	SR64	GRY	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 85E – STOREROOM LOCK – INTERIOR/FACULTY RESTROOM

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	FAC RESTRM W/IND CYL	ND85PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	**EA**	**DEADBOLT**	**B571 WITH IN-USE INDICATOR**	**626**	**SCH**
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	EA	WEATHERSTRIPPING	188S-BK	S-BK	ZER

1	EA	DOOR BOTTOM	222APK	AL	PEM
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 85R – STOREROOM LOCK - RATED INTERIOR/FACULTY RESTROOM

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	FAC RESTRM W/IND CYL	ND85PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	**EA**	**DEADBOLT**	**B571 WITH IN-USE INDICATOR**	**626**	**SCH**
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

INTERIOR AND EXTERIOR PANIC HARDWARE

PANIC HARDWARE GROUP LEGEND

# = INTERIOR SINGLE DOOR WITH NO CLOSER
99 = VON DUPRIN 98/99 SERIES EXIT DEVICE
#2 = **PAIR** OF DOORS WITH CLOSERS
#A = DOOR WITH ACOUSTICAL GASKETS
#AO = DOOR WITH LOW ENERGY AUTO OPENER
#C = INTERIOR DOOR, WITH **CLOSER** & HOLD OPEN
#E = **EXTERIOR** DOOR WITH CLOSER & HOLD OPEN
#EL = **ELECTRONIC LOCK**
#EO = **EXIT ONLY**
#HO = **ELECTRO-MAGNETIC DOOR STOPS**
#R = INTERIOR RATED DOOR WITH CLOSER
#S = INTERIOR STOREFRONT DOOR
#TR = TEMPERATURE RISE FIRE-RATED

Classroom Security Function "-2SI" to be used at all Fire Rated INTERIOR Classroom Doors

-2SI
Security Indicator

HARDWARE GROUP NO. 99-A - INTERIOR PANIC DEVICE / ACOUSTICAL HOLLOW METAL DOOR

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	652	IVE
1	EA	PANIC HARDWARE	CD-AX-99-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	ACOUSTICAL GASKETING	319CN	-	PEM
1	EA	AUTO DOOR BOTTOM	412CSL	-	PEM
1	EA	SADDLE THRESHOLD	151 (verify color)	-	PEM
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 99-AA - PANIC DEVICE WITH ACOUSTICAL DOUBLE GASKETS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	AL	HAG
1	EA	PANIC HARDWARE	CD-AX-99-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	ACOUSTICAL GASKETING	S773 (MATCH FRAME PAINT)	-	PEM
3	EA	ACOUSTICAL GASKETING	S44 (MATCH FRAME PAINT)	-	PEM
1	EA	AUTO DOOR BOTTOM	412CSL	-	PEM
1	EA	SADDLE THRESHOLD	151 (verify color)	-	PEM
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 99R - RATED PANIC DEVICE WITH ACOUSTICAL DOUBLE GASKETS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	AL	HAG
1	EA	FIRE EXIT HARDWARE	AX-99L-F-2SI-17-SNB-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	ADA T-TURN RIM CYLIN	XB13-088	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 99R-AA - RATED PANIC DEVICE WITH ACOUSTICAL DOUBLE GASKETS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	AL	HAG
1	EA	FIRE EXIT HARDWARE	AX-99L-F-2SI-17-SNB-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	ADA T-TURN RIM CYLIN	XB13-088	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	ACOUSTICAL GASKETING	S773 (MATCH FRAME PAINT)	-	PEM
3	EA	ACOUSTICAL GASKETING	S44 (MATCH FRAME PAINT)	-	PEM
1	EA	AUTO DOOR BOTTOM	411ASL	-	PEM
1	EA	SADDLE THRESHOLD	151 (verify color)	-	PEM
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 99AO - EXTERIOR STOREFRONT DOOR WITH PANIC HARDWARE & AUTO OPERATOR

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	120-600XHD 6063-T6 EPT	AL	HAG
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	QEL+-99-NL-OP-110MD-PA	626	VON
1	EA	MORTISE CYLINDER	20-001 114 USE W/ KEY SWITCH	626	SCH
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
1	EA	SURF. AUTO OPERATOR	9542 SURFACE-MOUNTED WITH 9540 MOUNTING PLATE	689	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-836T WIRED (EXTERIOR)	630	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-836TW WIRELESS (INTERIOR)	630	LCN
1	EA	WIRELESS RECEIVER	8310-865	-	LCN
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	MULLION SEAL	8780N	N	ZER
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
1	EA	KEY SWITCH	653-1414 L2	630	SCE
1	EA	POWER SUPPLY	PS902 900-BBK 900-2RS-FA	LGR	VON
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 99C - INTERIOR PANIC DEVICE WITH CLOSURE

RFI-006: Add Door Pull VR910 NL, 630, IVES

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	652	IVE
1	EA	PANIC HARDWARE	CD-AX-99-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	DOOR GASKETS	BY STOREFRONT	-	-
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

NOTES:

1) At Hollow Metal Doors and Frames, PROVIDE the following additional hardware:

3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 99E - EXTERIOR DOOR WITH PANI

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	EA	PANIC HARDWARE	CD-AX-99-NL-OP-110MD-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

NOTES:

1) At Hollow Metal Doors and Frames, PROVIDE the following additional hardware:

1	EA	WEATHERSTRIPPING	188S-BK	S-BK	ZER
1	EA	DOOR BOTTOM	222APK	AL	PEM

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

HARDWARE GROUP NO. 99EL - DOOR WITH PANIC HARDWARE – ELECTRONIC ALL-LOCK - MORT TECHNOLOGY WITH KEYPAD

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	EA	PANIC HARDWARE	CD-AX-99-EO-PA	626	VON
1	EA	ELECTRONIC LOCK	AD-200-993R-70-MTK-SPA-JD	626AM	SCH
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
~~1~~	~~EA~~	~~DOOR PULL~~	~~VR910 NL~~	~~630~~	~~IVE~~
1	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)	-	PEM
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

RFI-006: Omit

HARDWARE GROUP NO. 99EO - EXTERIOR DOOR "EXIT ONLY" WITH PANIC HARDWARE

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	EA	PANIC HARDWARE	CD-AX-99-EO-PA	626	VON
1	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)	-	PEM
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 99EOR - EXTERIOR RATED DOOR “EXIT ONLY” WITH PANIC HARDWARE

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	EA	PANIC HARDWARE	CD-AX-99-F-EO-PA Fire Rated Hardware, where occurs See plans for rated wall locations	626	VON
1	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 992-A - INTERIOR PANIC DEVICE / ACOUSTICAL HOLLOW METAL DOOR

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	652	IVE
1	EA	KEYED REMOVABLE MULLION	KR9954-154STAB-MT54	689	VON
2	EA	EXIT HARDWARE	CD-AX-99-L-2SI-17-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX (LEVER)	626	SCH
2	EA	MORTISE CYLINDER	20-061-ICX (CD-)	626	SCH
1	EA	FSIC MORT. CYL.	20-700 114 (MULLION)	626	SCH
5	EA	FSIC CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	7500M	689	NOR
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	ACOUSTICAL GASKETING	319CN	-	PEM
1	EA	MULLION SEAL	8780N	N	ZER
2	EA	AUTO DOOR BOTTOM	412CSL	-	PEM
1	EA	SADDLE THRESHOLD	151 (verify color)	-	PEM
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 992AO - EXTERIOR PAIR OF STOREFRONT DOORS WITH PANIC HARDWARE & AUTO OPERATOR

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	EA	CONT. HINGE	1200-600XHD 6063-T6 EPT	AL	HAG
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	KEYED REMOVABLE MULLION	KR4954-154154STAB-MT54	689	VON
1	EA	PANIC HARDWARE	CD-AX-99-EO-PA	626	VON
1	EA	ELEC PANIC HARDWARE	QEL+-99-NL-OP-110MD	626	VON
1	EA	MORTISE CYLINDER	20-001 114 USE W/ KEY SWITCH	626	SCH
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
1	EA	FSIC MORT. CYL.	20-700 114 (MULLION)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
1	EA	SURF. AUTO OPERATOR	9542 SURFACE-MOUNTED WITH 9540 MOUNTING PLATE	689	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-836T WIRED (EXTERIOR)	630	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-836TW WIRELESS (INTERIOR)	630	LCN
1	EA	WIRELESS RECEIVER	8310-865	-	LCN
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	MULLION SEAL	8780N	N	ZER
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
1	EA	KEY SWITCH	653-1414 L2	630	SCE
1	EA	POWER SUPPLY	PS902 900-BBK 900-2RS-FA	LGR	VON
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	EA	FLOOR STOP	FS18S	BLK	IVE

NOTES:

1) Install the FLOOR STOP/holder at the inactive leaf
2) The Auto-Operator is to be held open by using the key switch.
3) At Hollow Metal Doors and Frames, PROVIDE the following additional hardware:

1	EA	WEATHERSTRIPPING	188S-BK	S-BK	ZER
1	EA	DOOR BOTTOM	222APK	AL	PEM

HARDWARE GROUP NO. 992C - PAIR OF HM DOOR WITH PANIC HARDWARE

RFI-006: Add Door Pull VR910 NL, 630, IVES

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	652	IVE
1	EA	KEYED REMOVABLE MULLION	KR4954-154STAB -MT54	689	VON
1	EA	PANIC HARDWARE	CD-AX-99-EO-PA	626	VON
1	EA	PANIC HARDWARE	CD-AX-99-NL-OP-110MD-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX (NIGHT LATCH)	626	SCH
2	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
1	EA	FSIC MORT. CYL.	20-700 114 (MULLION)	626	SCH
4	EA	FSIC CORE	23-030	626	SCH
3	EA	FSIC CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	7500M	689	NOR
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	DOOR GASKETS	BY STOREFRONT	-	-
1	EA	MULLION SEAL	8780N	N	ZER
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

NOTES:

1) At Hollow Metal Doors and Frames, PROVIDE the following additional hardware:

3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 992CCD – CROSS CORRIDOR DOOR WITH HOLD OPEN

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	FIRE/LIFE WALL MAG	SEM7820 (Floor Mounted)	689	LCN
2	EA	PANIC HARDWARE	**AX9949-EO-LBL-PA** (Concealed vertical cable device with lever)	626	VON
-	EA	CLOSERS	BY STOREFRONT (Calibre Double Acting Concealed Overhead)	-	-
-	EA	PIVOT	BY STOREFRONT (Bottom Center Pivot)	-	-
-	EA	SMOKE SEALS	BY STOREFRONT	-	-

HARDWARE GROUP NO. 992E - EXTERIOR PAIR OF DOORS WITH PANIC HARDWARE

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	EA	KEYED REMOVABLE MULLION	KR4954-154STAB -MT54	689	VON
1	EA	PANIC HARDWARE	CD-AX-99-EO-PA	626	VON
1	EA	PANIC HARDWARE	CD-AX-99-NL-OP-110MD-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX (NL)	626	SCH
2	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
1	EA	FSIC MORT. CYL.	20-700 114 (MULLION)	626	SCH
3	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	MULLION SEAL	8780N	N	ZER
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

NOTES:

1) At Hollow Metal Doors and Frames, PROVIDE the following additional hardware:

3	EA	WEATHERSTRIPPING	319CN	-	PEM
2	EA	DOOR BOTTOM	222APK	AL	PEM

HARDWARE GROUP NO. 992E-A - EXTERIOR PAIR OF DOORS WITH PANIC HARDWARE - ACOUSTICAL

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	EA	KEYED REMOVABLE MULLION	KR4954-154STAB -MT54	689	VON
1	EA	PANIC HARDWARE	CD-AX-99-EO-PA	626	VON
1	EA	PANIC HARDWARE	CD-AX-99-NL-OP-110MD-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX (NL)	626	SCH
2	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
1	EA	FSIC MORT. CYL.	20-700 114 (MULLION)	626	SCH
3	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	MULLION SEAL	8780N	N	ZER
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

NOTES:
1) At Hollow Metal Doors and Frames, PROVIDE the following additional hardware:

3	EA	ACOUSTICAL GASKETING	319CN	-	PEM
1	EA	AUTO DOOR BOTTOM	412CSL	-	PEM
2	EA	DOOR BOTTOM	222APK	AL	PEM

HARDWARE GROUP NO. 992EO - EXTERIOR PAIR OF DOORS "EXIT ONLY" WITH PANIC HARDWARE

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	EA	KEYED REMOVABLE MULLION	KR4954-154STAB -MT54	689	VON
2	EA	PANIC HARDWARE	CD-AX-99-EO-PA	626	VON
1	EA	MORTISE CYLINDER	20-057-ICX	626	SCH
2	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
1	EA	FSIC MORT. CYL.	20-700 114 (MULLION)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	MULLION SEAL	8780N	N	ZER
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 992EL - EXTERIOR PAIR OF DOORS WITH PANIC HARDWARE – ELECTRONIC A.D. LOCK – MULTI TECHNOLOGY WITH KEYPAD

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	120-600XHD 6063-T6	AL	HAG
1	EA	KEYED REMOVABLE MULLION	KR4954-154STAB -MT54	689	VON
2	EA	PANIC HARDWARE	CD-AX-99-EO-PA	626	VON
1	EA	ELECTRONIC LOCK	AD-200-993R-70-MTK-SPA-JD	626AM	SCH
1	EA	MORTISE CYLINDER	20-057-ICX	626	SCH
2	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
1	EA	FSIC MORT. CYL.	20-700 114 (MULLION)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	MULLION SEAL	8780N	N	ZER
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 992NL - EXTERIOR PAIR OF DOORS "NIGHT LATCH" WITH PANIC HARDWARE

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	120-600XHD 6063-T6	AL	HAG
1	EA	KEYED REMOVABLE MULLION	KR4954-154STAB -MT54	689	VON
1	EA	PANIC HARDWARE	CD-AX-99-EO-PA	626	VON
1	EA	PANIC HARDWARE	CD-AX-99-NL-990-PA	626	VON
1	EA	MORTISE CYLINDER	20-057-ICX	626	SCH
2	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
1	EA	FSIC MORT. CYL.	20-700 114 (MULLION)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
3	EA	FSIC CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	7500M OUTSWING	689	NOR
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	MULLION SEAL	8780N	N	ZER
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 99R - FIRE RATED INTERIOR, EXIT DEVICE FOR CLASSROOM DOORS XB13-088 is an ADA Thumb-Turn Rim Cylinder

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	AL	HAG
1	EA	FIRE EXIT HARDWARE	AX-99-L-F-2SI-17-SNB-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	ADA T-TURN RIM CYLIN	XB13-088	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER

HARDWARE GROUP NO. 99R-A - FIRE RATED ACOUSTICAL INTERIOR, EXIT DEVICE CLASSROOM DOOR

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	AL	HAG
1	EA	FIRE EXIT HARDWARE	AX-99-L-F-2SI-17-SNB-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	ADA T-TURN RIM CYLIN	XB13-088	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	ACOUSTICAL GASKETING	319CN	-	PEM
1	EA	AUTO DOOR BOTTOM	412CSL	-	PEM
1	EA	SADDLE THRESHOLD	151 (verify color)	-	PEM
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

HARDWARE GROUP NO. 992R – FIRE-RATED INTERIOR, EXIT DEVICE FOR CORRIDOR DOORS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
10	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	FIRE EXIT HARDWARE	AX-99-L-F-2SI-17-SNB-PA	626	VON
1	EA	FIRE EXIT HARDWARE	AX-99-EO-F-SNB-PA	626	VON
2	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX	626	SCH
3	EA	FSIC CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	7500M	689	NOR
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	KEYED REMOVABLE MULLION	KR9954-154STAB-MT54	689	VON
1	EA	MULLION SEAL	8780N	N	ZER

NOTE: Verify the Hardware Group with the supplier and ensure that the hardware components are compatible with the system.

HARDWARE GROUP NO. 99R-HO – FIRE-RATED INTERIOR, EXIT DEVICE WITH FIRE ALARM WALL MAG

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HW HINGE	5BB1HW 5 X 4.5	652	IVE
1	**EA**	**PANIC HARDWARE**	**AX-99-L-F-990-PA**	**626**	**VON**
1	EA	MORTISE CYLINDER	20-061-ICX	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	FIRE/LIFE WALL MAG	SEM7850 WALL RECESSED	689	LCN
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER

HARDWARE GROUP NO. 99R-QM - FIRE-RATED INTERIOR, EXIT DEVICE WITH FIRE ALARM WALL MAG

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HW HINGE	5BB1HW 5 X 4.5	652	IVE
1	**EA**	**PANIC HARDWARE**	**QM-99-L-F-990-PA**	**626**	**VON**
1	EA	MORTISE CYLINDER	20-061-ICX	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	FIRE/LIFE WALL MAG	SEM7850 WALL RECESSED	689	LCN
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER

HARDWARE GROUP NO. 992R-HO – FIRE-RATED INTERIOR, EXIT DEVICE WITH FIRE ALARM WALL MAGS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HW HINGE	5BB1HW 5 X 4.5	652	IVE
1	**EA**	**PANIC HARDWARE**	**AX-99-EO-F-PA**	**626**	**VON**
1	**EA**	**PANIC HARDWARE**	**AX-99-L-F-990-PA**	**626**	**VON**
1	EA	MORTISE CYLINDER	20-061-ICX	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	7500M	689	NOR
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18S	BLK	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7850 WALL RECESSED	689	LCN
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER
1	EA	KEYED REMOVABLE MULLION	KR9954-154STAB-MT54	689	VON
1	EA	MULLION SEAL	8780N	N	ZER

HARDWARE GROUP NO. 99TR - INTERIOR TEMPERATURE RISE FIRE-RATED DOOR WITH PANIC HARDWARE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
10	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	FIRE EXIT HARDWARE	AX-99-L-F-2SI-17-SNB-PA	626	VON
2	EA	RIM CYLINDER	20-057-ICX	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER
1	EA	FLOOR STOP	FS18S	BLK	IVE

NOTE: Verify the Hardware Group with the supplier and ensure that the hardware components are compatible with the system.

HARDWARE GROUP NO. 992TR - INTERIOR PAIR OF TEMPERATURE RISE FIRE-RATED DOORS WITH PANIC HARDWARE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
5	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA	FIRE EXIT HARDWARE	AX-99-L-F-2SI-17-SNB-PA	626	VON
2	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX	626	SCH
3	EA	FSIC CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	7500M	689	NOR
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	SMOKE SEALS	188S-BK	S-BK	ZER
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	KEYED REMOVABLE MULLION	KR9954-154154STAB-MT54	689	VON
1	EA	MULLION SEAL	8780N	N	ZER

NOTE: Verify the Hardware Group with the supplier and ensure that the hardware components are compatible with the system.

EXTERIOR SITE DOORS AND GATES

HARDWARE GROUP NO. 21G – EXTERIOR FIRE DEPARTMENT GATE PADLOCK

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	PADLOCK	MODEL SERIES 21B772-L-M5 W/ GALV. STEEL CHAIN FIRE DEPARTMENT ACCESS LOCK DETERMINE WITH THE DISTRICT DEPARTMENT THE STANDARD METHOD OF SECURING THE LOCK TO THE GATE	606 SATIN BRASS	BEST

HARDWARE GROUP NO. 23G – PADLOCK – SINGLE SITE GATE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	PADLOCK KNK-KD	KS23F2300	606	SCH
1	EA	FSIC CORE	23-030	626	SCH

HARDWARE GROUP NO. 232G – PADLOCK – PAIR SITE GATES

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	PADLOCK KNK-KD	KS23F2300	606	SCH
2	EA	FSIC CORE	23-030	626	SCH

HARDWARE GROUP NO. 600M – DEADBOLT LOCK – BLEACHER GATE (BLDG M – GYM)

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	DEADBOLT LOCK	B662P	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	CONTINUOUS HINGE	112XY (cut to match gate height)	-	IVES
1	EA	WALL STOP-HOLDER	3EHX5	-	GRR

HARDWARE GROUP NO. 66G – DEADBOLT LOCK – SINGLE SITE GATE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	DEADBOLT LOCK	B662P	626	SCH
1	EA	FSIC CORE	23-030	626	SCH

NOTE: THESE GATES ARE LOCKED OPEN AND CLOSED

HARDWARE GROUP NO. 662G – DEADBOLT LOCK – PAIR SITE GATES

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	DEADBOLT LOCK	B662P	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
2	EA	HINGE CLOSER	MAMMOTH-180	BLACK	LOC

NOTE: THESE GATES ARE LOCKED OPEN AND CLOSED

HARDWARE GROUP NO. 662PG – DEADBOLT LOCK AT PAIRED POOL GATES – ORNAMENTAL IRON

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	DEADBOLT LOCK	B662P	626	SCH
4	EA	FSIC CORE	23-030	626	SCH
2	EA	HINGE CLOSER	MAMMOTH-180	BLACK	LOC
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES

NOTE: THESE GATES ARE LOCKED OPEN AND CLOSED

HARDWARE GROUP NO. 70G – CLASSROOM LOCK – SINGLE SITE GATE AT TENNIS COURTS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CLASSROOM LOCK	ND70PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	KICK PLATE	SEE GATE DETAILS	-	-
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	EA	CLOSER	MAMMOTH-180	SILVER	LOC

HARDWARE GROUP NO. 98G - SINGLE SITE GATE - ~~HOLLO~~

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	EA	PANIC HARDWARE	CD-AX-98-NL-OP-110MD-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	7500M	689	NOR
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 98TG - SINGLE SITE GATE – CHAIN LINK TENNIS COURT GATE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	PANIC HARDWARE	CD-AX-98-NL-OP-110MD-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	KICK PLATE	SEE GATE DETAILS	-	-
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
1	EA	CLOSER	MAMMOTH-180	SILVER	LOC

HARDWARE GROUP NO. 982G - PAIR SITE GATE - ~~HOLLOW~~

RFI-006: Use Ives 224HD and Omit the 120-600XHD.

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	1200-600XHD 6063-T6	AL	HAG
1	EA	PANIC HARDWARE	98-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES
6	EA	SILENCER	SR64	GRY	IVE
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUSTPROOF STRIKE	DP2	626	IVE
1	EA	MEETING STILE	328AA	AA	ZER

HARDWARE GROUP NO. 982GV - EXTERIOR POOL GATE WITH PANIC HARDWARE W/ VANDAL PULLS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE CLOSER	LOXINOX MAMMOTH 180	SILVER	LOX
1	EA	MULLION	SEE DETAILS	-	-
1	EA	PANIC HARDWARE	CD-AX-98-EO-PA	626	VON
1	EA	PANIC HARDWARE	CD-AX-98-NL-OP-110MD-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX (NL)	626	SCH
2	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
3	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PU-LL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES

HARDWARE GROUP NO. 982GL - EXTERIOR POOL GATE WITH PANIC HARDWARE W/ LEVER PULLS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE CLOSER	LOXINOX MAMMOTH 180	SILVER	LOX
1	EA	MULLION	SEE DETAILS	-	-
2	EA	PANIC HARDWARE	CD-AX-98-L-996L-06	626	VON
2	EA	RIM CYLINDER	20-057-ICX	626	SCH
2	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
4	EA	FSIC CORE	23-030	626	SCH
2	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVES

END OF SECTION

SECTION 088000 – GLASS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all glass materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. 06 22 00 MILLWORK
   4. 07 92 00 SEALANTS
   5. 08 11 00 METAL DOORS AND FRAMES
   6. 08 14 16 WOOD DOORS
   7. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   8. 08 41 00 STOREFRONTS
   9. 08 56 59 SERVICE WINDOWS
   10. 09 91 00 PAINTING
   11. 10 05 00 MISCELLANEOUS SPECIALTIES
   12. 10 14 00 IDENTIFYING DEVICES
   13. 10 28 13 TOILET ACCESSORIES
   14. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. AAMA American Architectural Manufacturers Association.
      b. ANSI American National Standards Institute.
      c. ASTM American Society for Testing and Materials.
      d. CSPC Consumer Products Safety Commission.
      e. FGMA Flat Glass Marketing Association Glazing Manual, 1990 Edition.
      f. GANA Glass Association of North America
      g. GTA Glass Tempering Association.
      h. IGCC Insulating Glass Certification Council.
      i. LSGA Laminated Safety Glass Association.
      j. SGCC Safety Glazing Certification Council.
      k. SIGMA Sealed Insulating Glass Manufacturers Association.

1.3 DEFINITIONS

A. Manufacturer is used in this Section to refer to a firm that produces primary glazing, fabricated glazing, or both as defined in the referenced glazing standards.

1. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written directions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
2. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written directions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated glass standard.
3. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed the manufacturing process and not to causes other than glass breakage and improper practices for maintaining, and cleaning insulating glass contrary to manufacturers written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on the interior surfaces of glass.
4. f.o.b. – "Free On Board".
5. Glass Surfaces:
   a. Single Glazed:
      1) Surface #1: exposed to outdoors.
      2) Surface #2: exposed to indoors.
   b. Dual Glazed:
      1) Exterior Lite:
         a) Surface #1: exposed to outdoors.
         b) Surface #2: faces insulating "air" space. Primary location for energy efficient coatings.
      2) Interior Lite:
         a) Surface #3: faces insulating "air" space. Secondary location for energy efficient coatings.
         b) Surface #4: exposed to indoors.

1.4 SYSTEM DESCRIPTION

A. Performance Requirements: It is the intention of this specification and the drawings to form a guide for a completely sealed glazing system. Any items not specifically noted but necessary for a completely sealed glazing system shall be provided under this section.
   1. Provide glazing systems that are produced, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading (where applicable), without failure, including loss or glazing breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; and other defects in construction.
   2. Glass Design: Glass thickness indicate minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for the various size openings in the thicknesses and strengths (annealed or heat-treated) to meet or exceed the following criteria:
      a. Minimum glass thickness for lites in exterior walls shall be not less than 6.0mm (1/4" nom.).
   3. Thermal Movement: Provide glazing that allows for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures acting on glass-framing members and glazing components. Base engineering calculation on material's actual surface temperatures due to both solar heat gain and nighttime sky heat loss.
      a. Temperature Change Range: 120 deg F, ambient; 180 deg F, material surfaces..

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Coordination Drawings:
a. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
2. Product Data.
a. Submit manufacturer's product data for each glazing product and accessory material indicated.
3. Samples.
a. Provide 12 inch square sample of each glass type, color and pattern selected.
b. Provide 6 inch square samples of insulated glazing panels for each glazing type and pattern selected.
c. Provide 12 inch long samples of each type of glazing sealant, gasket or glazing tape. Install sealant or glazing material sample between two strips of material representative in color of the adjoining framing system.
4. Quality Assurance/Control Submittals:
a. Test Reports:
1) Compatibility and Adhesion Test: From sealant manufacturer indicating that glazing sealants were tested for adhesion to glass and glazing channel substrates and compatibility with glass and other glazing material.
b. Certificates:
1) Contractor's Certification.
2) Qualification Data:
a) Material Qualifications.
b) Installer Qualifications.
c) Manufacturer/Supplier Qualifications.
3) Product Certificates:
a) Fire-Resistive Ceramic Glazing materials.
c. Manufacturer's Written Instructions:
1) Manufacturer's written installation instructions for all products.
5. Closeout Submittals in accordance with the following:
a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
b. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
c. Warranty in accordance with Specification Section - WARRANTIES.
1) Special Warranties:
a) Coated Glass Products.
b) Laminated Glass Products.
c) Insulated Glass Products.
d) Insulated Glazing Products.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
a. Comply with published recommendations of glazing product manufacturers and organizations listed, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

b. Obtain glazing from one source for each product indicated.

2. Installer Qualifications:
   a. An experienced Installer who has completed three (3) projects similar in materials, design and extent to that indicated for this Project; whose work has resulted in glass installation with a record of successful in-service performance..
3. Manufacturer/Supplier Qualifications:
   a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
   b. All glazing shall comply with provisions of CBC Chapter 24 for quality standards and CBC Section 2403.1 for identification.
   c. All glazing subject to Hazardous Locations shall comply with Safety Glazing Requirements and CBC Chapter 2406.

C. Certificates:
1. Contractor's Certification: Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the Code Minimum requirements, and the other specified requirements of this Section.
2. Qualification Data: Contractor's installation certificates.
3. Product Certificates: Glazing materials manufacturers certifying that their products comply with specified requirements.
4. Fire-Resistive Ceramic Glazing materials certification that products comply with CPSC Requirements.

D. Meetings:
1. Pre-Installation: Schedule prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
   c. Pre-glazing conference: Scheduled by the Contractor prior to the start of any glazing operation for the proper performance of the work.
      1) Minimum agenda shall be to review the work required; discuss field observations, problems, and decisions; corrective measures if necessary; and maintenance of quality and work standards in accordance with manufacturer's warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
a. Protect glazing materials to comply with manufacturer's written directions and as needed to prevent damage to glazing and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
2. Where insulating glass units will be exposed to substantial altitude changes, comply with insulating glass fabricator's recommendations for venting and sealing to avoid hermetic seal ruptures.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and Protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:
1. Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.
a. Do not install liquid sealants when ambient and substrate temperature conditions are outside of limits by glazing sealant manufacturer or below 40 deg F.

1.9 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. In accordance with manufacturer's written standard warranty.
2. Manufacturer's Warranty on Coated Glass Products:
a. Submit written warranty signed by coated glass manufacturer agreeing to replace coated glass units that deteriorate as defined in "Definitions" article, f.o.b. the nearest shipping point of Project Site, within specified warranty period.
b. Warranty Period: Five (5) Years.
1) From date of Substantial Completion.
3. Manufacturer's Warranty on Laminated Glass Products:
a. Submit written warranty signed by insulating glass manufacturer agreeing to replace laminated glass units that deteriorate as defined in the "Definitions" article, f.o.b. the nearest shipping point of Project Site, within specified warranty period.
b. Warranty Period: Five (5) Years.
1) From date of Substantial Completion.
4. Manufacturer's Warranty on Insulating Glass Products:

a. Submit written warranty signed by manufacturer of insulating glass agreeing to replace insulating glass units that deteriorate as defined in "Definitions" article, f.o.b. the nearest shipping point of Project Site, within specified warranty period.
b. Warranty Period: Ten (10) Years.
1) From date of Substantial Completion.

5. Manufacturer's Warranty on Acoustical Glass Products:
a. Submit written warranty signed by manufacturer of acoustical glass agreeing to replace acoustical glass units that deteriorate as defined in "Definitions" article, f.o.b. the nearest shipping point of Project Site, within specified warranty period.
b. Warranty Period: Ten (10) Years.
1) From date of Substantial Completion.

6. Manufacturer's Warranty on Insulated Glazing Panels:
a. Submit written warranty signed by manufacturer of Insulating Glazing Panels agreeing to replace Insulating Glazing Panels that deteriorate due to crazing, cracking, color fading and delamination under ordinary conditions.
b. Warranty Period: Twenty (20) Years.
1) From date of Substantial Completion.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period One (1) Year.
1) From date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified Annealed Float Glass product manufacturer, or approved equivalent:
a. Class 1 materials:
1) VITRO ARCHITECTURAL GLASS (formerly PPG INDUSTRIES, INC.).
2) Acceptable Alternative Class 1 Manufacturers:
a) AFG INDUSTRIES, INC.
b) CARDINAL GLASS INDUSTRIES.
c) GUARDIAN INDUSTRIES CORPORATION
d) PILKINGTON SALES (NORTH AMERICA) LTD.
b. Class 2 materials, Pyrolytic Coated (On-Line Process):
1) VITRO ARCHITECTURAL GLASS (formerly PPG INDUSTRIES, INC.), "Graylite" Tinted Glass.
2) Acceptable Alternative Class 2 Pyrolytic (On-Line) manufacturers:
a) AFG INDUSTRIES, INC.
b) PILKINGTON SALES (NORTH AMERICA) LTD.
c. Class 2 materials, Applied Coating (Off-Line Process):
1) VIRACON INC.
2) Acceptable Alternative Class 2 Applied Coating (Off-Line) manufacturers:
a) AFG INDUSTRIES, INC.

b) CARDINAL GLASS INDUSTRIES.
c) GUARDIAN INDUSTRIES CORPORATION.
d) PILKINGTON SALES (NORTH AMERICA) LTD.
e) VITRO ARCHITECTURAL GLASS (formerly PPG INDUSTRIES, INC.)

2. Specified Fire-Rated/Safety Glazing product manufacturer, or approved equivalent:
   a. PILKINGTON SALES (NORTH AMERICA) LTD.
   b. Acceptable Alternative Fire-Rated/Safety Glazing Manufacturers:
      1) SAINT-GOBAIN ("Vetrotech Products").
3. Specified Fire-Rated Safety Rated Wire Glass product supplier or approved equivalent:
   a. TECHINCAL GLASS PRODUCTS.
4. Specified Laminated Glass product manufacturer, or approved equivalent:
   a. OLD CASTLE GLASS, See schedule at the end of this section for type.
   b. Interlayer Manufacturers:
      1) SOLUTIA INC., Clear Interlayers.
      2) SOLUTIA INC., Colored Interlayers: "VANCEVA".
      3) DU PONT SENTRYGLAS EXPRESSIONS, Custom Graphic Interlayer.
5. Specified Mirrored Glass product manufacturer, or approved equivalent:
   a. C.R.LAURENCE CO., INC., Mirrored Glass Accessories.
   b. GUARDIAN INDUSTRIES: See schedule at the end of this section for type.
6. Specified Insulating Glazing Panel product manufacturer, or approved equivalent:
   a. MAPES INDUSTRIES, INC, See schedule at the end of this section for type.
7. Specified Glazing Tapes and other Accessory manufacturer, or approved equivalent:
   a. TREMCO, Glass Tapes "440 Tape".
   b. Acceptable Alternative Accessory Manufacturer:
      1) ADCO "ADCOSEAL GT-1 or GT-4".

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:
   1. All glazing shall comply with all provisions of CBC Chapter 24.
      a. Provide the required strength of glazing to comply with the area limitation set forth in CBC Table 2403.2.1 for individual lites.
   2. Refer to the Glass Schedule of this section for the class of each Glazing Type.
   3. Refer to the Insulating Glazing Panel Schedule of this section for the class of each Insulated Glazing Panel Type.

B. Annealed Float Glass: ASTM C 1036 "Specification for Flat Glass", Type I, and and ASTM C 1048 "Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass", Type (transparent glass, flat), Quality q3 (glazing select), of Class indicated.

C. Heat-Treated Float Glass: ASTM C 1048 "Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass", Type I (transparent glass, flat), Quality q3 (glazing select), of class, kind and condition indicated.
   1. Fabrication Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option, except provide horizontal process where indicated as tongless or free of tong marks.
   2. Provide Kind HS (Heat-Strengthened) float glass in place of annealed float glass where needed to resist thermal stresses indicated by differential shading of individual glass lites and to comply with glass design requirements.

3. Uncoated Glass: Comply with the requirements for Condition A.
4. Coated Glass: Comply with the requirements for Condition C.
5. Tempered: Provide Kind FT (Fully Tempered) float glass in place of annealed or Kind HS (Heat Strengthened) float glass where safety glass is indicated.

D. Ceramic-Coated Spandrel Glass: ASTM C 1048 "Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass", Condition B (spandrel glass, one surface ceramic coated), Type II (tinted flat glass), Quality-Q3, and complying with other requirements specified.
   1. Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048 "Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass"..

E. Fire-Rated Glass:
   1. Provide glass products that comply with NFPA 80, NFPA 252 & 257 Fire rating requirements.
   2. Provide Fire-Rated Safety Glass that complies with CBC Section 2406, CPSC and ANSI Z97.1 Safety Glazing requirements for glazing subject to human impact.

F. Fire-Rated Safety Rated Wire Glass:
   1. Provide glass products that comply with NFPA 80, NFPA 252 & 257 Fire Rating Requirements.
   2. Provide glass products that comply with CBC Table 2406.2(1), CPSC (Category I and II) Safety Glazing Requirements for Glazing Subject to Human Impact, and CBC Table 2406.2(2), ANSI Z97.1.

G. Patterned Glass: ASTM C 1036, "Specification for Flat Glass", Type II (patterned and wired flat glass), Class 1 (clear), Form 3 (patterned), and of quality, finish, and pattern specified.
   1. Tempered Patterned Glass: ASTM C 1048 "Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass", Kind FT (Fully Tempered), Type II (patterned flat glass), Class 1 (clear), Form 3 (patterned), and of quality, finish, and pattern specified.

H. Laminated Glass: ASTM C 1172 "Specification for Laminated Architectural Blast Glass", laminated glass indicated and compliance with other requirements specified, and with the following:
   1. Refer to annealed and heat-treated glass requirements relating to properties of glass products comprising laminated glass products.
   2. Interlayer: Of material and thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
      a. Clear Interlayer: When no color is required, provide clear 0.015" (0.38 mm) polyvinyl butyral interlayer in autoclave with heat plus pressure for glass areas less than 9 sq.ft. For areas larger than 9 sq.ft, provide 0.030" (0.76 mm) interlayer.
      b. Color Interlayer: Provide colored 0.015" (0.38 mm) polyvinyl butyral interlayer in autoclave with heat plus pressure for glass areas less than 9 sq.ft. For areas larger than 9 sq.ft, provide 0.030" (0.76 mm) interlayer.
         1) Color A: SOLUTIA INC., VANCEVA, thickness of 0.015" color layer with clear second layer thickness of 0.015", for a total thickness of 0.030" (0.76 mm) minimum.
         2) Color B: SOLUTIA INC., VANCEVA, thickness of 0.015" color layer with clear second layer thickness of 0.015", for a total thickness of 0.030" (0.76 mm) minimum.

3) Color C: SOLUTIA INC., VANCEVA, thickness of 0.015" color layer with clear second layer thickness of 0.015", for a total thickness of 0.030" (0.76 mm) minimum.

c. Decorative Graphic Interlayer: DU PONT SENTRY GLAS EXPRESSIONS, custom graphic, with clear backer layer, 0.060" (1.52 mm) minimum overall.

1) Image: coordinate with Architect’s graphic design department.

3. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:

a. Laminate lites with interlayer film in autoclave with heat plus pressure.

I. Mirrored Glass Products: Annealed Glass, with silver coating.

1. General:

a. Provide mirror edge sealant at all edges to prevent discoloration.

b. Provide adhesive that is compatible with backing of the mirror.

2. Safety: Provide Category 2 backing complying with CPSC 16CFR1201.

J. Insulated Glass:

1. General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated inter-space, and complying with ASTM E 774 "Specification for the Classification of the Durability of Sealed Insulating Glass Units", of Class CBA units and with requirements specified.

2. Provide Kind HS (Heat-Strengthened) float glass in place of annealed glass where needed to resist thermal stresses inducted by differential shading of individual glass lites and to comply with glass design requirements.

3. Tempered: Provide Kind FT (Fully Tempered) glass where safety glass is indicated.

4. Overall Unit Thickness and Thickness of each lite dimension indicated for insulating glass units are nominal and the overall thickness of units are measured perpendicular from outer surfaces of glass lites at unit's edges.

5. Sealing System: Dual seal with primary and secondary sealants as follows:

a. Manufacturers standard sealants.

6. Spacer: Manufacturers standard spacer material and construction, compatible with dehydrating gas filler.

K. Insulated Glazing Panels:

1. See Insulated Glazing Panel Schedule at the end of this section for types and texture of panel faces, overall panel thickness, types and thickness of stabilizers, types and thickness of cores, minimum R-Values required, and any spandrel glass requirements.

2. When Porcelain Enamel faces exceed five feet in any one direction, provide 24 gage face in lieu of 28 gage face.

2.3 ACCESSORIES

A. Elastomeric Glazing Sealants:

1. General: Provide products of type indicated, complying with the following requirements:

a. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials they will contact, including glazing products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

b. Suitability: Comply with sealant and glazing manufacturer's written recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.

c. Colors: Provide color of exposed joint sealants to comply with the following:

1) Match colors indicated by reference to manufacturer's standard designations.

2) Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

2. Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with ASTM C 920 "Specification for Elastomeric Joint Sealants", requirements indicated in Specification Section - SEALANTS, including those referencing ASTM classifications for Type, Grade, Class and Uses.

B. Glazing Sealants for Fire-Rated Glazing Products:
1. Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

C. Glass Tapes:
1. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, non-staining and non-migrating in contact with nonporous surfaces, with or without spacer rod as recommended in writing by tape and glazing manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with ASTM C 1281 "Specification for Preformed Tape Sealants for Glazing Applications", and AAMA 800 "Voluntary Specifications and Test methods for Sealants" for products indicated below:
a. AAMA Section 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

D. Mirrored Glazing Materials:
1. Adhesive that is compatible with the backing of the mirrors.

E. Miscellaneous Glass Materials:
1. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glass materials involved for glass application indicated, and with a proven record of compatibility with surfaces contacted in installation.
2. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
3. Setting Blocks: Elastomeric material with a Shore Type A durometer hardness of 85 plus or minus 5.
4. Spacers: Elastomeric blocks or continuous extrusions with a Shore Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
5. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side-walking).
6. Plastic Foam Joint Fillers: Pre-formed, compressible, resilient, nonstaining, nonextruding, nonoutgassing, strips of closed-cell plastic foam of density, size, and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.
7. Perimeter Insulation for Fire-Resistive Glass: Identical to product used in test assembly to obtain fire-resistive rating.

2.4 FABRICATION

A. Fabricate glass and other glass products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instruction and recommendations of product manufacturer and referenced glazing standard, to comply with system performance requirements.

B. Clean cut or flat grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.

C. Grind smooth and Polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
      a. Examine glass framing, with glazier present, for compliance with the following:
         1) Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
         2) Presence and functioning of weep system for aluminum framing systems, and proper sealing of hollow metal frame systems with no weep systems.
         3) Minimum required face or edge clearances.
         4) Effective sealing between joints of glass-framing members.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
   3. Clean glass channels and other framing members receiving glass immediately before glazing.
   4. Remove coatings that are not firmly bonded to substrates.
   5. Wipe down any mirror backing with alcohol before applying mirror adhesives.

3.3 INSTALLATION

A. Glass, General:
   1. Comply with installation standards of CBC Chapter 24.
      a. Glass subject to human impact shall be installed in accordance with CBC 2406.

2. Comply with combined written instructions and recommendations of manufacturers of glass, insulated glass panels, sealants, gaskets, and other glass materials, except where more stringent requirements are indicated, including those in referenced glazing publications.
3. Glass channel dimensions, as indicated on Drawings, provide necessary bite on glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
4. Protect glass from edge damage during handling and installation as follows:
   a. Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels on bottom horizontal edges so edges are located at top of opening, unless otherwise indicated by manufacturer's label.
   b. Remove damaged glass from Project site and legally dispose of off site. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.
5. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
6. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
7. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
8. Provide spacers for glass sizes larger than 50 united inches (length plus height) as follows:
   a. Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glass tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.
   b. Provide 3.0mm (1/8" nom.) minimum bite of spacers on glass and use thickness equal to sealant width. With glass tape, use thickness slightly less than final compressed thickness of tape.
9. Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.
10. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

B. Tape Glazing:
1. Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sight-line of stops.
   a. Slightly recess tape at exterior conditions, and continuously cap bead with elastomeric sealant leaving no open joints.
2. Install tapes continuously but not in one continuous length.
   a. Do not stretch tapes to make them fit opening.
3. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs.
4. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
5. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped.
6. Do not remove release paper from tape until just before each lite is installed.
7. Seal joints in tapes with compatible sealant approved by tape manufacturer.
   a. Apply continuous heal bead of elastomeric sealant at all exterior hollow metal framing stops.
   b. Install a continuous toe bead of elastomeric sealant at all exterior hollow metal framing stops on installations with Laminated Glass, Wire Glass or Insulated Glazing Panels.

c. Apply continuous cap bead of elastomeric sealant over exposed edge of tape.

8. Install tapes on all fixed and loose stops.

C. Sealant glazing (Wet):

1. Install continuous spacers between glass lites and glass stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems (if any) until sealants cure.
   a. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
2. Force sealant into glass channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
3. Tool exposed surfaces of sealants to provide a substantial wash away from glass.
   a. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion.
   a. Wash glass as recommended in writing by glazing manufacturer.

3.5 PROTECTION

A. Protection from traffic:

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.
2. Protect exterior glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass.
   a. Do not apply markers to glass surface.
   b. Remove nonpermanent labels, and clean surfaces.
3. Protect glass from contact with contaminating substances resulting from construction operations including weld splatter.
   a. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended in writing by glass manufacturer.
4. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkali deposits, or stains, and remove as recommended in writing by glass manufacturer.
5. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.

3.6 GLASS SCHEDULE

A. "G" -- General Types:

1. **<u>G-2 - Heat Strengthened, Clear Float + Clear Float:</u>**
   a. Thickness — 25.00 mm (1" nominal).
   b. Insulated Glazing Unit System:
      1) Outdoor Lite: 1/4" HS Clear Float
         a) Heat Treated, per ASTM C1048 — Kind HS
         b) Surface #2 Coating — SN 54

2) Interspace: 1/2 Inch.
a) Content: Air
b) Spacer Material: Manufactuer's standard
3) Indoor Lite: 1/4" HS Clear Float
a) Heat Treated, per ASTM C1048 Kind HS
c. Visible Light Transmittance 54.
d. Solar Heat Gain Coeffiecient (SHGC) 0.28
e. "U" Factor:
1) Winter Night-time 0.29
2) Summer Daytime 0.27

2. **G-2T - Tempered Clear Float + Clear Float:**
a. Thickness 25.00 mm (1" nominal).
b. Insulated Glazing Unit System:
1) Outdoor Lite: 1/4" Clear Float
a) Heat Treated, per ASTM C1048 Kind FT
b) Surface #2 Coating SN 54
2) Interspace: 1/2 Inch.
a) Content: Air
b) Spacer Material: Manufactuer's standard
3) Indoor Lite: 1/4" Clear Float
a) Heat Treated, per ASTM C1048 Kind FT
c. Visible Light Transmittance 54
d. Solar Heat Gain Coeffiecient (SHGC) 0.28
e. "U" Factor:
1) Winter Night-time 0.29
2) Summer Daytime 0.27

3. **G-2S - Heat Strengthened, Laminated Clear Float + Clear Float**
a. Thickness 25.00 mm (1" nominal).
b. Insulated Glazing Unit System:
1) Outdoor Lite: Laminated Clear Float 1/4" nom.
a) 3mm (1/8") HS Clear Float + 0.76 mm Opaque Color Interlayer + 3mm (1/8") HS Clear Float.
b) Heat Treated, per ASTM C1048 Kind HS
c) Architect to select interlayer color.
2) Interspace: 1/2 Inch.
a) Content: Air
b) Spacer Material: Manufactuer's standard
3) Indoor Lite: 1/4" HS Clear Float
a) Heat Treated, per ASTM C1048 Kind HS
c. Visible Light Transmittance 0.
d. "U" Factor:
1) Winter Night-time 0.29
2) Summer Daytime 0.27

B. "C" -- Clear Float Glass:
1. **C1-1 -- Clear Float, Class 1**:
a. Thickness 6.00 mm (1/4" nom).
b. Minimum Visible Light (%) Transmittance 89.
c. Solar Heat Gain Coefficient (SHGC) 0.81.
d. "U" Factor:
1) Winter Night-time 1.03.
2) Summer Daytime 0.93.

2. **C1-1T -- Tempered Clear Float, Class 1**:

a. Thickness 6.00 mm (1/4" nom).
b. Minimum Visible Light (%) Transmittance 89.
c. Solar Heat Gain Coefficient (SHGC) 0.81.
d. "U" Factor:
1) Winter Night-time 1.03.
2) Summer Daytime 0.93.

3. **C2-2 -- Heat Strengthened, Clear Float + Clear Float:**
a. Thickness 25.00 mm (1" nom).
b. Insulated Glazing Unit System:
1) Outdoor Lite: 1/4" HS Clear Float.
a) Heat Treated, per ASTM C1048 Kind HS.
b) Surface #2 Coating SN 54.
2) Interspace: 1/2 Inch.
a) Content: Air.
b) Spacer Material: Manufacturer's standard.
3) Indoor Lite: 1/4" HS Clear Float:
a) Heat Treated, per ASTM C1048 Kind HS.
c. Visible Light Transmittance 54.
d. Solar Heat Gain Coeffiecient (SHGC) 0.28.
e. "U" Factor:
1) Winter Night-time 0.29.
2) Summer Daytime 0.27.

4. **C2-2T -- Tempered Clear Float + Clear Float:**
a. Thickness 25.00 mm (1" nom).
b. Insulated Glazing Unit System:
1) Outdoor Lite: 1/4" Clear Float.
a) Heat Treated, per ASTM C1048 Kind FT.
b) Surface #2 Coating SN 54.
2) Interspace: 1/2 Inch.
a) Content: Air.
b) Spacer Material: Manufacturer's standard.
3) Indoor Lite: 1/4" Clear Float
a) Heat Treated, per ASTM C1048 Kind FT.
c. Visible Light Transmittance 54.
d. Solar Heat Gain Coeffiecient (SHGC). 0.28.
e. "U" Factor:
1) Winter Night-time 0.29.
2) Summer Daytime 0.27.

C. "M" -- Mirrored Glass:

1. **M-1 -- Annealed Glass Mirrors, Float Clear Glass:**
a. Thickness 6.00 mm (1/4" nom).
b. Minimum Visible Light (%) Transmittance N/A.
c. Solar Heat Gain Coefficient (SHGC) N/A.
d. "U" Factor: N/A.

2. **MS-1 -- Safety Mirror Glass Wall, "Clear Glass" (Annealed Glass Mirror with Category II Safety backing):**
a. Thickness 6.40 mm (1/4" nom).
b. Minimum Visible Light (%) Transmittance N/A.
c. Solar Heat Gain Coefficient (SHGC) N/A.
d. "U" Factor: N/A.

D. "FRS" -- Fire-Rated Safety Glass:

1. **FRS1-- Fire-Rated Safety Glass, 20 minute fire-rating,** "FIREGLASS 20", in accordance with NFPA 252 & 257, with ANSI Z97.1, and CPSC 16CFR1201 (Cat. II).
   a. Thickness 6.0 mm (1/4" nom).
   b. Minimum Visible Light (%) Transmittance 88.
   c. Solar Heat Gain Coefficient (SHGC) N/A.
   d. "U" Factor: N/A.
2. **FRS2 -- Fire-Rated Safety Glass, 45 minute fire-rating,** "PYROSTOP 45-200", in accordance with NFPA 252 & 257, with ANSI Z97.1, and CPSC 16CFR1201 (Cat. II), as manufactured by PILKINGTON PL.
   a. Thickness 19.0 mm (3/4" nom).
   b. Minimum Visible Light (%) Transmittance 84.
   c. Solar Heat Gain Coefficient (SHGC) N/A.
   d. "U" Factor: N/A.
3. **FRS3 -- Fire-Rated Safety Glass, interior 60 minute fire-rating,** "PYROSTOP 60-101", in accordance with NFPA 252 & 257, with ANSI Z97.1, and CPSC 16CFR1201 (Cat. II), as manufactured by PILKINGTON PL.
   a. Thickness 23.0 mm (7/8" nom).
   b. Minimum Visible Light (%) Transmittance 77.
   c. Solar Heat Gain Coefficient (SHGC) N/A.
   d. "U" Factor: N/A.
4. **FRS4 -- Fire-Rated Safety Glass, exterior 60 minute fire-rating,** "PYROSTOP 60-261", in accordance with NFPA 252 & 257, with ANSI Z97.1, and CPSC 16CFR1201 (Cat. II), as manufactured by PILKINGTON PL.
   a. Thickness 37.0 mm (1-5/8" nom).
   b. Minimum Visible Light (%) Transmittance 77.
   c. Solar Heat Gain Coefficient (SHGC) N/A.
   d. "U" Factor: N/A.
5. **FRS5 -- Fire-Rated Safety Glass, interior 120 minute fire-rating**, "PYROSTOP 120-104", in accordance with NFPA 252 & 257, with ANSI Z97.1, and CPSC 16CFR1201 (Cat. II), as manufactured by PILKINGTON PL.
   a. Thickness 54.0 mm (2-1/8" nom).
   b. Minimum Visible Light (%) Transmittance 78.
   c. Solar Heat Gain Coefficient (SHGC) N/A.
   d. "U" Factor: N/A.
6. **FRS6 -- Fire-Rated Safety Glass, exterior 60 minute fire-rating**, "PYROSTOP 60-201", in accordance with NFPA 252 & 257, with ANSI Z97.1, and CPSC 16CFR1201 (Cat. II), as manufactured by PILKINGTON PL.
   a. Thickness 27.0 mm (1-1/16" nom).
   b. Minimum Visible Light (%) Transmittance 86.
   c. Solar Heat Gain Coefficient (SHGC) N/A.
   d. "U" Factor: N/A.
7. **FRS7 -- Fire-Rated Safety Glass, exterior 120 minute fire-rating**, "PYROSTOP 120-262", in accordance with NFPA 252 & 257, with ANSI Z97.1, and CPSC 16CFR1201 (Cat. II), as manufactured by PILKINGTON PL.
   a. Thickness 54.5 mm (2-1/8" nom).
   b. Minimum Visible Light (%) Transmittance 75.
   c. Solar Heat Gain Coefficient (SHGC) N/A.
   d. "U" Factor: N/A.

E. "L" -- Laminated Glass:
1. **L-1A -- Laminated Float Glass, 1/8" nominal thickness,** Clear Glass Interior Lite with Clear / Color "A" Interlayer and 1/8" Clear Glass Exterior Lite as manufactured by OLD CASTLE GLASS:
   a. Thickness 6.76 mm (1/4" nom).

1) 3.00 mm clear glass + 0.76 mm clear/colored interlayers + 3.00 mm clear glass.

2. **L-2A -- Laminated Float Glass, 1/2" nominal thickness,** Clear Glass Interior Lite with Clear Interlayer and 1/4" Clear Glass Exterior Lite as manufactured by OLD CASTLE GLASS:
   a. Thickness 12.76 mm (1/2" nom).
      1) 6.00 mm clear glass + 0.76 mm clear interlayer + 6.00 mm clear glass.
3. **L-2B -- Laminated Float Glass, 1/2" nominal thickness,** Clear Glass Interior Lite with Color Interlayer and 1/4" Clear Glass Exterior Lite as manufactured by OLD CASTLE GLASS:
   a. Thickness 12.76 mm (1/2" nom).
      1) 6.00 mm clear glass + 0.76 mm colored interlayer + 6.00 mm clear glass.
      2) Architect to select interlayer color.

END OF SECTION

SECTION 089100 – LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material. labor, equipment and services necessary to completely install all Louver and Vent materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 06 10 00 ROUGH CARPENTRY
   5. 07 60 00 SHEET METAL
   6. 09 22 16 METAL FRAMING
   7. 09 24 00 CEMENT PLASTER
   8. 09 29 00 GYPSUM BOARD
   9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   10. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. In accordance with the following:
   1. AHDGA American Hot Dip Galvanizers Association
   2. AISI American Iron and Steel Institute

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Submit manufacturer’s standard color range for selection by the Architect.
      b. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
   2. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   2. Manufacturer/Supplier Qualifications:

a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.5 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified Insert Louver product manufacturer:
a. INDUSTRIAL LOUVERS, INC.; Model #413-SXP.
2. Specified Wall Louver product manufacturer:
a. CENTRIA; Model #FS-4S30.

B. Products from other manufacturers not listed must submit in accordance with Specification Section – SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. Insert Louver:
1. Furnish and install an all welded Model #413-SXP as manufactured by INDUSTRIAL LOUVERS, INC., complete with 19 gage wire bird screen.
2. Louver Frame and Blades:
a. Gage: 16 minimum.

b. Material: G-90 Galvanized Steel.
c. Finish: Shop Primed.

B. Wall Louver:
1. "Fixed Louver", Standard Design, designed to withstand a minimum of 20 psf wind load, Model #FS-4S30 as manufactured by CENTRIA.
2. Louver Frame and Blades:
   a. Gage: 18 minimum.
   b. Material: G-90 Galvanized Steel.
   c. Finish: Shop Primed.

C. Accessories:
1. Insect Screens (when required to control insects form migrating inside occupied space):
   a. Provide 14-18 mesh aluminum crimped insect screen, unless otherwise noted.
   b. Screens shall be mounted in a removable extruded unpainted aluminum frame.
   c. Framed screens shall be shipped loose for field installation.
   d. Screens shall mount flush with the interior face of the Fixed Louvers.
2. Mullion Covers:
   a. Provide manufacturer's compatible mullion cover constructed of the same materials and finish as the louvers and shall be provided for the interior face.
   b. Mullions shall be shipped loose for field installation.

2.3 FABRICATION

A. Shop Assembly:
1. All louvers shall be riveted constructed and factory assembled, unless otherwise noted.
2. Miter corners at Louver Intersections when shown on drawings.

2.4 FINISHES

A. Shop Priming:
1. 0.2 mil primer coat as recommended in writing by the manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work specified under this specification section.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 ERECTION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
2. Clean any soiled surfaces immediately.
3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 092216 – METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all metal framing materials (both Cold-Formed Framing and Lightgage Metal Framing), accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 15 14 DRILLED ANCHORS
   4. 03 30 00 CAST-IN-PLACE CONCRETE
   5. 04 22 00 CONCRETE MASONRY UNITS
   6. 05 12 00 STEEL AND FABRICATIONS
   7. 05 30 00 METAL DECK
   8. 05 52 00 RAILING SYSTEMS
   9. 06 10 00 ROUGH CARPENTRY
   10. 06 41 23 MODULAR CASEWORK
   11. 07 21 00 INSULATION
   12. 07 40 00 METAL PANELS
   13. 07 51 13 BUILT-UP ROOFING
   14. 07 53 29 ELASTOMERIC MEMBRANE ROOFING
   15. 07 60 00 SHEET METAL
   16. 07 72 00 ROOF ACCESSORIES
   17. 07 81 16 FIREPROOFING
   18. 07 84 00 FIRESTOPPING
   19. 07 92 00 SEALANTS
   20. 08 11 00 METAL DOORS AND FRAMES
   21. 08 14 16 WOOD DOORS
   22. 08 41 23 STOREFRONT TEMPERATURE RISE
   23. 08 33 00 COILING DOORS
   24. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   25. 08 91 00 LOUVERS
   26. 09 24 00 CEMENT PLASTER
   27. 09 29 00 GYPSUM BOARD
   28. 09 30 00 TILE
   29. 09 50 00 ACOUSTICAL CEILINGS
   30. 09 68 40 CARPET
   31. 10 05 00 MISCELLANEOUS SPECIALTIES
   32. 10 14 00 IDENTIFYING DEVICES
   33. 10 21 13 TOILET PARTITIONS
   34. 10 44 00 FIRE PROTECTION SPECIALTIES
   35. 10 51 13 METAL LOCKERS
   36. 11 66 43 SCOREBOARDS
   37. 12 66 13 TELESCOPING BLEACHERS
   38. 14 24 23 HYDRAULIC ELEVATORS

39. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. In accordance with the following:
1. AISI American Iron and Steel Institute
2. ASTM American Society for Testing Materials
3. AWS American Welding Society
4. ICC International Code Council.

1.3 DEFINITIONS

A. Minimum Uncoated Steel Thickness: Minimum uncoated thickness of metal framing delivered to the Project site shall be not less than 95 percent of the thickness used in the metal framing design. Lesser thicknesses shall be permitted at bends due to cold forming.

1.4 SYSTEM DESCRIPTION

A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete framing system. Any items not specifically noted but necessary for a complete framing system shall be provided under this section.
1. Wall systems shall accommodate tolerances, deflection of building structural members, and clearances of intended openings.
2. Fire-Test-Response Characteristics: Where indicated, provide metal framing materials and construction identical to that of assemblies tested for fire resistance.
a. Per ASTM E 119 "Test methods for Fire Tests of Building Construction and Materials" by a testing and inspecting agency acceptable to Authorities Having Jurisdiction (AHJ), products used in the assembly shall carry a classification label from a testing laboratory acceptable to the AHJ.

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data: For each type of product indicated.
a. Materials list of items proposed to be provided under this section.
2. Quality Assurance/Control Submittals:
a. Test Reports:
1) Current ICC ES Report.
2) Welding inspection report per DSA/SSS "T & I" List.
b. Certificates:
1) Welding certificates indicating qualifications.
2) Mill certificates, per ICC AC46 "Acceptance Criteria for Cold-Formed Steel Framing Members", indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, and metallic-coating thickness. Comply also with CBC Section 2203A.1.
c. Manufacturer's Written Instructions:
1) Manufacturer's written recommended installation procedures shall become the basis for accepting or rejecting actual installation procedures on the work.
3. Closeout Submittals in accordance with the following:

a. Warranty in accordance with Specification Section –WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
a. Galvanized and carbon sheet steel products formed from steel with a minimum yield stress of 33 ksi for 18 gage and lighter member and 50 ksi for 16 gage and heavier members.
b. All products shall be engineered to meet the latest Edition of the American Iron and Steel Institute (AISI), "North American Specification for the Design of Metal Steel Structural Members".
c. All products manufactured shall comply with the CBC and AISI, and shall have a current ICC Evaluation Service Report (ICC ESR).
1) AISI "Code of Standard Practice for Cold-Formed Steel Structural Framing".
2. Installer Qualifications:
a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
b. Welders shall be qualified for welding in horizontal, vertical, and overhead positions in accordance with AWS D1.3.
3. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
a. Coordinate the work with other work being performed.
b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General: Steel Framing and related accessories shall be stored and handled in accordance with AISI "Code of Standard Practice for Cold-Formed Steel Structural Members".

B. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from corrosion, deformation, dents, scratches and other damage.

C. Acceptance at Site:
   1. Products must be in manufacturer's original unopened bundles and containers with labels indicating brand name, size, and grade.
   2. Damaged products will not be accepted.

D. Storage and protection:
   1. Metal Framing and related accessories shall be stored and handled in accordance with the AISI "Code of Standard Practice".
   2. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Existing Conditions:
   1. Examine project and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Field Measurements: Take and be responsible for field measurements as required. Report any significant differences between field dimensions and the contract document conditions to Architect.
   3. Carefully coordinate work under this Section with that of the structural framing sections and details so that the interface between structural framing and non structural framing shall provide the lines and degree of finish shown and specified.

1.9 Describe special or extended warranty or bonds covering the conformance and performance of the work of the section. Coordinate with Contracting Requirements. Do not make statements that will limit or void those provisions. Ensure that procedures complement Division 01 Closeout Submittals. Include statements specific to this section that supplement or extend warranties contained in Div 01 WarrantiesWARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Studs, Tracks, Ceiling Joists, Channels and Steel Accessories specified product manufacturer:
      a. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
      b. Acceptable alternative manufacturers:
         1) CEMCO.
         2) STUDCO.
   2. Slotted Deflection Track and Vertical Deflection Clip accessories specified product manufacturer, unless otherwise noted:
      a. BRADY INNOVATIONS "SLP-TRK" Slotted Deflection Track.
      b. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
         1) Vertical Deflection Clips:
            a) "Fast TopTM Clips".
            b) "Fast ClipTM Slide Clips".
            c) "Quick ClipTM".
            d) "Slide ClipTM.
      c. Acceptable alternative manufacturers:
         1) CEMCO.
         2) STUDCO.
   3. Shaftwall specified product manufacturer:
      a. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
      b. Acceptable alternative manufacturers:
         1) CEMCO.
         2) STUDCO.
   4. Flat Strap and Backing Plate:
      a. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS):
         1) "DanBackTM" Fire Treated Wood Backing Plate.
      b. Acceptable alternative manufacturers:
         1) CEMCO.
         2) STUDCO.
   5. Channel Bridging or Bracing:
      a. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS):
         1) "Spazzer® 9200" Bridging and Spacer bar.
         2) "EasyClipTM" and "U-SeriesTM" Clip Angle.
      b. Acceptable alternative manufacturers:
         1) CEMCO.
         2) STUDCO.
   6. Metal screw specified product manufacturer:
      a. GRABBER CONSTRUCTION PRODUCTS.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Steel Sheet:
1. Steel sheet for 16 gage and heavier shall comply with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", structural steel classification, Grade 50 ksi, Class 1 or 2.
2. Steel sheet for 18 gage and lighter shall comply with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", structural steel classification, Grade 33 ksi, Class 1 or 2.
3. When hot-rolled steel sheet and strip is used in fabrication of metal members they shall comply with ASTM A1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength", structural steel classification, Grade 50 ksi.

B. Coating:
1. Steel sheet shall be galvanized in accordance with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", G60 minimum and comply with ASTM A 924 "Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process".
   a. Vertical Deflection Clips shall be in accordance with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members", G90 minimum and ASTM A 924 "Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process".
2. When hot-rolled steel sheet and strip is used in fabrication of metal members, hot-dip galvanize coating shall be in accordance with ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products".

C. Thickness:

REFERENCE GAGE	MILS	MINIMUM BASE METAL THICKNESS (INCH)	MINIMUM DESIGN THICKNESS (INCH)
20	33	0.0329	0.0346
18	43	0.0428	0.0451
16	54	0.0538	0.0566
14	68	0.0677	0.0713
12	97	0.0966	0.1017
10	118	0.1180	0.1240

2.3 COMPONENTS

A. Studs: Manufacturer's standard C-shaped steel studs, punched, with stiffened flanges, complying with ASTM C 645 "Specification for Nonstructural Steel Framing Members".

B. Track: Manufacturer's standard U-shaped steel track, unpunched, with unstiffened flanges, complying with ASTM C 645 "Specification for Nonstructural Steel Framing Members".
1. Slotted Deflection Track: Manufacturer's single, 20 gage minimum, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges with vertical slotted holes, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads.

a. Product, or approved equivalent, must be approved by DSA/SSS.
b. Slotted Deflection Track must be rated for both 1 and 2 hour "T" and "F" Fire-Rated Assemblies.

2. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
   a. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads.

C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure.

D. Ceiling Joists: Manufacturer's standard C-Shaped steel sections, with stiffened flanges, complying with ASTM C 645 "Specification for Nonstructural Steel Framing Members".

E. Channels: In sizes as shown in the Contract Documents:
   1. 16 gage, 3/4 inch with 1/2 inch flange 300 lbs/1000 feet weight.
   2. 16 gage, 1-1/2 inch with 17/32 inch flange 500 lbs/1000 feet weight.
   3. 16 gage, 2 inch with 17/32 inch flange 590 lbs/1000 feet weight.

F. Shaftwall: Manufacturer's standard shapes for fire-rated assemblies and complying with ASTM C 645 "Specification for Nonstructural Steel Framing Members". Shapes shall be 20 gage minimum, unless noted otherwise.
   1. Track: Manufacturer's standard J-Runner Shaped Track (JR), tabbed, with un-stiffened flanges.
   2. Studs: Manufacturer's standard C-H (CH), E-S (ES), I-S (IS) Shaftwall Studs, punched with stiffened flanges.
   3. Jamb Strut: Manufacturer's standard corner and Jamb Strut (JS), un-punched, with un-stiffened flanges.

G. Flat Strap and Backing Plate: Galvanized Steel Sheet for blocking and bracing in length and width required.
   1. Standard Backing shall be 16 gage minimum and continuous. Notch backing at studs.

H. Channel Bridging or Bracing:
   1. U-Channel Assembly per ASTM C 645 "Specification for Nonstructural Steel Framing Members", Base Metal Thickness of 0.0538 inch and minimum 1/2 inch wide flanges.

I. Steel Accessories: Fabricate Backing, Bridging, Clip Angles, Strap and Shapes in configurations shown and in compliance with ASTM C 645 "Specification for Nonstructural Steel Framing Members".
   1. Standard Backing shall be 16 gage minimum and continuous. Notch backing at studs.

2.4 ACCESSORIES

A. Fasteners:
   1. Metal Screws: Provide corrosion-resistant-coated, self-drilling or self-tapping steel screws complying with ASTM C 1513 "Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections" and ICC ESR 2196 "HILTI Self-Drilling and Self-Piercing Screws".
      a. Provide low profile "Truss Head" framing screws so that subsequent substrates lay flat over fasteners.

2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 "Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members" conducted by a qualified independent testing agency.
3. Expansion Anchors: Refer to Specification Section – DRILLED ANCHORS.

B. Welding Electrodes: Comply with AWS Standards.

C. Galvanized Repair Paint: Provide product complying with ASTM A 780 "Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings".

D. Drypack Grout: Refer to Specification Section – CAST-IN-PLACE CONCRETE.

E. Barrier Mesh: Type II, Class 1 - Carbon Steel - Mesh, Complying to ASTM F1267, 48" x 96" sheet sizes. Provide BM-Clips 2.75 • long, x 1.50• wide.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
2. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
3. Carefully coordinate all requirements for pipes and other items designed to be housed within the partition, wall or ceiling systems.
4. Carefully coordinate all requirements for backing support of items to be mounted on finished walls.
5. Space metal framing as required for compliance with all pertinent regulations, to give proper support for the facing material, and as indicated on the Drawings.

3.2 PREPARATION

A. Protection:
1. Protect all adjacent surfaces from damage from work under this specification section.
2. Remove any fireproofing only as much of these materials as needed to complete installation of metal framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

B. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
3. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.3 INSTALLATION

A. General:
1. In accordance with drawings and manufacturer's written instructions and recommendations, and procedures described in ASTM C 754 "Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products".
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Metal Framing may be shop or field fabricated for installation, or it may be field assembled.

B. Layout:
1. Lines shall be straight and true.
2. Install Metal Framing according to ASTM C 754 "Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products", unless more stringent requirements are indicated.

C. Installation:
1. Install shop or field fabricated, Metal Framing and securely anchor to supporting structure.
   a. Bolt or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch in ten (10) feet.
2. Install Metal Framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements of the Contract Documents.
   a. Cut framing members by sawing or shearing; do not torch cut.
   b. Fasten Metal Framing members by welding or screw fastening. Wire tying of framing members is not permitted.
      1) Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      2) Locate mechanical fasteners and install, with screw penetrating joined members by not less than three exposed screw threads.
      3) Beneath sheathing provide low-profile screw heads (i.e. "Wafer Head").
      4) Fasten both flanges of studs to track, unless otherwise indicated.
3. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.
4. Punched openings in studs must align when placed in final position.
5. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
6. Install horizontal bridging in wall studs, spaced in rows as indicated on the drawings. Fasten at each stud intersection.
7. Do not bridge building expansion and control joints with Metal Framing. Independently frame both sides of joints.
8. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

9. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
10. Erection Tolerances: Install Metal Framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
    a. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
11. At all sound partitions, set floor runners in two 1/4 inch diameter continuous beads of acoustical sealant as prescribed in Specification Section - SEALANTS.
12. At all smoke barrier partitions, set floor and ceiling runners in two 1/4 inch diameter continuous beads of Class II Flame Spread and Smoke Developed rated acoustical sealant as prescribed in Specification Section - SEALANTS.
13. Install supplementary backing and bracing wherever walls or partitions are indicated to support equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to wall or partition. Comply with stud manufacturer's written instructions and industry standards.
14. Frame wall openings larger than 2-foot square with double stud at each jamb.
15. Install continuous strapping to side of studs that do not receive sheathing at 3'-6" o.c. vertically.

D. Ceiling Joist Installation:
1. Align and install joist track and ceiling joists plumb, square, and true to line bearing on supporting frame. Securely fasten connections according to manufacturer's written recommendations and requirements of the Contract Documents.
2. Install bridging at interval indicated on the drawings. Fasten at each joist intersection.

E. Barrier Mesh:
1. Install 48" x 96" sheet panels with BM-Clips spaced 12" on center. Install the Barrier Mesh on the outside face of the wall framing that is to be protected.
2. Attach to metal framing with fFlat head bugle, self-tapping fine thread Type S screws that penetrate the steel studs a minimum 3/8-inches.

3.4 REPAIR / RESTORATION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed Metal Framing with galvanized repair paint and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure Metal Framing is without damage or deterioration at time of Substantial Completion.

3.5 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.

B. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. Project Inspector shall verify that all stud cavity walls are free of moisture and dry prior to any other construction that encloses the wall cavity.

END OF SECTION

SECTION 092400 – CEMENT PLASTER

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Cement Plaster materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
   2. The Exterior Wall finishes and the water resistant barrier (WRB) shall comply with CBC Code Section 1402.5, 2603.5.5 and NFPA 285. The Rigid Insulation shall have a flame spread index no greater than 25 as determined by ASTM E84 or UL 723

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. DIVISION 00 SPECIFICATION SECTIONS
   2. DIVISION 01 SPECIFICATION SECTIONS
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 06 10 00 ROUGH CARPENTRY
   6. 05 12 00 STEEL AND FABRICATIONS
   7. 05 33 00 METAL DECK
   8. 07 21 00 INSULATION
   9. 07 60 00 SHEET METAL
   10. 07 84 00 FIRESTOPPING
   11. 07 92 00 SEALANTS
   12. 08 11 00 METAL DOORS AND FRAMES
   13. 08 31 13 ACCESS DOORS AND FRAMES
   14. 08 33 00 COILING DOORS
   15. 08 41 00 STOREFRONTS
   16. 08 41 23 STOREFRONT TEMPERATURE RISE
   17. 08 91 00 LOUVERS
   18. 09 22 16 METAL FRAMING
   19. 09 30 00 TILE
   20. 09 50 00 ACOUSTICAL CEILINGS
   21. 09 65 10 RESILIENT BASE AND ACCESSORIES
   22. 09 91 00 PAINTING
   23. 10 05 00 MISCELLANEOUS SPECIALTIES
   24. 10 14 00 IDENTIFYING DEVICES
   25. 10 21 13 TOILET PARTITIONS
   26. 10 26 00 WALL AND CORNER GUARDS
   27. 10 28 13 TOILET ACCESSORIES
   28. 10 44 00 FIRE PROTECTION SPECIALTIES
   29. 10 51 13 METAL LOCKERS
   30. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:

a. AAMA American Architectural Manufacturers Association
b. ASTM American Society of Testing Materials
c. FS Federal Specification
d. ML/SFA Metal Lath / Steel Framing Association - a Division of NAAMM.
e. NAAMM National Association of Architectural Metal Manufacturers.
f. PDSM Plaster and Drywall Systems Manual, ©1988 by BNI and McGraw-Hill, Inc., Third Edition.
g. SSMA Steel Stud Manufacturer's Association.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data:
   a. Manufacturer's Data for each type of product specified.
   b. Submit manufacturer's standard color range for selection by the Architect.
   c. .
   d. Manufacturer's ICC ES Evaluation Reports (ESR) for fasteners as required.
2. Shop Drawings:
   a. Show location of all metal accessories: expansion joints, control joints, casing beads, corner reinforcements, separation screeds and reglets.
   b. Provide installation details of flashings at various types of penetrations, all metal accessories, metal lath, and integration with other related work.
3. Samples:
   a. 24 inch square field sample of each Cement Plaster Finish prepared on rigid backing for selection.
      1) Cement Plaster Finish of each pattern and texture selected prior to paint coat.
      2) Cement Plaster Finish of each pattern and texture for each color with type of paint coating selected. Coordinate with Specification Section – PAINTING.
   b. 6 inch lineal samples of each piece of specified Metal Accessory material as required for the project.
4. Quality Assurance/Control:
   a. Installer's experience.
   b. Manufacturer's certification of Installers.
   c. Manufacturer's installation instructions.
   d. Water Tightness Test Reports.
   e. Manufacturer's Field Reports:
      1) Confirm mixing and installation procedures of proprietary mixes for all coats of the cement plaster system were within manufacturers requirements.
   f. Tension Testing Reports.
5. Closeout Submittals in accordance with the following:
   a. In accordance with Specification Section - PROJECT CLOSEOUT.
   b. Warranty in accordance with Specification Section – WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
   a. Proprietary systems data sheets shall include design properties of each product.
2. Installer Qualifications:

a. Installer shall be experienced and shall have successfully completed three (3) projects of similar scope and size to that indicated for this Project.
b. Shall participate in a mock-up installation that was successfully tested for water tightness.
c. Manufacturer of proprietary products shall provide written certification that the Installer is qualified to install manufacturer's systems in accordance with manufacturer's warranty requirements.

3. Manufacturer/Supplier Qualifications:
   a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section – REGULATORY REQUIREMENTS, and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Field Samples:
1. Provide Field Samples for approval prior to the application of the cement plaster coats.
2. Field Samples shall be panels of a complete installation, representing each of the finish textures and colors from the approved submittal samples.
   a. The field samples shall be done by the installers for the project.
   b. The approved field samples shall establish the acceptable standards for all subsequent work.
3. When it is the Contractor's intent to incorporate the approved sample panels into the finish Project, the panels shall be located in an area relatively obscured from general view.

D. Mock-Ups:
1. Provide mock-up panels prior to application of cement plaster work and prior to installation of any exterior wall cavity and interior materials.
2. Mock-Up Assemblies:
   a. Mock-Ups shall be at exterior wall assemblies and shall integrate all other related work assemblies, including but not limited to, each type of wall openings, wall/eave interface, wall sill, parapet cap, various types of penetrations, material transitions and shall be representative of the intended end-use configuration.
      1) Mock-Ups shall be a minimum overall size of 10'-0" wide x 8'-0" high.
   b. Mock Ups will be used for establishing construction sequence, installation requirements of materials, and creating water tight assemblies without the cement plaster coats.
   c. Mock Ups may become part of the completed Work upon successful testing for water tightness.
3. Installation:
   a. The Project Inspector, the Architect, Contractor’s Superintendent and Sub-contactor’s Superintendent shall observe the installation of materials.
   b. Installation crew for the Mock-Ups shall be the installers of the Cement Plaster Systems for this project and installers, as necessary, of other related work assemblies.
   c. Mock Ups shall include the installation of water barriers, penetration flashing, Metal Accessories, Metal Lath, and other related work flashings and materials.
   d. Failed Mock Ups shall be removed and the assembly reinstalled until the water tightness test is successful.

E. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with all other related work.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Store materials inside and under cover on a level platform, six (6) inches above ground, to allow air circulation.
   a. Keep dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes.

1.6 PROJECT CONDITIONS

A. Environmental requirements:
1. Temperature: No plastering shall be done under unsuitable conditions of weather or temperature.
   a. Exterior: No plastering shall be done when prevailing temperature is 40 degrees F. or less for the preceding 24 hours prior to plastering, during the plaster operations, and for at least 48 hours after the set of each plaster coat.
      1) Apply and cure plaster to prevent plaster drying out during the curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
   b. Factory-Prepared Finishes: Comply with manufacturers written recommendations for the environmental conditions for application of finishes.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.7 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period Five (5) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Water Barriers:
      a. Building Wrap (also qualifies as an "Air Barrier"):
         1) DuPONT COMPANY.
         2) TYPAR.
      b. Sealing Tape:
         1) DuPONT COMPANY.
         2) Acceptable alternative manufacturers:
            a) CANTECH INDUSTRIES.
            b) 3M COMPANY.
            c) TYPAR.
      c. Building Paper:
         1) FORTIFIBER CORP.
   2. Ice and Water Shield:
      a. GRACE CONSTRUCTION PRODUCTS “Ice and Water Shield”.
      b. Acceptable alternative manufacturers:
         1) CARLISLE COATINGS & WATERPROOFING “Dri-Start A”
   3. Penetration Flashing:
      a. GRACE CONSTRUCTION PRODUCTS.
      b. Acceptable alternative manufacturers:
         1) FORTIFIBER.
   4. Expanded Metal Lath:
      a. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
      b. Acceptable alternative manufacturers:
         1) ALABAMA METAL INDUSTRIES CORPORATION (AMICO).
         2) CEMCO.
   5. Wire Fabric Lath :
      a. Woven Wire Fabric Lath:
         1) GEORGETOWN WIRE COMPANY

2) Acceptable alternative manufacturers:
a) DAVIS WIRE COMPANY.
b) JAENSON WIRE COMPANY.

b. Welded Wire Fabric Lath:
1) STRUCTA WIRE COMPANY, INC.

6. Fiber Reinforced Cement Plaster with Embedded Mesh Reinforcing Coat, and Acrylic-Enhanced Cementitious Finish System:
a. OMEGA
1) Scratch/Brown: "Super Cement" Fiber reinforced.
2) Reinforcing Mesh: "Crack Isolation System".
a) Base Coat, Styro-Glue DryBond
b) Mesh, CI Mesh
3) Primer/base coat:
a) RapidPrime as manufactured by OMEGA PRODUCTS INTERNATIONAL, INT.
4) Finish Coat:
a) Cementitious Finish Coat, Colortek SmoothCoat Exterior Stucco "Santa Barbara" finish.
b) Cementitious Finish Coat, acrylic admix: "AcroLoc".
b. Acceptable alternative system manufacturers:
1) BASF WALL SYSTEMS
2) PAREX

7. Metal Accessories:
a. Galvanized Metal Plaster Accessories:
1) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
2) STOCKTON PRODUCTS (SP).
3) Acceptable alternative manufacturers:
a) ALABAMA METAL INDUSTRIES CORPORATION (AMICO).
b) CEMCO.
b. Aluminum Plaster Accessories:
1) FRY REGLET CORPORATION.
2) Acceptable alternative manufacturers:
a) FLANNERY, INC.
b) PITTCON.
c. Fastener:
1) FLANNERY, INC.

8. Suspension System and Furring:
a. CEMCO.
b. Acceptable alternative manufacturers:
1) ALABAMA METAL INDUSTRIES CORPORATION (AMICO).
2) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
3) UNIMAST, INC.

9. Lath Fasteners:
a. Self-Sealing Furring Nails and Self-Sealing Furring Screws:
1) FASTEN SEAL PRODUCTS, LLC.
b. Screw Anchors:
1) POWERS FASTENERS "TAPPER +".

B. Products from other manufacturers not listed must submit in accordance with Specification Section – SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Suspension System:
1. Main Runners:
a. Cold Hot-Rolled Channels: 17 gage (0.0538 inch), galvanized steel:
1) 2-1/2 inch web x 1/2 inch flange, 597 lbs./1000 lineal feet weight minimum.
2. Cross Furring:
a. Cold-Rolled Channel: 17 gage (0.0538 inch), galvanized steel.
1) 1-1/2 inch x 1/2 inch flange, 414 lbs./1000 lineal feet weight minimum.
3. Wire:
a. General:
1) All wire shall be Class 1 zinc coated (galvanized), soft tempered wire in accordance with ASTM A 641 "Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire."
a) All wire shall also comply with FS-QQ-W-461H, and ASTM A 510, "Standard Specification for General Requirements for Wire Rods and Course Round Wire Carbon Steel."
2) All wire diameters specified are uncoated and corresponds with United States Steel Wire Gauge (USSWG).
b. Hanger Wire: 8 gage (0.1620 inch).
c. Bracing (Splay)Wire: 12 gage (0.0475 inch)
d. Grid Tie Wire: 16 gage (0.0625 inch)
4. Compression Struts (Metal angles, galvanized steel):
a. 1/8 inch thick x 1 inch x 1 inch 800 lbs./1000 lineal feet weight.
b. 3/16 inch thick x 1-1/4 inch x 1-1/4 inch 1,480 lbs./1000 lineal feet weight.
c. 3/16 inch thick x 1-1/2 inch x 1-1/2 inch 1,800 lbs./1000 lineal feet weight.
d. 3/16 inch thick x 1-3/4 inch x 1-3/4 inch 2,120 lbs./1000 lineal feet weight.
e. 3/16 inch thick x 2 inch x 2 inch 2,440 lbs./1000 lineal feet weight.
f. 3/16 inch thick x 2 inch x 2-1/2 inch 3,070 lbs./1000 lineal feet weight.
g. 3/16 inch thick x 3 inch x 3 inch 3,710 lbs./1000 lineal feet weight.
h. 1/4 inch thick x 3-1/2 inch x 3-1/2 inch 5,800 lbs./1000 lineal feet weight.
i. 1/4 inch thick x 4 inch x 4 inch 6,600 lbs./1000 lineal feet weight.
j. Alternate Compression Struts: Refer to drawings.
1) Must be submitted to and approved by DSA.

B. Furring:
1. Cold Rolled Channels: 16 gage minimum galvanized steel.
a. 3/4 inch x 1/2 inch flange, 300 lbs./1000 lineal feet weight.
b. 1-1/2 inch x 17/32 inch flange, 500 lbs./1000 lineal feet weight.

C. Cement Plaster System:
1. Line Wire: Galvanized steel wire, in accordance with ASTM A 641 "Specification for Zinc-Coated (Galvanized) Carbon Steel Wire".
a. Minimum 18 gage (0.0475 inch).
2. Water Barriers: Water-Resistive Barriers shall be in accordance with CBC Sections 1404.2 and 2510.6:
a. Building Wrap (also qualifies as an "Air Barrier"): Woven and non-woven polyolefin sheets approved per ICC ES Reports for Water-Resistive Barriers for buildings of any construction type and equivalent to Grade D paper with 60 minute water-resistant rating.
1) "Tyvek® Commercial Wrap" by DuPONT COMPANY.
b. Sealing Tape (3" wide minimum):
1) "Tyvek® Housewrap Tape" by DUPONT COMPANY.
2) Accceptable alternative manufacturer:

a) "Clipper Tape" by CANTECH IND.
b) "8086 Construction Sheathing Tape" by 3M.

c. Building Paper:
1) Number 15 Asphalt-Saturated felt complying with Type I felt in accordance with ASTM D226 "Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing".
2) Asphalt-Saturated Kraft Waterproof Building Paper approved per ICC ES Reports for Water-Resistive Barriers for buildings of any construction type and equivalent to Grade D paper with 60 minute water-resistant rating.

3. Penetration Flashing: Self-adhered and self-healing weather barrier strips, in accordance with FS UU-B-790a, Grade A.
a. 40 mil. minimum thickness, in 9-inch and 12-inch widths as is appropriate for barrier application.
1) "VYCOR V40" by GRACE CONSTRUCTION PRODUCTS.
2) Acceptable alternative manufacturer:
a) "Fort-I-Flash 40" by FORTIFIBER
b) "FlexWrap" and "StraightFlash" by TYVEK.

4. Metal Accessories: Zinc Alloy, Aluminum or Hot-Dipped Galvanized Steel, G-60 minimum (Coordinate depth of trim and accessories with the thicknesses and number of plaster coats).
a. Control Joints:
1) 28 gage galvanized steel, depth as required, AMICO No. "GripLock J Control Joint".
b. Expansion Joint
1) 26-Gauge galvanized steel.
2) 2-piece expansion joint for up to 1" in vertical travel,
3) 10-feet lengths.
4) 3/4" Ground x 3/4" Reveal.
c. Casing Bead:
1) 26 gage galvanized steel, 1-1/2" x depth as required, CDBS No. 66, Short Flange Casing Bead.
d. Corner Reinforcement:
1) Outside Reinforcements:
a) 26 gage galvanized steel, depth as required, CDBS #1A, Expanded Flange.
2) Inside Joints:
a) 28 gage galvanized steel, depth as required, CDBS #30 Construction Control Joint.
e. Drip Mold:
1) 24 gage galvanized steel, 2-3/4" x depth as rquired, SP BSS Blind Spot #10 Drip.
f. Vents:
1) 26 gage galvanized steel, 3" x depth as required, SP SBS Bug Stop Vent.
2) 26 gage galvanized steel, 3" x depth as required, SP SES Ember Stop Soffit Vent.
g. Foundation Sill Screed: 3-1/2 inch minimum vertical attachment flange per CBC Section 2512.1.2.
1) 26 gage galvanized steel, 3-1/2" x depth as required, CDBS #FHA7 Foundation Sill Screed, with weep holes.
h. Weep Screed:
1) 26 gage galvanized steel, 1-1/2" x depth as required with weep holes, CDBS #66 Short Flange Casing Bead, with weep holes.
i. Special Trim Shapes, minimum 0.025 extruded aluminum alloy 6063:

1) Channel Screeds, Reveal Moldings, & Screeds by FRY REGLET:
   a) Provide specific shapes as shown on the Drawings.
   b) Provide manufacturer's standard channel screed "+", "T", "L", and "corners", factory fabricated intersections as required for channel screeds, reveal moldings and screeds.
   c) Provide manufacturer's standard flashing connectors between straight runs and intersections.
   d) Butt Joints shall be flush and align with other metal accessories.
   e) Provide End Caps compatible for all channel screeds, reveal moldings, and screeds that terminate at opening frames and other construction.
   f) All finishes shall be "Special Anodic Coating," clear color.

j. Single Point Separation Screed:
   1) 26 gage galvanized steel, Expanded Metal Base x depth as required, SP PBS Pointed Base Screed with Keyholes.

k. Stucco Reglet: 26 gage galvanized steel:
   1) 2-1/2-inch flange by FRY REGLET "STX" Series.
   2) 1-3/4 inch flange by FRY REGLET "ST" Series.
   3) Accessories: Factory manufactured mitered and sealed corners, and polyvinyl chloride "Vinylok" flashing retainer clips.

5. Metal Lath:

a. Expanded Metal Lath: Galvanized steel in accordance with ASTM C 847 "Standard Specification for Metal Lath."
   1) "Diamond Mesh" Lath, 3.4 pounds per square yard.
   2) "Hi Rib" Lath, 3/8 inch rib, 3.4 pounds per square yard.
   3) "Self-Furred Diamond Mesh" Lath, 3.4 pounds per square yard.

b. Wire Fabric Lath:
   1) Woven: Galvanized steel in accordance with ASTM C 1032, "Specification for Woven Wire Plaster Base," and ASTM C 1066, "Specification for Installation of Lath and Furring to Receive Interior and Exterior Portland Cement-Based Plaster".
      a) 1-1/2 inch x 17 gage (0.0540 inch) hexagon shaped mesh, 1.86 lbs. per square yard.
      b) "Paper Backed" Woven Wire Fabric Lath and "Self-Furring" Woven Wire Fabric Lath are not acceptable.
   2) Welded: Galvanized steel in accordance with ASTM C 933, "Specification for Welded Wire Lath," and ASTM C 1066, "Specification for Installation of Lath and Furring to Receive Interior and Exterior Portland Cement-Based Plaster".
      a) 1-1/2 inch x 1-1/2 inch x 16 gage (0.0625 inch) square shaped mesh, 1.14 lbs. per square yard.
      b) "Paper Backed" Welded Wire Fabric Lath is not acceptable.
      c) "Self-Furring" Welded Wire Fabric Lath without paper backing shall be acceptable.Cement Plaster, Embedded Mesh Leveling Coat, and Acrylic-enhanced Cementitious Finish System: .

c. Stucco Base:
   1) Cement: Super Cement with Fibers.
   2) Fibers: Fiberglass reinforcing fibers compatible with cement plaster system manufacturer, no longer than 1/2 inch.
   3) Sand: Clean and washed sand complying with ASTM C 897 “Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters."
      a) Grading:

U.S. STANDARD SIEVE	CUMULATIVE WEIGHT MINIMUM	PERCENT RETAINED MAXIMUM
D. 4	--	0
E. 8	0	10
F. 16	10	40
G. 30	30	65
H. 50	70	90
I. 100	95	100
J. 200	97	100

1. Leveling and Reinforcing Coat:
   a. Leveling Material: as recommended by manufacturer.
   b. Cementitious based leveling material.
   c. Reinforcing Mesh: as recommended by manufacturer.
      1) Weight: 4.5 oz per yard.
   d. Surface Applied Liquid Bonding Agent: as recommended by manufacturer.
   e. Resinous emulsion with the following minimum requirements:
      1) Minimum tensile strength of 60 psi.
      2) Minimum compressive shear strength of 300 psi.
2. Finish Coat: as recommended by manufacturer.

2.3 ACCESSORIES

A. Fasteners: Shall be in accordance with ASTM C 1063, "Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster".
   1. Staples: 16 gage, galvanized steel.
      a. In accordance with ASTM E1667 "Standard Specification for Driven Fasteners, Nails, Spikes and Staples."
      b. Provide 1/4 inch furring wads at staple attachments for lath.
   2. Nails: galvanized steel.
      a. In accordance with ASTM E1667 "Standard Specification for Driven Fasteners, Nails, Spikes and Staples."
      b. Minimum, 7/16 inch (0.437 inch) diameter head and 11 gage (0.1205 inch) barbed, roofing or common nails.
      c. Provide 1/4 inch self-sealing furring wads at nail attachments for lath.
      d. Tie Nails: 10d galvanized nails.
      e. Concrete Stub Nails: Corrosion Resistant.
         1) Minimum, 3/8 inch wide head.
   3. Screws at Wood Framing: Corrosion Resistant.
      a. In accordance with ASTM C 1002, "Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs."
         1) Minimum 7/16 inch (0.437 inch) diameter pan wafer head and a 0.163 inch (#8) diameter shank with sharp-point.
      b. Provide 1/4 inch self-sealing furring wads at screw attachments for lath.
   4. Screws at Metal Framing: Corrosion Resistant.

a. In accordance with ASTM C 954, "Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. to 0.122 in. in Thickness."
b. Provide 1/4 inch self-sealing furring wads at screw attachments for lath.

5. Power or Powder Actuated Fasteners:
   a. In accordance with ASTM E 488 "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements."
   b. Size: min. 3/8 inch wide heads with 0.145 inch shank diameter, in length as required to achieve specified penetration.
   c. Corrosion Resistant.
6. Screw Anchor Fasteners:
   a. In accordance with ASTM E 488 "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements."
   b. In accordance with valid ICC ESR testing applicable to installation conditions.
   c. Size: 3/16 inch diameter, in length as required to achieve specified penetration.
   d. Corrosion Resistant.
   e. Accessories for Screw Anchor Fasteners:
      1) Matched tolerance drill bit, dust removal device, and other accessories in accordance with written manufacturer's instructions and ICC ES Evaluation Report.
7. Wires:
   a. Galvanized (Class 1 zinc coating) soft temper steel wire, in accordance with ASTM A 641, "Specification for Zinc-Coated (Galvanized) Carbon Steel Wire."
   b. All wire diameters specified are uncoated and corresponds with United States Steel Wire Gauge (USSWG):
      1) Member to Member: Minimum 16 gage (0.0625 inch).
      2) Lath to Support Member: Minimum 18 gage (0.0475 inch).
      3) Lath to Metal Accessories: Minimum 18 gage (0.0475 inch).
      4) Lath to Lath: Minimum 18 gage (0.0475 inch).

B. Open Corner Reinforcement:
   1. Cement Plaster: Expanded Metal Lath, AMICO "Cornalath" galvanzied steel.

2.4 MIXES

A. Cement Plaster Mixes: Shall be in accordance with ASTM C 926, "Specification for Application of Portland Cement-Based Plaster."
   1. Scratch Coat Mix (No additions of plasticizing agents allowed):
      a. 2.5 to 4 parts one part Super Cement.
   2. Brown Coat Mix (No additions of plasticizing agents allowed):
      a. 3 to 5 parts sand per 1 part Super Cement.
   3. Leveling and Reinforcing Coat:
      a. Specified system materials.
      b. Mesh.
   4. Primer/base coat: Mixed thoroughly, immediately prior to use with a paddle mixer.
      a. For application with a sprayer, dilute the Omega RapidPrime with 8oz of clean, potable water.
   5. Acrylic -Enhanced Cementitious Finish Coat
      a. Specified System materials.
         1) Acrylic Finish Coat, Colortek Paint Grade Exterior Stucco 30/30 with Acroloc acrylic admixture.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with all related work specified under other sections to ensure proper and adequate interface of work.
   a. Verify and locate framing and or backing necessary for proper installation of cement plaster system.
2. Integrate Water barriers and Penetration Flashing with all flashings from all other related work for proper shedding of water out of the building.
3. Protection:
4. Project Inspector shall verify that all stud cavity walls are free of moisture and dry prior to any other construction that fully closes the wall cavity.
5. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
   a. Provide temporary protections and enclosures for other work.

B. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. It is the intent to provide a weather resistant exterior plaster system envelope upon completion.
   a. Overlap and shingle fashion all substrate barriers, papers and penetration flashing with accessories in such a way as to shed water at the midpoint flashing (i.e. floor juncture flashing, or head flashing at openings and penetrations), or allow it to weep to drainage weep holes at the foundation sill screed in accordance with the requirements of the CBC Section 1403 and 1404.2.
2. In accordance with ASTM C 1063, "Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster" and ASTM C 926, "Application of Portland Cement-Based Plaster."
   a. In accordance with CBC Chapter 7, Chapter 7A, Chapter 14, and Chapter 25.
   b. In accordance with listed UL Assemblies at designated fire rated assemblies.
   c. In accordance with "The Plaster and Drywall Systems Manual" (PDSM).
   d. In accordance with Regulatory Requirements.

B. Layout:
   1. Set plumb, level, and square.
   2. Lines of all Metal Accessories shall be straight and true. Set accessories to create a cement plaster finish plane within a tolerance of 1/8 inch in 10 feet.
   3. Apply all Brown and Finish Coats of plaster to create a finish plane with a tolerance of 1/8 inch in 10 feet.

C. Suspension System:
   1. General:
      a. Installation shall be in accordance with ASTM C 1063 "Standard Specification of Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement Based Plaster," and shall comply with additional DSA requirements.
      b. Provide trapeze or other supplementary support members at obstructions to typical hanger spacing. Provide additional hangers, struts and/or braces as required at all ceiling breaks, soffits or discontinuous areas.
      c. Attachment to the structure as indicated.
         1) Hanger or Bracing Wire anchors to the structure shall be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire.
   2. Hangers:
      a. Hanger wires shall be spaced a maximum of 4'-0" on center each way.
      b. Hanger wires shall hang straight down. Splices in hanger wires are not permitted.
      c. Separate all hanger and bracing wires at least six inches (6") from all unbraced ducts, pipes, conduit, etc.
      d. Fasten hanger wires with not less than three tight turns within a distance of 1-1/2 inches.
   3. Bracing Assemblies:
      a. Provide Bracing assemblies for every 144 square feet, spaced not more than 12 feet by 12 feet on center.
         1) Provide Bracing assemblies for every 96 square feet spaced not more than 8 feet by 12 feet on center at Fire Rated Assemblies.
      b. Provide Bracing assemblies for every 96 square feet spaced not more than 8 feet by 12 feet on center at Non-Fire Rated and Fire Rated assemblies.
      c. Suspension systems not exceeding the area and or spacing required for bracing assemblies, are not required to have bracing assemblies when surrounded by walls which connect directly to the structure above and are attached to at least two adjacent walls
      d. Provide bracing assemblies at locations not more than 1/2 the required spacing from each perimeter wall and at edge of ceiling offsets.
      e. The slope of the Bracing Wires shall not exceed 45 degrees from the plane of the ceiling and shall be taut. Splices in bracing wires are not permitted.
      f. Fasten bracing wires with not less than four tight turns within a distance of 1-1/2 inches.
   4. Main Runners:
      a. Main runners shall be spaced a maximum of 4'-0" on center.
      b. Hanger wires shall be saddle-tied around main runners.
      c. Where main runners are spliced, the ends shall be overlapped not less than 12 inches with flanges of channels interlocked and securely tied near each end of the splice with double loops of 16 gauge (0.0625 inch) wire or double loops of twin strands of 18 gauge (0.0475 inch) wire.
      d. Locate main runners within 6 inches of the paralleling walls to support the ends of the cross furring. The ends of main runners shall be supported by hangers located not more than 6 inches from the ends.

e. Maintain 1 inch clearance between the ends of the main runners and the abutting masonry or concrete walls, partitions and columns.

f. All recessed or drop-in light fixtures, as well as ceiling mounted mechanical air terminals and services, shall be supported directly by main runners or by supplemental framing which is supported by main runners and positively attached with screws or other approved connectors.

g. Surface mounted fixtures shall be attached to a main runner with a positive clamping device made of material with a minimum of 14 gage. Rotational spring clamps do not comply.

5. Cross-Furring:

a. Cross furring shall be spaced a maximum of 2'-0" on center.

b. Cross furring shall be saddle-tied to main runners with 16 gage wire, or double strand 18 gage wire .

c. Where cross furring members are spliced, the ends shall be overlapped not less than 8 inches, with flanges of channels interlocked, and securely tied near each end of the splice with double loops of 16 gage wire or double loops of twin strands of 18 gage wire.

d. Cross furring shall not come into contact with abutting masonry, reinforced concrete walls, or partitions.

D. Installation of Line Wire:

1. Apply Line Wire prior to the placement of the water barriers.
2. Line Wire shall be installed at open framing of exterior vertical assembly.
3. Install Line Wire perpendicular to the framing members at 6” on center and secured to every fourth framing member with a screw.

a. Stretch Line Wire sufficiently tight to minimize bulging of the Water Barriers and to ensure a uniform thick scratch coat.

E. Installation of Water Barriers:

1. Install Water Barriers after installation of Line Wire at open framing.
2. Water barriers shall be installed at all exterior walls, exterior soffits, and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e. Toilets, Showers, Lockers, Kitchens and etc.).
3. Install Water Barriers with Penetration Flashing, Metal Accessories, and all other related work in "shingle" or "weatherboard" fashion.
4. Water Barriers shall be installed as required in CBC Sections 1404.2, 1404.3,1405, and 2510.6 as follows:

a. Provide two layers of Water Barriers.

1) One inner layer of Building Wrap (also qualifies as an "Air Barrier"):

a) Seal all laps and penetrations with a 3" wide minimum Sealing Tape.

2) One outer layer of Building Paper.

b. The Water Barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 6 inches and free from holes and breaks.

1) Where vertical joints occur, barrier shall be lapped not less than 6 inches.

c. Exposure:

1) Maximum exposure of Water Barriers shall be 30 days prior to plaster application or less as required by Water Barrier Manufacturer.

a) Protect Water Barriers from the elements (both exposure to the sun and water) with a temporary 6-mil visqueen barrier or other material approved by the barrier manufacturer.

F. Installation of Penetration Flashing:

1. Apply Penetration Flashing in conjunction with Water Barriers, Metal Accessories and all other related work.

2. Install Penetration Flashing at all openings and penetrations at all exterior walls and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e. Toilets, Showers, Lockers, Kitchens, etc.).
3. Install Penetration Flashings with Water Barriers, Metal Accessories and all other related work in "shingle" or "weatherboard" fashion.
4. Penetration Flashings shall be installed as required in CBC Sections 1405.3 in 9" widths and continuous to 9" past all intersections around all openings, penetrations and termination of plaster systems.
   a. Should any penetration warrant a greater width of wall flashing, provide 12" wide flashing as required.
   b. When an object extends through the Cement Plaster System, return the edge of the Penetration Flashing 1" and apply to the sides of the penetrating item.
5. Objects such as electrical back-boxes, electrical speaker enclosures, penetrations created by structural members, and the like.

G. Installation of Metal Accessories:
1. Apply Metal Accessories in conjunction with Water Barriers, Penetration Flashings and all other related work.
2. Install Metal Accessories as required to delineate cement plaster work into areas of the following maximum size and shall be in addition to locations shown on the drawings:
   a. Vertical surfaces 144 sq.ft.
   b. Horizontal and other non-vertical surfaces 100 sq.ft.
   c. Length-to-width ratios of not greater than 2-1/2:1.
   d. Distances not greater than 18 feet.
3. Install Metal Accessories with Water Barriers, Penetration Flashing Sheets and all other related work in "shingle" or "weatherboard" fashion.
4. Install all Metal Accessories in accordance with manufacturer's instructions, and the PDSM.
   a. All Metal Accessories shall be fully supported in accordance with CBC, secure flanges to framing.
   b. Installed in 10 foot lengths wherever possible.
   c. All joints (butt, mitered, bent, continuing around corners, or changing directions) shall be cut accurately, welded, or folded, sealed, pop-riveted and sealed again, for a watertight joint.
      1) Special Trim Shapes joints (butt, "T", "+", "L" and inside/outside intersections) provide manufacturer’s flashing connectors and factory fabricated intersections to connect shapes.
         a) Provide End Caps at all open ends and when terminated at opening frames and all other construction.
         b) Butt Joints shall be flush and align with other metal accessories.
         c) Seal all intersections and ends.
      2) Maintain the water barrier continuously behind any joint.
      3) Joints shall occur at nearest possible expansion or control joints.
   d. When an object extends through the Cement Plaster System, accurately cut and install in "shingle" or "weatherboard" fashion the Metal Accessories around the penetration. Apply sealant between the metal accessories and the penetrating object.
5. Metal Accessories shall be attached to framing members at maximum 7 inches o.c. along supports.
   a. Single Point Separation Screeds can be wire tied over Metal Lath.
   b. Where dissimilar metals come into surface contact provide electrolytic protection between dissimilar metals using neoprene, plastic sheet, EPDM rubber or other protective coating.

H. Installation of Metal Lath:

1. General:
   a. Apply Metal Lath after the installation of Line Wire, Water Barriers, Penetration Flashings and Metal Accessories.
   b. Install the various types of Metal Lath at the following conditions:
      1) Diamond Mesh Lath at horizontal and vertical surfaces over open framing members at 16 inches on center.
      2) Hi Rib Lath at horizontal and vertical surfaces over open framing members at 24 inches on center.
      3) Self Furred Diamond Mesh Lath at over Masonry and Concrete surfaces.
      4) Woven Wire Fabric Lath over Solid Sheathing.
      5) Welded Wire Fabric Lath over Solid Sheathing.
   c. Apply Metal Lath in accordance with all applicable portions of CBC Chapters 7 and 25, and ASTM C 1063, "Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster".
      1) Metal Lath shall be applied with long dimension of sheet perpendicular to the framing members to which it is attached.
         a) All fasteners shall be corrosion resistant equal to or superior to that of the lath.
         b) All lath shall be furred out away from supports and solid substrate at least 1/4 inch.
         c) Lath shall be attached to framing members at not more than 7" o.c. along framing members except for 3/8-in. rib metal lath shall be attached at each rib.
      2) The Metal Lath shall be broken at all metal accessories and cut into panels that are defined by the edges of the cement plaster metal accessories, expansion joints and the like.
         a) Perimeter of the lath panel shall be wire tied to the cement plaster metal accessories.
         b) No joints shall be permitted at any angle or corner.
      3) Lapping of Metal Lath.
         a) Side laps shall be secured to framing members and shall be wire tied between supports with No. 18 gage (0.0475-inch) galvanized annealed steel wire at 9" o.c. maximum.
         b) Where end laps occur between the framing members or between attachments, the end of the metal lath sheets shall be laced or wire tied with No. 18 gage (0.0475 inch) galvanized annealed steel wire.
         c) Expanded Metal Lath shall be lapped 1/2-inch or nest the edge ribs at sides and 1" at ends.
         d) Wire Fabric Lath shall be lapped one mesh at the sides and the ends.
2. Metal Framed Construction:
   a. Horizontal Framing:
      1) Screws shall project not less than 3/8-in. through metal framing member when the lath is installed and shall engage not less than three strands of lath.
         a) Screw attachments at Hi-Rib Lath shall pass through, but not deform rib.
      2) Where Water Barriers are not required, securely attach to metal framing members with No. 18 gage (0.0475 inch) wire ties, clips, hog rings or approved equivalent attachments.
         a) Securely attach Hi-Rib Lath to open-web steel joists by single ties of galvanized, annealed steel wire not less than No. 18 gage (0.0475 inch), with the ends of each tie twisted together 1-1/2 times.
   b. Vertical Framing:

1) Screws shall project not less than 3/8-in. through metal framing members when the lath is installed. and shall engage not less than three strands of lath.
   a) Screw attachments at Hi-Rib Lath shall pass through, but not deform rib.
2) Where Water Barriers are not required (Interior Walls), securely attach to metal framing members with No. 18 gage (0.0475 inch) wire ties, clips, hog rings or approved equivalent attachments.

3. Concrete Substrates, Horizontal and Vertical:
   a. Install power driven or power actuated fasteners:
      1) Penetration, min.: 3/4 inch.
      2) Location: One fastener at each corner, and one fastener at midpoint of long dimension of lath sheet. Balance of locations may be same fasteners or hardened concrete stub nails.
      3) Spacing:
         a) Horizontal (row), max.: 16 inches on center.
         b) Vertical (column), max: 7 inches on center.
      4) Wire tie laps and metal accessories with expanded metal flanges. Power/powder-actuated fasten accessories with solid flanges.
4. Masonry Substrates, Vertical:
   a. Install screw anchor fasteners per ICC ES Evaluation Report installation requirements.
      1) Penetration: 1-1/2 inch.
      2) Spacing:
         a) End distance, min.: 3 inches.
         b) Edge distance, min.: 1-1/2 inch.
         c) Any direction, min.: 1-1/2 inch.
      3) Pattern Spacing:
   b. Horizontal (row), max: 16 inches.
   c. Vertical (column), max: 7 inches.
5. Wire tie laps and metal accessories with expanded metal flanges. Screw anchor fasten accessories with solid flanges.
6. Attach accessories in such a manner as to ensure proper alignment during plaster application.

I. Cement Plaster Installation:
1. General: Each plaster coat shall be applied without interuption to entire wall or ceiling panels to eliminate cold joints and abrupt changes in the uniform appearance of succeeding coats. Panels are defined by naturally occuring interruptions in the plane of the plaster, such as corner angles, rustications, openings, and control joints.
2. Nominal Cement Plaster Thickness over Metal Lath:
   a. At open framing and sheathing substrates, Vertical and Horizontal Surfaces: 7/8" nominal.
      1) Scratch Coat thickness: 3/8"
      2) Brown Coat thickness: 3/8"
      3) Finish Coat thickness: 1/8"
   b. At concrete or masonry substrates, Vertical and Horizontal Surfaces 7/8" nominal.
      1) Scratch Coat thickness: 1/2"
      2) Brown Coat thickness: 1/4"
      3) Finish Coat thickness: 1/8"
3. Nominal Cement Plaster Thickness over Concrete or Masonry Substrates:
   a. Masonry Vertical Surfaces: 1/2" nominal.
      1) Bond Coat: N/A
      2) Brown Coat thickness 3/8"

3) Finish Coat thickness 1/8"

b. Masonry Horizontal Surfaces: 3/8" nominal.

1) Bond Coat: N/A
2) Brown Coat thickness 1/4"
3) Finish Coat thickness 1/8"

c. Concrete Vertical and Horizontal Surfaces: 3/8" nominal.

1) Bond Coat: N/A
2) Brown Coat thickness 1/4"
3) Finish Coat thickness 1/8"

d. Where the installed plaster thickness over masonry will exceed the nominal 1/2 inch thickness, the plaster system shall be the three coat application over self-furred expanded metal lath.

e. Where the installed plaster thickness over concrete will exceed the nominal 3/8 inch thickness, the plaster system shall be the three coat application over self-furred expanded metal lath.

4. Scratch Coat Installation:

a. Cover Lath totally and completely with Scratch Coat Mix.

b. Finish: Heavily scratched at right angles to framing members to provide strong mechanical key for Brown Coat.

c. Curing: Continuously moist cure a minimum of 48 hours immediately after installation and prior to application of Brown Coat.

5. Bond Coat Installation:

a. Apply "Surface Applied Liquid Bonding Agent" Mix solid over masonry or concrete and fill all pores completely to form bonding, water resistant finish.

b. Cure: In accordance with Manufacturer’s requirements and ASTM C 932 "Specification for Surface-Applied Bonding Compounds for Exterior Plastering".

6. Brown Coat Installation:

a. Apply Brown Coat Mix to slightly damp, and cured Scratch Coat.

b. Finish: Dry rod to a straight even plane.

c. Float to densify at 1/8 inch in 10 feet and leave rough for finish.

1) At exterior horizontal soffits with recessed light fixtures, provide a smooth and level brown coat finish around the perimeter of the light fixture housing.

a) After installation of the brown coat, knock down any ridges and provide a smooth trowel finish within a distance of 3 inches around the light fixture housing. This level of finish is required, so that the light fixture lens (with a compression gasket) can be installed with full contact against the plaster system.

b) Coordinate with the electrical contractor and obtain a sample fixture lens, and conduct a pre-cement plaster installation meeting to discuss this topic.

d. Curing: Continuously moist cure a minimum of 48 hours immediately after installation and dry cure a minimum of 7 days, allow time for plaster to shrink prior to application of finish coats.

7. Acrylic Finish Coat Installation:

a. Exterior Cement System: Acrylic-Enhanced Cementitious Finish System:

1) New concrete, stucco, and masonry must be clean and cured a minimum of 28 days.
2) Prime with manufacturer's recommended primer.
3) Provide Open Corner Reinforcement where cement plaster is not divided or separated at opening corners. Place diagonally at all corners of openings and apply with cement adhesive on cured Brown Coat.

4) For application techniques refer to manufacturer's technical bulletins and recommendations. See manufacturer's recommendations for application over existing concrete surfaces.
5) Finish with manufacturer's finish coat in accordance with manufacturer's recommendations for application, curing times and temperature ranges.
6) Always maintain a wet edge and work to corners or joints.
7) Use material with the same batch number within wall section.
8) Apply in two 1/16" coats. Allow first coat to dry enough that it will not be disturbed during the application of the second coat. When second coat is partially dry, trowel smooth. Use light consistent misting with water.
9) Texture: Smooth

3.4 REPAIR / RESTORATION

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.5 FIELD QUALITY CONTROL

A. General: Comply with ASTM C 926 "Standard Specification for Application of Portland Cement-Based Plaster."
1. Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface.
2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Site Tests:
1. As required by Regulatory Requirements.
2. Mock-Up Assemblies:
a. Water Spray Test: Upon completion of the installation of the Mock-Up Assembly, conduct test for water penetration in according to AAMA 501.2 requirements.
1) The Project Inspector, the Architect, Contractor’s Superintendent and Sub-contactor’s Superintendent shall visually inspect for water penetration.
2) A Thermal Imagining process conducted by the Owner's Testing Laboratory Service, shall be used for additional inspection for water penetration.
3) Cost of additional testing and inspection required due to failure for water tightness shall be borne by the Contractor.
b. Reports:
1) Project Inspector and/or Owner's Testing Laboratory Services shall provide a written report noting the installation and water tightness of the Mock-Up Assemblies tested.

C. Inspection:
1. As required by Regulatory Requirements and in accordance with CBC Section 2503.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.6 CLEANING

A. Clean in accordance with Specification Section – PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. Finish shall be clean and ready for the application of any additional finishes.
   3. In accordance with manufacturer's written instructions and recommendations.

B. Remove temporary protection and enclosure of other work.

C. Promptly remove plaster from door frames, window and other surfaces not indicated to be plastered.

D. Repair floors, walls and other surfaces stained, marred or other wise damaged during plastering

END OF SECTION

SECTION 092900 – GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all gypsum board materials, suspension systems, furring, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 06 10 00 ROUGH CARPENTRY
   5. 06 41 23 MODULAR CASEWORK
   6. 07 21 00 INSULATION
   7. 07 81 16 FIREPROOFING
   8. 07 84 00 FIRESTOPPING
   9. 07 92 00 SEALANTS
   10. 08 11 00 METAL DOORS AND FRAMES
   11. 08 14 16 WOOD DOORS
   12. 08 31 13 ACCESS DOORS AND FRAMES
   13. 08 33 00 COILING DOORS
   14. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   15. 08 91 00 LOUVERS
   16. 09 22 16 METAL FRAMING
   17. 09 30 00 TILE
   18. 09 50 00 ACOUSTICAL CEILINGS
   19. 09 65 10 RESILIENT BASE AND ACCESSORIES
   20. 09 65 16 RESILIENT SHEET
   21. 09 65 19 RESILIENT TILE
   22. 09 67 23 RESINOUS FLOORING
   23. 09 68 40 CARPET
   24. 09 72 00 WALL COVERINGS
   25. 09 91 00 PAINTING
   26. 10 05 00 MISCELLANEOUS SPECIALTIES
   27. 10 11 00 VISUAL DISPLAY BOARDS
   28. 10 14 00 IDENTIFYING DEVICES
   29. 10 21 13 TOILET PARTITIONS
   30. 10 26 00 WALL AND CORNER GUARDS
   31. 10 28 13 TOILET ACCESSORIES
   32. 10 44 00 FIRE PROTECTION SPECIALTIES
   33. 10 51 13 METAL LOCKERS
   34. 11 62 00 MUSIC EQUIPMENT
   35. 14 24 23 HYDRAULIC ELEVATORS
   36. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
1. In accordance with the following standards:
a. CISCA Ceilings & Interior Systems Construction Association.
b. DITF Drywall Industry Trust Fund.
c. GA Gypsum Association.
d. MPI Master Painters Institute
e. PDCA Painting and Decorating Contractors of America.
f. PDSM Plaster and Drywall Systems Manual, ©1988 by BNI and McGraw-Hill, Inc., Third Edition.

1.3 SYSTEM DESCRIPTION

A. Suspension System Design Requirements: In accordance with allowable values and properties assigned and approved by CBC.
1. Lateral Load Design: ASCE 7, Chapter 13.
2. Design Weight for lateral loads: Total Weight does not exceed four (4) pounds per square foot, including air conditioning grilles and light fixtures.
3. System is not to support lateral loads from partitions.
4. Fasteners into concrete:
a. Must be capable of sustaining, without failure, a load equal to 200 lbs. tension for hangar wires and 440 lbs. tension for bracing wires.
5. Gypsum board suspended ceiling systems shall not support materials or building components other than grills, light fixtures, small electrical conduits, small ducts and the like.
a. All such components shall be supported either directly from main runners, or by supplemental framing, which is supported by main runners.
b. No vertical loads other than gypsum board dead load shall be applied to cross-furring.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
a. Gypsum board fastening schedule: Indicate type, size and spacing of fasteners for each type of framing and fire resistive condition.
b. Manufacturer's written recommended construction instructions or handbook for all gypsum board panel products and accessories.
c. Manufacturer's written recommended construction instructions or handbook for all suspension system products and accessories
d. Manufacturer's data for all types of gypsum board used on this project.
2. Samples.
a. Provide 24 inch square samples for all textures for each level of finish.
b. Provide 4 inch lineal samples of each piece of metal trim accessory specified.
c. Provide 12 inch lineal samples of Suspension System components for each type of system specified.
3. Quality Assurance/Control Submittals:
a. Test Reports:

1) Site Tests of suspended gypsum board ceiling fasteners and anchors provided by Testing Agency.

b. Certificates:

1) General Construction: Certificate signed by the Contractor on Contractor's letterhead.

2) Products: Certificates signed by manufacturers of gypsum board assembly components.

4. Closeout Submittals in accordance with Specification Section -PROJECT DOCUMENTS.

a. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Material Qualifications:

a. Where fire-rated gypsum board assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 "Test methods for Fire Tests of Building Construction and Materials", by an independent testing and inspecting agency acceptable to CSFM.

b. Empty containers shall not be removed from site without the Project Inspector's approval.

2. Installer Qualifications:

a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

1) Helpers and apprentices used for such work shall be under full and constant supervision at all times by thoroughly skilled gypsum board installers.

2) In the acceptance or rejection of installed gypsum board, no allowance will be made for lack of skill on the part of installers.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

b. IR Interpretation of Regulations.

C. Certificates:

1. General Construction: Contractor to certify that work provided, meets or exceeds the requirements of this section.

2. Manufacturers of gypsum board assembly components certify that their products comply with specified requirements.

a. Certify that all adhesive and compound materials have a good shelf life longer than the construction period of this project.

D. Mockups:

1. Before starting the finishing of gypsum board surfaces, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and qualities of materials and execution.

a. Install mockups for the following applications:

1) All surfaces without finish texture.

2) All surfaces without finish texture to be painted.

3) All surfaces with finish texture to be painted.

b. Simulate finished lighting conditions for review of mockups.

c. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:

1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period One (1) Year.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Specified gypsum board products manufacturer:
   a. NATIONAL GYPSUM COMPANY.
      1) Wallboard "REGULAR".
      2) Water-Resistant "XP GYPSUM BOARD".
      3) Shaftwall "SHAFTLINER".
      4) Sheathing "GYPSUM SHEATHING".
      5) Soffit "EXTERIOR SOFFIT BOARD".
   b. Acceptable alternative manufacturers:
      1) PABCO:
         a) Wallboard "REGULAR" AND "TYPE X".
         b) Water-Resistant "MOLD CURB PLUS".
         c) Shaftwall "MOLD CURB PLUS SHAFLINER".
         d) Sheathing "GLASS SHEATHING".
         e) Soffit "EXTERIOR SOFFIT".
      2) UNITED STATES GYPSUM COMPANY - "SHEETROCK".
         a) Wallboard "SW EDGE".
         b) Water-Resistant: "MOLD TOUGH".
         c) Shaftwall "LINER PANEL-MOLD TOUGH".
         d) Sheathing "SECUROCK GLASS-MAT SHEATHING".
         e) Soffit "EXTERIOR GYPSUM CEILING BOARD".
2. Specified Impact and Abuse board products manufacturer:
   a. NATIONAL GYPSUM COMPANY
      1) Impact Board "HI-IMPACT XP"
      2) Abuse Resistant "HI-ABUSE XP"
   b. Acceptable alternative manufacturers:
      1) PABCO.
         a) Impact Board "HI-IMPACT"
         b) Abuse Resistant "ABUSE CURB"
      2) UNITED STATES GYPSUM COMPANY - Walls only.
         a) Impact Board "MOLD TOUGH VHI".
         b) Abuse Resistant "MOLD TOUGH AR".
3. Specified Roof Board board products manufacturer:
   a. G-P GYPSUM "DENS-DECK".
   b. Acceptable alternative manufacturers
      1) UNITED STATES GYPSUM COMPANY
         a) SECUROCK Roof Cover Board.
4. Specified gypsum board accessories product manufacturer:
   a. Prep. Coat (Drywall Primer):
      1) WESTPAC MATERIALS "PREP COAT".

2) Acceptable alternative manufacturer:
a) UNITED STATES GYPSUM - SECUROCK First Coat Primer.

b. Primer-Surfacer: "TUFF-HIDE".
1) UNITED STATES GYPSUM COMPANY.

c. Other Accessories:
1) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).

5. Specified revel molding products manufacturer:
a. FRY REGLET CORPORATION.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Furring:
1. Metal Angles: 24 gage galvanized steel.
a. 1-3/8 inch x 7/8 inch 190 lbs./1000 feet weight.
2. Cold Rolled Channels: 16 gage galvanized steel.
a. For furred walls and ceilings:
1) 3/4 inch x 1/2 inch flange: 300 lbs./1000 feet weight.
2) 1-1/2 inch x 17/32 inch flange: 500 lbs./feet weight.
3) 2 inch x 17/32 inch flange: 590 lbs./1000 feet weight.
3. Resilient Channels (USG's RC-1): 25 gage corrosion resistant steel.
a. Pre-punched holes at 4 inches on center in the flange to facilitate screw attachment only into framing. For improving sound transmission loss through framed partitions and ceilings.
1) 1/2 inch flange x 2-1/2 inch overall w/1-1/2 inch offset flange x 1/2 inch offset:
a) 200 lbs./1000 feet weight.
4. Zee Channels: 24 gage corrosion resistant steel.
a. 1 inch thick x 7/8 inch x 1-1/4 inch 224 lbs./1000 feet weight.
b. 1-1/2 inch x 7/8 inch x 1-1/4 inch 269 lbs./1000 feet weight.
c. 2 inch x 7/8 inch x 1-1/4 inch 313 lbs./1000 feet weight.
d. 3 inch x 7/8 inch x 1-1/4 inch 400 lbs./1000 feet weight.
5. Hat Channels:
a. 7/8 inch x 2-9/16 inch 276 lbs./1000 feet weight (25 gage).
b. 7/8 inch x 2-9/16 inch 515 lbs./1000 feet weight (20 gage).
6. Channel Clips:
a. Pre-formed galvanized wire used for attaching metal furring channels to cold rolled channels and single gypsum panel systems only.
1) 1-1/2 inch x 2-3/4 inch 38 lbs./1000 feet weight.

B. Suspension System:
1. General: Comply with ASTM C754 "Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products", for conditions indicated.
2. Wires: ASTM A641 "Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire", Class 1 zinc coating, soft temper:
a. Tie: 0.0625 inch diameter wire (16 gage), or double strand of 0.0475 inch diameter (18 gage) wire.
b. Hanger: 0.162 inch diameter (8 gage).
c. Brace: 0.106 inch diameter (12 gage).

3. Anchors:
   a. General: Fabricate from corrosion-resistant material with holes or loops for attaching hanger and brace wires.
      1) Ceiling Clips: 3/4 inch wide x 0.0934 inch galvanized sheet (13 gage).
      2) Steel Straps:
         a) 1 inch wide x length as required x 0.108 inch galvanized sheet (12 gage).
         b) 3 inches wide x 4 inches long x 0.108 inch galvanized sheet (12 gage).
4. Main Runners:
   a. Hot Rolled Channels:
      1) 1-1/2 inch web x 1/2 inch flange x 1/8 inch thick 1,120 lbs./1000 feet weight.
5. Cross Furring:
   a. Hat Channels:
      1) 7/8 inch thick x 2-9/16 inch 276 lbs./1000 feet weight.
6. Compression Struts (Metal angles, galvanized steel):
   a. 1/8 inch thick x 1 inch x 1 inch 800 lbs./1000 feet weight.
   b. 3/16 inch thick x 1-1/4 inch x 1-1/4 inch 1,480 lbs./1000 feet weight.
   c. 3/16 inch thick x 1-1/2 inch x 1-1/2 inch 1,800 lbs./1000 feet weight.
   d. 3/16 inch thick x 1-3/4 inch x 1-3/4 inch 2,120 lbs./1000 feet weight.
   e. 3/16 inch thick x 2 inch x 2 inch 2,440 lbs./1000 feet weight.
   f. 3/16 inch thick x 2 inch x 2-1/2 inch 3,070 lbs./1000 feet weight.
   g. 3/16 inch thick x 3 inch x 3 inch 3,710 lbs./1000 feet weight.
   h. 1/4 inch thick x 3-1/2 inch x 3-1/2 inch 5,800 lbs./1000 feet weight.
   i. 1/4 inch thick x 4 inch x 4 inch 6,600 lbs./1000 feet weight.
   j. Alternate Compression Struts Refer to drawings.
      1) Must be submitted to and approved by DSA.
7. Shaft Wall Framing: Shaft Wall Steel Framing listed below are manufactured by USG, or approved equivalent.
   a. CR-Runners:
      1) 2"-width 25 gage.
   b. J-Runners:
      1) 2-1/2", 4" or 6" as required 20 gage.
   c. E-Studs:
      1) 2-1/2", 4" or 6" as required 20 gage.
   d. C-H Studs:
      1) 2-1/2", 4" or 6" as required 20 gage.
   e. Jamb Studs:
      1) 2-1/2", 4" or 6" as required 20 gage.
   f. H-Studs:
      1) 2"-width 25 gage.

C. Wallboard: For interior walls and ceilings.
   1. Standard: In accordance with ASTM C 1396 "Standard Specification for Gypsum Board".
   2. Size: See drawings for specific thickness locations.
      a. 5/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
         1) When curved walls are indicated on the drawings, provide multiple layers of 1/4 inch & 3/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
   3. Long Edges: SW Tapered.
   4. Core Type:

a. Non-Fire Rated: Regular.
b. Fire Rated Type X at fire-resistive-rated assemblies.

5. Finish: Natural-finish face paper suitable for paint, wallpaper or other decorations.

D. Water-Resistant: For interior walls subjected to, but not constant, moisture and humidity and at adhesive application of ceramic tile and wallcoverings.

1. Standard: In accordance with ASTM C 1396 "Standard Specification for Gypsum Board".
   a. Surface Burning Characteristics: ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
      1) Flame Spread: 20.
      2) Smoke Developed: 0.
2. Size - see drawings for specific thickness locations:
   a. 5/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
3. Long Edges: Tapered.
4. Core Type:
   a. Non-Fire Rated: Regular water-resistant core all the way through.
   b. Fire Rated: Type X and water-resistant additives all the way through, at fire-resistive-rated assemblies.
5. Finish: Multi-layered paper facings, chemically treated to resist moisture penetration.
6. Color of the face paper is dependent on the manufacturer.

E. Impact Board: For interior walls requiring greater impact resistance.

1. Standard: In accordance with ASTM C 1629 "Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
   a. Surface Abrasion Resistance: ASTM D 4977 "Test method for Granule Adhesion to Mineral Surfaced Roofing by Abrasion": Level 3.
   b. Indentation Resistance: ASTM D 5420 "Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a falling Weight (Gardner Impact)": Level 1.
   c. Impact/Penetration Resistance, Soft Body: ASTM E 695 "Standard Method for Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading": Level 3.
   d. Impact/Penetration Resistance, Hard Body: ASTM C 1629 "Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels", Annex 1: Level 3.
2. Mold/Mildew Characteristics:
   a. Mold Resistance: ASTM G 21 "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi": 0.
   b. Mold Resistance: ASTM D 3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber": 10.
   c. Water Absorption: ASTM C 173 "Test method for Air Content of Freshly Mixed Concrete by the Volumetric Method": less than 5 percent.
3. Surface Burning Characteristics: ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
   a. Flame Spread: 15.
   b. Smoke Developed: 0.
4. Size: See Drawings for specific thickness locations:
   a. 5/8 inches thick by 4 feet wide maximum by practical length to minimize joints.
5. Long Edges: Tapered.
6. Core Type:

a. Moisture resistant core with an embedded fiberglass mesh.
b. Non-Fire-Rated: --
c. Fire Rated: Type X at fire-resistive-rated assemblies.

7. Finish: Abrasion and mold/mildew/moisture resistant paper on the face side, and abrasion and mold/mildew/moisture resistant paper on the back side.
   a. Color of the face paper is dependent on the manufacturer.

F. Abuse Resistant: For interior walls and ceilings requiring greater impact resistance.
1. Standard: In accordance with ASTM C 1629 "Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels".
   a. Surface Abrasion Resistance: ASTM D 4977 "Test method for Granule Adhesion to Mineral Surfaced Roofing by Abrasion": Level 3.
   b. Indentation Resistance: ASTM D 5420 "Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a falling Weight (Gardner Impact)": Level 1.
   c. Impact/Penetration Resistance, Soft Body: ASTM E 695 "Standard Method for Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading": Level 1-2.
2. Mold/Mildew Characteristics:
   a. Mold Resistance: ASTM G 21 "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi": 0.
   b. Mold Resistance: ASTM D 3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber": 10.
   c. Water Absorption: ASTM C 173 "Standard Test Methods for Physical Testing of Gypsum Panel Products": less than 5 percent.
3. Surface Burning Characteristics: ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
   a. Flame Spread: 15.
   b. Smoke Developed: 0.
4. Size: See Drawings for specific thickness locations:
   a. 5/8 inches thick by 4 feet wide maximum by practical length to minimize joints.
5. Long Edges: Tapered.
6. Core Type:
   a. Moisture resistant core.
   b. Non-Fire-Rated: --
   c. Fire Rated: Type X at fire-resistive-rated assemblies.
7. Finish: Abrasion and mold/mildew/moisture resistant paper on the face side, and abrasion and mold/mildew/moisture resistant paper on the back side.
   a. Color of the face paper is dependent on the manufacturer.

G. Shaftwall: For interior walls and ceiling at shafts, area separations, high-attenuation, floor/ceiling assemblies, etc.
1. Standard: ASTM C 1396 "Standard Specification for Gypsum Board".
2. Size:
   a. 1 inch thick by 2 foot wide maximum by practical length to minimize joints.
3. Long Edges: Beveled.
4. Core Type:
   a. Fire Rated: Type X at fire-resistive-rated assemblies.
5. Finish:
   a. Multi-layered paper facings, chemically treated to resist moisture penetration.
      1) Color of the face paper is dependent on the manufacturer.

H. Sheathing: For exterior walls.
1. Standard: ASTM C 1177 "Standard Specification for Glass-Mat Gypsum Substrate for use as Sheathing".
   a. Surface Burning Characteristics per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
      1) Flame Spread: 20.
      2) Smoke Developed: 0.
2. Size:
   a. 5/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
3. Long Edges: "V" Shaped T & G.
4. Core Type:
   a. Non-Fire Rated: Gypsum with Fiberglass face and back.
   b. Fire Rated : Treated Gypsum with fiberglass face and back. at fire-resistive-rated assemblies.
5. Finish Color: Manufacturer's standard.
   a. Color of the face paper is dependent on the manufacturer.

I. Soffit: For exterior soffits with indirect weather exposure.
1. Standard: ASTM C1396 "Standard Specification for Gypsum Board".
   a. Surface Burning Characteristics per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
      1) Flame Spread: 20.
      2) Smoke Developed: 0.
2. Size:
   a. 5/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
3. Long Edges: SW Tapered.
4. Core Type:
   a. Non-Fire Rated: Regular Gypsum with water-resistant additive treatment.
   b. Fire Rated: Type X with weather resistant additives at fire-resistive-rated assemblies.
      1) Available only in 5/8 inch thickness only.
5. Finish: Water-repellant paper facings.
   a. Color of the face paper is dependent on the manufacturer.

J. Roof Board:
1. Thickness 5/8 inch.
2. Surfacing: Glass Mat.
3. Flute Spanibility:
   a. 5/8 inch thick: 8 inches per ASTM E 661 "Test Method for Performance of Wood and Wood-Based Floor and Roof Sheathing Under Concentrated Static and Impact Loads".
4. "R" Value:
   a. 5/8 inch thick: 0.67 per ASTM C 518 "Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus".
5. Water Absorption: 10.0
   a. Per ASTM C 473 "Test methods for Physical Testing of Gypsum Panels and Products".
6. Compression Strength: 500-900 psi normal.
7. Surface Water Absorption: 2.5 grams.
   a. Nominal per ASTM C 473 "Test methods for Physical Testing of Gypsum Panels and Products".
8. Flame Spread / Smoke Developed Index: 0/0.

a. Per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials".

9. Mold Resistance: No Growth.
   a. Per ASTM D 3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber".

K. Metal Accessories:
1. Corner Beads:
   a. Outside Corner, 1-1/4 inch x 1-1/4 inch galvanized:
      1) CDBS / USG "Dur-A-Bead" #103.
2. Edge Trim:
   a. "U"-Shaped 1 inch galvanized CDBS / USG #200-A, size to fit gypsum board.
   b. "L"-Shaped 1 inch galvanized CDBS / USG #200-B, size to fit gypsum board.
      1) When "U"-Shaped molding above cannot be used.
3. Control Joint:
   a. 1-3/4" wide, 1/4" wide center channel with removable tape strip:
      1) CDBS / USG #093.
4. Reveal Moldings (Aluminum Trim): Moldings listed below are manufactured by FRY REGLETS, or approved equivalent.
   a. Reveal Molding Sized to fit gypsum board.
   b. "L" Trim Molding Sized to fit gypsum board.
   c. "F" Reveal Molding Sized to fit gypsum board.
   d. Snap-In Reveal Sized to fit gypsum board.
   e. "Z" Reveal Molding Sized to fit gypsum board.
   f. Reveal Channel Screed Sized to fit gypsum board.
   g. "F" Reveal Sized to fit gypsum board.
   h. "T" Molding Sized to fit gypsum board.

2.3 ACCESSORIES

A. Water:
1. Clean, fresh and free from deleterious amounts of foreign material.

B. Fasteners:
1. At Gypsum Board: In accordance with the manufacturer's written recommendations and the following:
   a. Nails: In accordance with CBC Chapter 7 and ASTM C 514 "Standard Specification for Nails for the Application of Gypsum Board".
   b. Screws: In accordance with CBC Chapter 7, ASTM C 1002 "Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs", type S, G, and W, and ASTM C 954 "Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness", Type S-12.
      1) Provide "Bugle Head" screws that help prevent damage to the gypsum core and face paper.
   c. Adhesives: In accordance with ASTM C 475 "Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board".
      1) Commercial adhesives bridging minor irregularities in the base or framing at "non-fire-rated" construction.
         a) In accordance with ASTM C 557 "Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing".
2. At Suspension Systems:

a. Wood Construction:
   1) Eye screws, minimum 1/4 inch diameter, 1-1/4 inch minimum embedment.
   2) Staples, 1-1/2 inch x 0.148 inch diameter (9 gage).
   3) Nails, "STRONGHOLD-J" nails.
b. Steel Framing:
   1) Shot-in Anchors.
   2) Metal Deck or Metal Deck without Structural Concrete:
   3) Screws, self-tapping, minimum #8 x 1/2 inch.
c. Metal Deck with Structural Concrete or Structural Concrete:
   1) Drilled-in Anchors, 5/16 inch diameter minimum at hanger and bracing wires.
   2) Shot-in Anchors, 3/4 inch minimum penetration at hanger wires only.

C. Joint reinforcement tape and joint compounds:
1. In accordance with ASTM C 474 "Standard Test Methods for Joint Treatment Materials for Gypsum Board Construction" and C 475 "Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board", and Gypsum Board Manufacturer's written recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
   a. Joint Tapes:
      1) Paper reinforcing tape, unless otherwise indicated.
      2) Polymer-coated, open glass-fiber mesh for cementitious backer units.
   b. Setting-Type Joint compounds for gypsum board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.
      1) When used for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
      2) When used for pre-filling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.
      3) When used for filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer for this purpose.
      4) When used for topping compound, use sandable formulation.

D. Prep. Coat: Provide a preparation coat of the specified material to gypsum board surfaces to be decorated with all paints.

E. Primer-Surfacer: "TUFF-HIDE" • by USG, Interior White Latex High Build Spray for a smoother paint finish over all types of drywall, 9.8 to 13 mils DFT in one spray application

F. Textured Finish Coats: Gypsum Board manufacturer supplying the products to this project shall also supply the Texture Finishes to provide distinctive appearance and surface decoration to gypsum board panel walls and ceilings, and as scheduled at the end of this Specification Section.

G. Other Materials: All other miscellaneous materials, not specifically described, but required for a complete and proper installation of gypsum board, shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
2. Coordinate proper placement of ceiling mounted tracks, accessories, light fixtures, HVAC, registers and other items, which are to be integrated with gypsum board ceilings.

B. Protection:
1. Do not begin work until all rooms have been protected against the weather, and the building is covered and fully enclosed. Wet gypsum board after installation shall be removed and replaced at no extra cost to the Owner.
2. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with Regulatory Requirements.
   a. DSA's IR 25-3 "Drywall Ceiling Suspension Conventional Construction-One Layer".
3. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.
2. Control Joints:
   a. Layout in accordance with GA-234-08 for both Non-Rated and Rated wall and ceiling conditions as follows:
      1) Provide Control Joints at in an uninterupted straight plane exceeding 30 ft. in length and total area between control joints, such that no area exceeds 900 sq.ft.

C. Suspension System Installation: In accordance with DSA's IR 25-3.
1. Hanger and Main Runner Installation:
   a. Vertical hanger wires shall be #8 gage and galvanized; use #12 gage wire in "non-accessible" ceiling areas.

b. Hanger spacing shall be 4'-0" o.c. with 1-1/2 inch hot rolled main runners (weighing 1.12 lbs./ft.).

c. Bracing assemblies shall not be greater than a 12' by 12' on center spacing.

1) Provide bracing assemblies at locations not more than 1/2 the spacing given above, from each perimeter wall and at edge of vertical ceiling offsets.

2) The slope of these wires shall not exceed 45 degrees from the plane of the ceiling and shall be taut. Splices in bracing wires are not to be permitted without special DSA approval.

3) Ceiling grid members may be attached to not more than two (2) adjacent walls. Ceiling grid members shall be at least 1/2" free of other walls.

4) If walls run diagonally to ceiling grid system runners, one end of main and cross runners shall be free, and a minimum of 1/2" clear of wall.

5) Suspended ceiling systems with an area of 144 square feet or less, and fire rated ceiling systems with an area of 96 square feet or less, surrounded by walls which connect directly to the structure above, do not require bracing assemblies when attached to at least two adjacent walls.

d. Fasten hanger wires with not less than three tight turns.

1) Fasten bracing wires with not less than four tight turns.

2) Make all tight turns within a distance of 1-1/2 inches.

3) Hanger or Bracing Wire anchors to the structure shall be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire.

a) Wire turns made by machine where both strands have been deformed or bent in wrapping can waive the 1-1/2" requirement, but the number of turns shall be maintained, and be as tight as possible.

4) Separate all ceiling and bracing wires at least six inches (6") from all unbraced ducts, pipes, conduit, etc. It is acceptable to attach lightweight items, such as single electrical conduit not exceeding 3/4" nominal diameter, to hanger wires using connectors acceptable to DSA.

e. Hangers shall be saddle-tied around main runners to develop the full strength of the hangers.

f. Main Runners shall be spliced by lapping and interlocking flanges 12 inches minimum and tying near each end with double loops of #16 gage wire.

g. Provide trapeze or other supplementary support members at obstructions to typical hanger spacing. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits or discontinuous areas. Hanger wires that are more than 1 in 6 out of plumb shall have countersloping wires.

h. All recessed or drop-in light fixtures, as well as ceiling mounted mechanical air terminals and services, shall be supported directly by main runners or by supplemental framing which is supported by main runners and positively attached with screws or other approved connectors.

i. Surface mounted fixtures shall be attached to a main runner with a positive clamping device made of material with a minimum of 14 gage. ROTATIONAL SPRING CLAMPS DO NOT COMPLY.

2. Cross-Furring:

a. Cross-Furring shall be 7/8 inch, 25 gage galvanized hat sections at 24 inches on center maximum.

b. Cross-Furring shall be saddle-tied to the main runners with one strand of #16 gage, or two strands of #18 gage tie wire.

c. Cross-Furring shall be spliced by lapping and interlocking the pieces eight inches minimum and tying near each end with double loops of #16 gage wire.

D. Furring Channels:

1. Attach hat channels at 16" o.c. to framing members at 24" o.c. maximum with one 1-1/2" Type "G" screw at each bearing point. Stagger screws to opposite sides at every bearing surface.

E. Gypsum Board:
1. General:
   a. During Winter Weather Installation periods, follow the GA-220 GYPSUM BOARD WINTER RELATED INSTALLATION RECOMMENDATIONS.
2. Install in accordance with CBC Chapter 25, DITF and GA recommendations, gypsum board panel manufacturer's written recommendations and in accordance with fire-rated design numbers.
   a. At Ceilings and Soffits:
      1) At gypsum board ceilings and soffit areas, install the ceiling prior to installing the walls.
      2) Float the interior ceiling angles, and where permitted by code,
   b. At Sound and Acoustical Walls:
      1) Set all gypsum board panels on each side of the partition in a continuous 1/4 inch bead of acoustical sealant furnished and installed in accordance with the provisions of Specification Section -- SEALANTS.
   c. At Water Resistant Walls:
      1) Install where scheduled and in all areas where high moisture conditions are present, or ceramic tile, or wall coverings are scheduled over gypsum board.
      2) In all areas to be tiled, treat all edges, cutouts, utility holes and joints, corners and nailheads with an approved sealant material in lieu of standard taping. Joints not to be covered by tile shall be treated as regular gypsum board. Do not use standard joint compound under ceramic tile.
   d. At Sheathing:
      1) Screw-attach sheathing to exterior of each stud with 1" Type "S-12" corrosion resistant screws spaced 3/8" from ends and edges and approximately 8" o.c. Apply sealant around sheathing perimeter at interface with other materials and install flashing.
3. Install gypsum board panels horizontally on walls, floor to ceiling.
4. At metal frames terminate wall board panel edge inside frame. Do not terminate gypsum board panel edge against metal frame trim unless otherwise indicated.

F. Cutting:
1. Cut gypsum board panels by scoring and breaking or by sawing, working from the face side.
   a. When cutting by scoring, cut through the face paper and then snap the panel back away from the cut face; then break the backpaper by snapping the panel in the reverse direction or by cutting the back paper.
2. Smooth all cut ends and edges of panels as necessary to obtain a smooth joint.
3. For cut-outs in panels for pipes, fixtures, and other small openings, make holes and cut-outs by sawing or by such other method as will not fracture the core or tear the covering and with such accuracy that plates, escutcheons, or trim will cover the edges.
4. The use of "score-and-knockout" method will not be permitted.

G. Metal Accessories:
1. Corner Beads:
   a. Install at all corners with galvanized screws at nine (9) inch intervals in both flanges with fasteners placed opposite one another the full length of the corner bead. Clinch-on fastening is not allowed.
      1) Fasteners shall be driven below the anticipated finished joint compound surface.

b. Install in one piece except when length of corner exceeds stock lengths – then put splice up high away from people traffic.

2. Edge Trim: Install at all exposed joints where gypsum board panels abut another material with galvanized screws at nine (9) inch intervals the full length of the edge trim. Clinch-on fastening is not allowed.
   a. Fasteners shall be driven below the anticipated finished joint compound surface.
   b. Provide joint sealer in accordance with Specification Section -- SEALANTS.
      1) Provide fire sealant in accordance with Specification Section -- FIRSTOPPING or Specification Section -- SEALANTS, when the wall or ceiling is part of a fire-rated situation.
3. Control Joints:
   a. Install at 30'-0" o.c. maximum at all interior walls or partitions with uninterrupted planes that exceed 30' in length.
      1) Opening frames that are full height of wall or partition may be considered a control joint.
   b. Install at 50'-0" o.c. maximum at all interior ceilings and shall not exceed 2,500 sq.ft. in total area with perimeter relief.
   c. Install at 30'-0" o.c. maximum at all interior ceilings and shall not exceed 900 sq.ft. in total area without perimeter relief.

H. Fastening:
1. Properly space all fasteners in careful accordance with the manufacturer's written recommendations and code requirements, with heads driven slightly below the surface for proper cementing, but without breaking the paper face.
2. Loosely butt all joints to be taped; firmly butt all joints to be left untreated.
3. Stagger all end joints and the joints between panels to achieve a maximum of bridging and a minimum of continued joints.

I. Taping and Finishing:
1. First Coat:
   a. Spread compound evenly over all joints, using suitable tools designed for the purpose.
   b. Fill all joint recesses and metal trim.
   c. Center the reinforcing tape on the joint and press into the fresh compound at all joints, wiping down with sufficient pressure to remove excess compound but leaving sufficient compound under the tape for proper bond.
   d. Feather all edges and leave the surface free from blisters and tape wrinkles.
   e. Apply compound to all fastener recesses, leaving flush with the adjacent surfaces.
   f. Fold reinforcing tape along its centerline and apply to all interior angles, following the same procedure as for joints.
   g. Surfaces shall be free of excess joint compound.
2. Second Coat:
   a. Lightly sand the dry compound with fine sandpaper to remove all irregularities.
   b. Apply a second coat of compound to all joints, feathering approximately three inches beyond edges of tape.
   c. Apply second coat to all fastener recesses.
   d. Surfaces shall be free of excess joint compound.
3. Third Coat:
   a. Lightly sand the dry compound with fine sandpaper to remove irregularities.
   b. Apply final skim coat, feathering out approximately two inches beyond second coat.
   c. Third coat all fastener recesses and metal trim, and all interior angles; allow to dry.
   d. Surfaces shall be free of excess joint compound.

J. Prep. Coat (Drywall Primer):
1. Apply Prep. Coat material at approximately 200 sq.ft. per gallon for all painted wall surfaces. Follow manufacturer's written recommendations for proper preparation of material, mixing and installation at recommended minimum coverage rates.
   a. For smooth walls with no texture, provide airless sprayer application in accordance with manufacturer's written recommendations.
      1) Fine finish: Sand wall surface with 220 grit mesh screen after application of Prep. Coat. **Do not oversand!**
   b. For textured walls: Provide roller application with a 3/8" to 1/2" nap roller before texture application is applied in accordance with manufacturer's written recommendations.

K. Primer - Surfacer:
1. Apply Primer - Surfacer material at manufacturer's written recommendations for proper preparation of material, mixing and installation, and at recommended minimum coverage rates.
   a. For smooth walls with no texture, provide airless sprayer application in accordance with manufacturer's written recommendations.
      1) Fine finish: Sand wall surface with 220 grit mesh screen after application of Primer - Surfacer. **Do not oversand!**
   b. For textured walls: Provide roller application with a 3/8" to 1/2" nap roller before texture application is applied in accordance with manufacturer's written recommendations.

L. Textured Finish Coats: After taping and finishing, apply Textured Finish Coats as indicated in the schedule at the end of this Specification Section.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. Testing Agency: The Owner's Testing Laboratory Agency shall perform field tests and Inspections and prepare test reports.
   a. Testing and inspecting of completed installations of suspended gypsum board ceiling fasteners and anchors shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of gypsum board ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
2. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed:
   a. Concrete Anchors:
      1) Must be capable of sustaining, without failure, a load equal to 200 lbs. tension for hanger wires and 440 lbs. tension for bracing wires by construction as determined by testing according to ASTM E 488 "Test Methods for Strength of Anchors in Concrete and Masonry Elements", by a qualified independent testing agency.
         a) Hanger Wire Anchors 1 in 10 must be field tested.
         b) Bracing Wire Anchors 1 in 2 must be field tested.
3. Remove and replace gypsum board ceiling hangers where test results indicate that they do not comply with specified requirements.
4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

a. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors ot previously tested until 20 pass consecutively and then will resume initial testing frequency.

B. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Clean any soiled surfaces at the end of each day, minimum.
3. Finish shall be clean and ready for the application of any additional finishes.
4. In accordance with manufacturer's written instructions and recommendations.

3.6 PROTECTION

A. Protection from weather:
1. Protect newly installed work from moisture after installation.

B. Protection from traffic:
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

A. The following textured finish coat finishes shall be applied to the board surfaces within the scope of this section prior to covering with other finish materials.
1. Refer to the Material and Finish Schedule for specific locations of each substrate finish.
2. Where no specific substrate finish is called for on the drawings, select the appropriate level of substrate finish from the descriptions below for the final finish material.
3. Where no determination can be made from the descriptions below, provide a minimum of GB-2 substrate finish.
4. Where sound, smoke control or fire-ratings are required, details of construction shall be in accordance with reports of tested assemblies meeting the requirements.

B. GB-1 - Architect's Finish Designation:
1. Level 5 - GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
a. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. A thin skim coat of joint compound or a material manufactured especially for this purpose, shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges.
b. Architect's Finish:
1) Surface shall receive Primer/Surfacer "TUFF HIDE" as manufactured by USG.

2) Uniformly smooth and ready to receive light grade wallcoverings, or fine textured finishes, or flat, semi-gloss, or gloss paints over flat surfaces.
3) Use "Fog and Splatter" fine textured finish where walls and ceilings are scheduled to be painted, unless otherwise noted.

C. GB-2 - Architect's Finish Designation:
1. Level 4 - GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
a. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound surfaces shall be smooth and free of tool marks and ridges.
b. Architect's Finish:
1) Uniformly smooth and ready to receive light textures ("Spray-Splatter", "Orange Peel" (light or heavy) "Stipple" or "Skip Trowel" finishes), or medium grade wall-coverings.
2) Use "Orange Peel" light texture finish when walls and ceilings are scheduled to be painted, unless otherwise noted.

D. GB-3 - Architect's Finish Designation:
1. Level 2 - GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
a. All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
b. Architect's Finish:
1) Total surface must be sufficiently smooth to create a good bonding plane acceptable for installation of scheduled materials (ceramic tile, plywood, acoustical tile or similar materials).

E. GB-4 - Architect's Finish Designation:
1. Level 3 - GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
a. All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fastener heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges.
b. Architect's Finish:
1) Uniformly smooth and ready to receive heavy grade wallcoverings or medium heavy texture finishes (spray or hand applied).
2) Use medium textured finishes where walls and ceilings are scheduled to be painted, unless otherwise noted.

F. GB-5 - Architect's Finish Designation:
1. Level 1 - GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
a. All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
b. Architect's Finish:
1) No applied texture. Use at areas that are above finished ceilings, in attics, in areas where the assembly would generally be concealed.

G. GB-6 - Architect's Finish Designation:
1. Level 0 - GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:

a. No taping, finishing, or accessories required.
b. Architect's Finish:

2. Intended for "Temporary Partitions" and not for permanent construction. Not suitable for Fire-resistive construction.

H. Non-rated and fire-rated wall signage:

1. Provide identification on both sides of all non-rated, fire-rated, and area separation walls with 3" high stenciled letters above ceiling line and no further than 30' from the adjacent identification symbol. Intersecting walls with different ratings shall be identified 5' from such intersection. All identification symbols shall be visible without the aid of a ladder or other similar devices. Colors listed below are from PPG/ICI's "DEV-GUARD" 4208 Series Industrial Interior Enamel line.

	IDENTIFICATION	**COLOR OF IDENTIFICATION**
a.	Non-Rated Wall	Semi-Gloss Black
b.	1-HR Fire Wall	Fire Red
c.	1-HR Occupancy Separation Wall	International Orange
d.	2-HR Fire Wall	Safety Blue
e.	2-HR Occupancy Separation Wall	Cobalt Blue
f.	2-HR Shaft Wall	Safety Green
g.	3-HR Fire Wall	Prairie Beige
h.	4-HR Fire Wall	Safety Yellow

END OF SECTION

SECTION 093000 - TILE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all tile materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 06 10 00 ROUGH CARPENTRY
   6. 07 18 50 VAPOR-ALKALINITY CONTROL
   7. 07 92 00 SEALANTS
   8. 08 31 13 ACCESS DOORS AND FRAMES
   9. 09 22 16 METAL FRAMING
   10. 09 24 00 CEMENT PLASTER
   11. 09 29 00 GYPSUM BOARD
   12. 09 68 40 CARPET
   13. 10 21 13 TOILET PARTITIONS
   14. 10 28 13 TOILET ACCESSORIES
   15. 10 51 13 METAL LOCKERS
   16. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ADAAG Americans with Disabilities Act Accessibilities Guidelines
      b. ADAS Americans with Disabilities Act Standards
      c. ANSI American National Standards Institute, Specifications for the Installation of Ceramic Tile, latest edition, unless otherwise indicated.
      d. FDA Food and Drug Administration
      e. TCNA Tile Council of North America, "Handbook for Ceramic Tile Installation".

1.3 DEFINITIONS

A. Definitions shall comply with the latest edition of the TCNA "Handbook for Ceramic Tile Installation".
   1. MOH's: Relative Measure of Hardness by scratching the surface of the tile with different minerals and subjectively assigning a "MOH's Scale Hardness" number to the glaze.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data:
      a. For each type of Tile indicated.
      b. Manufacturer's full color range (including any standard and premium colors).
      c. Design Data for components, fillers, adhesives, etc.
   2. Shop Drawings:
      a. Location of all movement/expansion joints.
   3. Samples:
      a. Full Size sample of each color and pattern selected.
      b. 6 inch lineal samples of each piece of trim material specified.
   4. Quality Assurance/Control Submittals:
      a. Test Reports:
         1) From Manufacturer that all floor tile complies with the slip resistance standards recommended by the ADAAG/ADAS.
      b. Certificates:
         1) Provide TCNA Master Grade Certificate.
      c. Manufacturer's Written Installation Instructions.
      d. Statement of Installer's Qualifications.
   5. Closeout Submittals in accordance with the following:
      a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
      b. Warranty in accordance with this specification, and with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. Tile Grade: Standard Grade in accordance with ANSI A 137.1x.
      b. Tile shall meet the Breaking Strength limits listed in accordance with ASTM C 648 “Test Method for Breaking Strength of Ceramic Tile”.
      c. Tile shall meet the Scratch Hardness limits in accordance with MOH's
      d. TCNA Master Grade Certificate signed by tile manufacturer and tile installer.
   2. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
      b. CBC California Building Code (CBC 804.1)

C. Meetings:
   1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
      a. Coordinate the work with other work being performed.

b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
c. Review delivery, storage, and handling procedures.
d. Review Project Conditions.
e. Review subfloor preparation procedures.

2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from dents, chips, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
   1. Temperature:
      a. Maintain temperature in space to receive ceramic tile above 50 degrees F for 3 days prior, during, and 7 days following installation.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Field Measurements:
      a. Take and be responsible for field measurements as required.
      b. Report any significant differences between field dimensions and drawings to the Architect.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty,
   2. Warranty Period shall be for the following:
      a. Interior Ceramic Tile One (1) Year.
      b. Exterior Ceramic Tile One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period: One (1) Year.

1.9 MAINTENANCE

A. Extra Materials:
   1. Maintenance Material:
      a. In accordance with Specification Section - PROJECT CLOSEOUT.
      b. Supply 2 square feet of tile and 3 lineal feet of trim for each color and pattern of tile

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Interior Ceramic Tile manufacturer:
      a. DALTILE.
      b. Acceptable alternative manufacturers:
         1) CROSSVILLE CERAMICS.
         2) INTERCERAMIC.
   2. Finishing and Edge Protection Trim manufacturer, or approved equivalent:
      a. SCHLUTER SYSTEMS
   3. Grout Materials manufacturer:
      a. CUSTOM BUILDING PRODUCTS, INC.
      b. Acceptable alternative manufacturers:
         1) LATICRETE.
         2) MAPEI.
   4. Mortar Materials manufacturer:
      a. MAPEI.
      b. Acceptable alternative manufacturers:
         1) CUSTOM BUILDING PRODUCTS, INC.

2) LATICRETE.

5. Admixture manufacturer:
   a. MAPEI "Plancrete AC".
6. Membranes manufacturer:
   a. THE NOBLE COMPANY.
   b. Acceptable alternative manufacturers:
      1) DALTILE.
      2) INTERCERAMIC
7. Cementitious Backer Units manufacturer:
   a. USG CORPORATION "DUROCK Cement Board".
   b. Acceptable alternative manufacturers:
      1) C-CURE "C-Cure Board 990".
      2) CUSTOM BUILDING PRODUCTS "Wonderboard".
      3) FINPAN, INC. "Util-A-Crete Concrete Backer Board".
8. Sealer manufacturer:
   a. CUSTOM BUILDING PRODUCTS Tile Lab "Surface Gard Penetrating Sealer".
      1) Acceptable alternative manufacturers:
         a) C-CURE "Penetrating Sealer #978".

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:
   1. Slip Resistance:
      a. Level Surfaces:
         1) Static Coefficient of Friction (SCOF): Tile installed on level walkway surfaces shall be slip resistant by achieving a minimum 0.6 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM C 1028 "Test method for Static Coefficient of Friction of Ceramic Tile and Like Surfaces by the Horizontal Dynometer Pull Meter Method".
         2) Dynamic Coefficient of Friction (DCOF): Tile installed on level walkway surfaces shall be slip resistant by achieving a minimum 0.42 or greater dynamic coefficient of friction as recommended in ADAS per TCNA technical bulletin "Coefficient of Friction and the DCOF AcuTest," by testing per ANSI A 137.1 "American National Standard Specifications for Ceramic Tile," section 9.6 "Procedure for Dynamic Coefficient of Friction (DCOF) Testing."
   2. Colors and patterns shall be selected from manufacturer's standard line (including premium), except as noted otherwise.

B. Ceramic:
   1. Interior Floor Tile **CT-1.**
      a. Manufacturer: DALTILE.
         1) "Keystones" unglazed mosaics, Group 3.
         2) Trim to match.
            a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses", "coves", "thin-lip bases", "round top bases", "beads", and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.

b. Design: 2" x 2" x 1/4" thick.
c. Pattern: Any combination thereof of the sizes listed above, to be back/edge mounted on manufacturers strong, flexible 2' x 1' sheets.
d. Grout joint width: 1/8".
e. Color: Shall be selected in any combination thereof from manufacturer's full range of color.
f. Material: Unglazed Porcelain Ceramic Mosaics.
1) Water Absorption: less than 0.5 percent.
2) Breaking Strength: greater than 364 lbs.
3) Chemical Resistance: Resistant.
4) Bond Strength: greater than 65 psi.
5) Coefficient of Friction: greater than or equal to 0.60.

2. Interior Base Tile **CTB-1**
a. Manufacturer: DALTILE
1) "Keystone" unglazed mosaics, Group 3
2) Size: 6" x 12" long x 2" x 2" back/edge mounted built-up coved base, including inside and outside corner trims.
3) Pattern to match adjacent floor tile.

3. Interior Base Tile **CTB-2**
a. Manufacturer: DALTILE
1) Color Wheel Classic, glazed ceramic, Sanitary Cove Base, Group 1
a) Size: 6" x 6" x 5/16" thick sanitary cove base, including inside and outside corner trims.
2) Pattern: Single sized tile pattern.

4. Interior Base Tile **CTB-3**
a. Manufacturer: DALTILE
1) Volume 1.0 Glazed Porcelain, Cove Base
a) Size: 6" x 12" cove base, including inside and outside corner trims
b) Pattern: Single sized tile pattern.

5. Interior Wall Tile: **CT-2.**
a. Manufacturer: DALTILE.
1) Color Wheel Linear: Semi-Gloss, Groups 1 and 2.
2) Trim to match.
a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses", "coves", "thin-lip bases", "round top bases", "beads", and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.
b. Design: 4-1/4" x 12-7/8" x 5/16" thick.
c. Pattern: Single size tile pattern.
d. Grout joint width: 1/16".
e. Color: Shall be selected in any combination thereof from manufacturer's full range of colors.
f. Material: Interior Glazed Ceramic.
1) Water Absorption: less than 16.0 percent.
2) Scratch Hardness: 4.
3) Chemical Resistance: Resistant.

6. Interior Wall "Accent:" Tile: **CT-2a.**
a. Manufacturer: DALTILE.
1) Color Wheel Classic: Semi-Gloss, Groups 1 and 2.
2) Trim to match.

a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses", "coves", "thin-lip bases", "round top bases", "beads", and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.

b. Design: 4-1/4" x 4-1/4" x 5/16" thick.
c. Pattern: See Drawings.
d. Grout joint width: 1/16".
e. Color: Shall be selected in any combination thereof from manufacturer's full range of colors.
f. Material: Interior Glazed Ceramic.
1) Water Absorption: less than 16.0 percent.
2) Scratch Hardness: 4.
g. Chemical Resistance: Resistant.

7. Interior "Accent" Wall Tile: **CT-3.**
a. Manufacturer: DALTILE.
1) Color Wheel Linear: Semi-Gloss, Group 3.
2) Trim to match.
a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses", "coves", "thin-lip bases", "round top bases", "beads", and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.
b. Design: 4-1/4" x 12-7/8" x 5/16" thick.
c. Pattern: Single size tile pattern.
1) Grout joint width: 1/16".
d. Color: Shall be selected in any combination thereof from manufacturer's full range of colors.
e. Material: Interior Glazed Ceramic.
1) Water Absorption: less than 16.0 percent.
2) Scratch Hardness: 4.
3) Chemical Resistance: Resistant.

8. Interior Wall "Accent:" Tile: **CT-3a.**
a. Manufacturer: DALTILE.
1) Color Wheel Classic: Semi-Gloss, Groups 3.
2) Trim to match.
a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses", "coves", "thin-lip bases", "round top bases", "beads", and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.
b. Design: 4-1/4" x 4-1/4" x 5/16" thick.
c. Pattern: See Drawings.
d. Grout joint width: 1/16".
e. Color: Shall be selected in any combination thereof from manufacturer's full range of colors.
f. Material: Interior Glazed Ceramic.
1) Water Absorption: less than 16.0 percent.
2) Scratch Hardness: 4.
g. Chemical Resistance: Resistant.

9.

10. Interior "Accent" Wall Tile: **CT-4**
a. Manufacturer: DALTILE.
1) Color Wheel Mosaics: Semi-Gloss, Group 3.
2) Trim to match.

a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses", "coves", "thin-lip bases", "round top bases", "beads", and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.

b. Design: 1.5" Hexagon Mosaic x 1/4" thick Dot Mounted on a 12" x 11" sheet

c. Pattern: Single size tile pattern

d. Color: Shall be selected in any combination thereof from manufacturer's full range of colors.

e. Material: Interior Glazed Ceramic.

1) Water Absorption: less than 3.0 percent.

2) Scratch Hardness: 4-6.

3) Chemical Resistance: Resistant.

11. Interior "Accent" Wall Tile: **CT-5.**

a. Manufacturer: DALTILE.

1) Multitude Glazed Ceramic: Hexagon.

2) Trim to match.

a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses", "coves", "thin-lip bases", "round top bases", "beads", and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.

b) Metal Trim: Provide metal trim at Base where Tile meets floor, SCHLUTER DILEX-BWA, 6mm, Bright White :
Schluter®-DILEX-BWASchluter

b. Design: 12" x 24"x 3/8" thick .

c. Pattern: Single size tile pattern.

1) Grout joint width: 1/8".

d. Color: Shall be selected from the manufacturer's full range of glaze colors.

e. Material: Glazed Ceramic.

1) Moisture Absorption Rate: less than 20% percent.

2) Scratch Hardness: 4-6.

3) Chemical Resistance: Resistant.

12. Interior "Accent" Wall Tile: **CT-6**

a. Manufacturer: DALTILE

1) Revalia Remix: Kaleidoscope Mosaic

2) Trim to match

a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses", "coves", "thin-lip bases", "round top bases", "beads", and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.

3) Trim at Outside Corners:

a) Metal Trim: Provide metal trim at outside corners, SCHLUTER JOLLY, 6mm, Brushed Stainless Steel. See Details.

b. Design: 6" x 6" x 1/4" thick

c. Pattern: Single size tile pattern.

1) Grout joint width: 1/8"

d. Color: Shall be selected in from the manufacturer's full range of glaze colors.

e. Material: Interior Glazed Ceramic

1) Water Absorption: less than 3.0%

2) Scratch Hardness: 4.0-6.0

3) Chemical Resistance: Resistant.

13. Interior Floor Tile: **CT-7**

a. Manufacturer: DALTILE

1) Volume 1.0
2) Trim to match.
   a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses", "coves", "thin-lip bases", "round top bases", "beads", and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.

b. Design: 12" x 24"
c. Pattern: 1/3 Tile Staggered
d. Grout joint width: 3/16"
e. Color: Shall be selected in any combination thereof from manufacturer's full range of color. See Interior Color Schedule
f. Material: Glazed Porcelain
   1) Absorption: less than 0.5 percent.
   2) Breaking Strength: greater than 275 lbs.
   3) Chemical Resistance: Resistant
   4) Scratch Hardness: 8.0
   5) Coefficient of Friction: greater than or equal to 0.60.

C. Finishing and Edge Protection Trim
1. Manufacturer: SCHLUTER SYSTEMS
   a. Profile: Quadec, provide all necessary pieces to provide a seamless installation
   b. Material: Aluminum
   c. Finish: To be selected from manufacturer's full range of offerings
   d. Height: 6mm, appropriate for 1/4" thick tile.

D. Setting Bed:
1. Thick-Set:
   a. Portland Cement: In accordance with ASTM C 150 “Specification for Portland Cement• ,Type 1.
   b. Sand (Aggregate): In accordance with ASTM C 144 “Standard Specification for Aggregate for Masonry Mortar”.
   c. Hydrated Lime: In accordance with ASTM C 207 “Specification for Hydrated Lime for Masonry Purposes”, Type S.
   d. Admixture: Shall be Mortar Latex Admix "Planicrete AC" as manufactured by MAPEI, or approved equivalent.
      1) This Admixture serves as a replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.
2. Thin-Set:
   a. Dry-Set Portland Cement Mortar: In accordance with ANSI A 118.1-1999.
      1) Shall be "Kerabond" by MAPEI, or approved equivalent for floor and wall surfaces.
         a) For wall applications, provide non-sagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.
   b. Improved Modified Dry-Set Cement Mortar: In accordance with A118.4TE, A118.15TE and A118.11
      1) Shall be "ProLite Premium Large Format Tile Mortar" by CUSTOM BUILDING PRODUCTS,, or approved equivalent.
      2) For applications in which the long edge of tile exceeds 8" (large format tiles).
   c. Latex-Portland Cement Mortar: In accordance with ANSI A 118.4-1999.

1) Shall be "Keralastic" + "Kerabond" by MAPEI, or approved equivalent for floor and wall masonry or floor and wall concrete surfaces.
   a) For wall applications, provide non-sagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

E. Grout:
1. Cement:
   a. ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.
2. Commercial Cement:
   a. ANSI A118.6, composed of Standard Sanded Cement Grout, color as indicated.
3. Silicone-Rubber:
   a. One-part, chemically curing, silicone-rubber-based elastomeric sealants used for factory-grouted joints within pre-grouted sheets of glazed wall tile and for field-grouted joints between the same pre-grouted sheet
      1) Silicone-Rubber grout shall not be used on kitchen countertops or other food preparation surfaces unless it meets the requirements of FDA Regulation No. 21, CFE 177.2600.
4. Dry-Set:
   a. ANSI A 108.5-1999 and ANSI A 118.1-1999, a mixture of Portland Cement with sand and additives, color as indicated.
5. Epoxy:
   a. ANSI A118.3-1999, Chemical-Resistant, Water-Cleanable, Ceramic Tile-Setting and Grouting Epoxy, color as indicated.

2.3 ACCESSORIES

A. Membranes:
1. Wall:
   a. Polyethylene, 4 mil sheet with 6 inch laps at wet areas.
   b. Polyethylene, 6 mil sheet with 6 inch laps at shower areas adjacent to concrete or masonry wall areas.
2. Floor:
   a. Mortar bed: Nonplasticized, chlorinated polyethylene sheet faced on both sides with nonwoven polyester fabric; 0.040 inch nominal thickness, water vapor transmission rate 0.040 perms per ASTM E 96 "Test Methods for Water Transmission of Materials", Procedure E.
      1) "Chloraloy" by THE NOBLE COMPANY.
   b. Thin-Set: Nonplasticized, chlorinated polyethylene sheet faced on both sides with nonwoven polyester fabric; 0.030 inch nominal thickness, water vapor transmission rate 0.15 perms per ASTM E 96 "Test Methods for Water Transmission of Materials", Procedure E.
      1) "Nobleseal TS" by THE NOBLE COMPANY.
      2) Approved equivalent: "Dal-Seal CIS" by DALTILE over a skim coat of "Keralastic" + "Kerabond" by MAPEI.

B. Cementitious Backer Units:
1. Provide cementitious backer units complying with ANSI A118.9-1999, in maximum lengths available to minimize end-to-end butt joints.
   a. Thickness: Manufacturer's standard thickness, but not less than 1/2 inch unless otherwise noted.

b. Width: Manufacturer's standard width, but not less than 32 inches, unless otherwise noted.

C. Miscellaneous Materials:
1. Provide miscellaneous guides, shims, spacers, rust resistant fasteners, etc., applicable to substrates and finish materials necessary for flat and true surfaces that minimize cracks, bulges and uneven surfaces.

D. Cleaners:
1. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

E. Sealers:
1. Grout and Tile Sealer: Manufacturer's standard product for sealing grout joints and tile surfaces that does not change color or appearance of grout or tile.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors comply with surface finish requirements in ANSI A108.01 for installations indicated.
   a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
   b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.

C. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
2. Prior to installation of Tile, inspect the installed work executed under other Sections which affect the installation of Tile.

a. Prepare masonry surfaces with a parge coat and cure so that all surfaces are flat prior to the installation of tile.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
3. Fill cracks, holes, and depressions in concrete substrates for tile floors with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
4. Maximum backing surface variations shall be as follows:
   a. Mortar Bed at Floors: 1/4 inch in 10 feet from required plane.

D. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Determine location of all movement/expansion joints before starting tile work.
6. Install Cementitious Backer Units in accordance with Cementitious Backer Unit Board Manufacturer's recommendations.
   a. Shim Cementitious Backer Unit Boards as required for a flat and true surface plane with no bulges or uneven or flared surfaces.
   b. Set shims at fasteners.
   c. Fasten with corrosion resistant, waferhead, self-drilling screws with countersinking ribs, min. 8 gauge. Set flush with Board's surface. Fasten thru shims.
7. Determine location of all toilet accessories before starting tile work.
8. Isolate tile installations from concrete slabs at shower floor areas to minimize cracking of the tile installation systems. Install in accordance with the TCNA recommendations using cleavage membranes.
   a. Provide crack isolation membranes as required in accordance with TCNA installation requirements.
9. Provide wall membranes as required by TCNA installation requirements.

B. Layout:
1. Lines shall be straight and true.
2. Refer to Wall and Floor Pattern Drawing(s) in the Interior and Exterior Color Schedules for layout of patterns.
3. Lay out all tile work to minimize cuts less than one-half in size.
4. Lay out tile wainscots to next full tile beyond dimension shown.

C. Joints
1. General: Movement/Expansion Joints shall be placed in accordance with the TCNA recommendations for placement.
2. Align all wall joints to give straight uniform grout lines, plumb and level.
3. Align all floor joints to give straight uniform grout lines, parallel with walls.
4. All joints shall be uniform in width.
5. Locate expansion joints in the tilework:
   a. Over construction or expansion joints in the backing.
   b. Where backing materials change or change directions.
   c. At wall/floor intersections.
   d. Exterior work:
      1) Not more than 8 - 12 feet in each direction.
   e. Interior work:
      1) Not more than 20 - 25 feet in each direction.
         a) Interior tilework exposed to direct sunlight or moisture: 8 to 12 feet in each direction.
         b) Above ground concrete slab substrate: 8 to 12 feet in each direction.
6. Movement/expansion joint width sizes:
   a. Working Butt Joints 1/4 inch minimum.
   b. Working Lap Joints 1/8 inch minimum.

D. Flatness and Lippage:
1. Maximum lippage between adjacent units: 1/32 inch.

E. Tile System Installations:
1. Interior Floor:
   a. System IFA: Concrete Sub-Floor, thin-set installation: **SYS-IFA.**
      1) Use: Dry or Limited water exposure.
      2) Method: Dry-set Mortar or Latex-Portland Cement Mortar.
      3) Detail Standard: TCNA F113-, 3/32" thin-set Dry-set or Latex-Portland Cement Mortar, Bond Coat, Tile, Grout.
      4) Installation Standard:
         a) Tile: ANSI A 108.5.
         b) Grout: ANSI A 108.10.
   b. System IFB: Concrete Sub-Floor, mortar bed installation **SYS-IFB.**
      1) Use: Dry or Wet (Kitchens and Toilets).
      2) Method: Cement Mortar.
      3) Detail Standard: TCNA F114 - Cleavage Membrane, Reinforcing, 1-1/4" to 2"- Mortar Bed, Bond Coat, Tile, Epoxy Grout.
      4) Flush Grout with tile surface at kitchen floors only.
      5) Installation Standard:
         a) Tile: ANSI A 108.1B.
         b) Epoxy Grout: ANSI A 108.6.
   c. System IFC: Concrete Sub-Floor, shower receptor mortar bed installation: **SYS-IFC.**
      1) Use: Wet Exposure (Showers).
      2) Method: Cement Mortar.
      3) Detail Standard: TCNA B414 - Tile or Stone, Shower Membrane, 1" to 1-3/4" Reinforced Mortar Bed, Bond Coat Tile, Grout.
      4) Installation Standard:
         a) Tile: ANSI A 108.1B.
         b) Grout: ANSI A 108.10.

c) Shower Pan Membrane ANSI A108.01-3.6

d. System IFD: Concrete Sub-Floor, Cementitious Backer Installation **SYS-IFD**.

1) Use: Wet Exposure (Showers).
2) Method: Latex Portland Cement Mortar.
3) Detail Standard: TCNA B 415 – shower floor membrane, cementitous backer unit over Wood or Metal studs or fiber cement underlayment, reinforced mortar bed, tile.
4) Installation Standard:
   a) Tile: ANSI A 108.5.
   b) Grout: ANSI A 108.10.
   c) Shower Pan Membrane ANSI A108.01-3.6.

2. Interior Wall:

a. System IWA: Masonry or Concrete Walls, thin-set installation **SYS-IWA**.

1) Use: Dry or Limited Water Exposure (Toilets).
2) Method: Cement Mortar.
3) Detail Standard: . TCNA W202I - 3/32" Thin-Set Mortar Bed Bond Coat, Tile, Epoxy Grout.
4) Installation Standard:
   a) Tile ANSI A 108.5.
   b) Epoxy Grout ANSI A 108.6.

b. System IWB: Masonry or Concrete Walls, mortar bed installation **SYS-IWB.**

1) Use: Dry or Limited Water Exposure (Toilets).
2) Method: Cement Mortar, Bonded.
3) Detail Standard: TCNA W211 - 3/8" to 3/4" Mortar Bed, Bond Coat, Tile, Grout.
4) Installation Standard:
   a) Tile ANSI A 108.1A, 1B, or 1C.
   b) Grout ANSI A 108.10.

c. System IWC: Masonry or Concrete Walls, Mortar bed installation **SYS-IWC.**

1) Use: Wet Exposure (Showers)
2) Method: Cement Mortar.
3) Detail Standard: TCA 221 - Membrane, Metal Lath, 3/4" to 1 1/2" Scratch Coat and Epoxy Mortar Bed, Bond Coat, Tile, Epoxy Grout.
4) Installation Standard:
   a) Tile ANSI A 108.1B.
   b) Epoxy Grout ANSI A 108.6.
   c) Waterproof membrane ANSI A108.13.

d. System IWD: Gypsum Board Wall, or Cement Board, thin-set installation **SYS-IWD**.

1) Use: Dry Exposure.
2) Method: Dry-Set or Latex-Portland Cement Mortar.
3) Detail Standard at Gypsum Board: TCNA W243 - Water Resistant Gypsum Board, 3/32" Thin-Set Dry-Set or Latex-Portland Cement Mortar, Bond Coat, Tile, Grout.
4) Detail Standard at Cement Backer Board: TCNA W244 - Cement Backer Board, 3/32" Thin-Set Dry-Set or Latex-Portland Cement Mortar, Bond Coat, Tile, Grout.
   a) For wall applications in which the long edge of the tile exceeds 8 inches (large format tile).
5) Installation Standard:
   a) Tile ANSI A 108.5.
   b) Epoxy Grout ANSI A 108.6.

e. System IWE: Wood Stud Walls, mortar bed installation **SYS-IWE.**

1) Use: Dry or Wet Exposures (Kitchen, Toilets and Showers).
2) Method: Cement Mortar.
3) Detail Standard: TCNA W231 - Cleavage Membrane, Metal Lath, 3/4" to 1-1/2" Scratch Coat and Mortar Bed, Bond Coat, Tile, Grout.
4) Installation Standard:
   a) Tile ANSI A 108.1B.
   b) Grout ANSI A 108.10.
   c) Waterproof membrane ANSI A108.13.

f. System IWF: Metal Stud Walls, mortar bed installation **SYS-IWF**.
1) Use: Dry or Wet Exposure (Kitchen, Toilets and Showers).
2) Method: Cement Mortar.
3) Detail Standard: TCNA W241 - Cleavage Membrane, Metal Lath, 3/4" to 1" Scratch Coat and Mortar Bed, Bond Coat, Tile, Grout.
4) Installation Standard:
   a) Waterproof membrane ANSI A108.13.
   b) Cured Mortar Bed.
   c) Tile ANSI A 108.1B.
   d) Grout ANSI A 108.10.

3. Sealer Application:
   a. For tile and grout sealers, follow manufacturer's written recommendations and procedures, at application rates recommended by the label on the material container.
   b. Apply penetrating grout sealer and cure in accordance with tile manufacturer's written recommendations for the resistance of moisture penetration into the grout surface.
   c. For Stone Tile and Stone Grout sealers, apply at a rate of 500 to 1,500 sq. ft. per coat per gallon, depending on type of stone (slate), porosity and texture of the surface, temperature, humidity and method of application.
   d. For exterior Stone Tile applications, provide two coats of sealer per manufacturer's written recommended rate of application, allowing the proper time between coats for curing (30 minutes) as recommended by the manufacturer.
      1) Protect newly coated surface from traffic and moisture for a period of twelve hours.

F. Curing:
1. Apply Curing Sheet over all tiled surfaces.
   a. Lap sheets 4 inches minimum and seal against escape of moisture.
   b. Leave Curing Sheets in place a minimum of 3 days.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.
3. In accordance with manufacturer's written instructions and recommendations.
4. Wash down cured tile work with cleaner mixed and applied in accordance with manufacturer's written instructions.
5. Rinse tile-work thoroughly, with clean water, and polish with soft-cloth.

B. Cleaning, Removal, Replacement and Repointing of Existing Tile:
1. Clean all existing tile and grout of all dirt, oils and graffiti.

2. Remove all existing tile which has been damaged, cracked, drilled, or otherwise disfigured from its original shape and installation (including Graffiti which can not be cleaned off).
    a. Provide in the Base Bid for an ALLOWANCE of 100 sq. ft. maximum of tile areas selected by the Architect (excluding expected tile replacement for blocking or new walls) for additional work required to complete the modernization.
3. Repoint all grout conditions subject to tile removal and replacement, and repoint all grout conditions where the existing grout has been damaged, cracked, drilled, or otherwise disfigured from its original shape and installation. Repoint with Latex-Portland Cement Mortar.
4. Install new tile in locations subject to tile removal. Install tile colors (maximum of 4 color choices) in locations selected by the Inspector and Architect.

3.5 PROTECTION

A. Protection from weather:
    1. Protect newly installed work from freezing for 24 hours after erection, installation or application.

B. Protection from traffic:
    1. Prohibit all foot and wheel traffic from using newly tiled floor for at least 3 days.
    2. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 095000 – ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Acoustical Ceiling Materials, Suspension Systems, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 05 12 00 STEEL AND FABRICATIONS
   5. 05 30 00 METAL DECK
   6. 06 10 00 ROUGH CARPENTRY
   7. 07 21 00 INSULATION
   8. 07 81 16 FIREPROOFING
   9. 09 22 16 METAL FRAMING
   10. 09 24 00 CEMENT PLASTER
   11. 09 29 00 GYPSUM BOARD
   12. 09 72 00 WALL COVERINGS
   13. 09 91 00 PAINTING
   14. 10 05 00 MISCELLANEOUS SPECIALTIES
   15. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. CISCA Ceilings & Interior Systems Construction Association.

1.3 SYSTEM DESCRIPTION

A. Suspension System Design Requirements: In accordance with allowable values and properties assigned and approved by CBC.
   1. Heavy Duty in accordance with ASTM C 635 "Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and lay-in Panel Ceilings," ASTM E 580 "Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint", Section 5.1, ASCE 7 as modified by CBC Sections 1617A.1.20, 2506.2.1, and IR 25-2.13.
   2. Design Weight: Total Weight does not exceed four (4) pounds per square foot, including air conditioning grilles and light fixtures.
   3. System is not to support lateral loads from partitions.
   4. Fasteners must be capable of sustaining, without failure, hanger wires with 200 lbs. tension load and bracing wires with 440 lbs. tension load.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Manufacturers Product Information for each type of Acoustical Ceiling Tile or Panel scheduled to be used.
      b. Manufacturers Product Information for each component of the Suspension System specified or scheduled.
   2. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing ceiling suspension system assemblies and indicating dimensions, method of field assembly (including hanger and bracing wires, compression struts, wall angle attachments), other components, and location and detail of each suspension system grid connection.
         1) Submit drawings showing details of Hanger Wires, Brace Wires, expansion joint locations, and Compression Strut connections to structure and to suspension system.
   3. Samples.
      a. Provide 4 to 6 inch square sample for each type of Acoustical Ceiling Tile or Panel scheduled to be used.
      b. Provide 12 inch lineal sample of Suspension System components for each type of system specified or scheduled.
   4. Quality Assurance/Control Submittals:
      a. Test Reports:
         1) Tension Tests of acoustical ceiling wire anchors provided by Testing Agency.
      b. Certificates:
         1) General Construction: Certification signed by the Contractor on Contractor's letterhead.
         2) Certificates signed by manufacturers of Acoustical Ceiling components certifying that their products comply with specified requirements.
      c. Manufacturer's Written Instructions:
         1) Manufacturer's written instructions showing their suspension grid installation methods.
   5. Closeout Submittals in accordance with the following:
      a. In accordance with Specification Section - PROJECT DOCUMENTS.
      b. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. Where fire-rated Acoustical Ceiling assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per UL or ASTM E 119 "Test Methods for Fire Tests of Building Construction and Materials", by an independent testing and inspecting agency acceptable to the California State Fire Marshal.
      b. Source Limitations:
         1) Acoustical Ceiling Tiles or Panels: Obtain each type through one source from a single manufacturer.
         2) Suspension Systems: Obtain each type through one source from a single manufacturer.

2. Installer Qualifications:
   a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      1) Helpers and apprentices used for such work shall be under full and constant supervision at all times by thoroughly skilled Acoustical Ceiling and Suspension System installers.
      2) In the acceptance or rejection of installed Acoustical Ceiling or Suspension Systems, no allowance will be made for lack of skill on the part of the installers.
3. Manufacturer/Supplier Qualifications:
   a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
   b. Products, materials and evaluation reports to comply with IR-A5.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
   b. CBC California Building Code (CBC 803.1.1)
   c. CSFM California State Fire Marshal.
   d. FDA Food and Drug Administration, a department of US Department of Health and Human Services.
   e. IR Interpretation of Regulations.
   f. USDA/FSIS United States Department of Agriculture., Food Safety and Inspection Service.

C. Certificates:
1. General Construction: Contractor to certify that work provided, meets or exceeds the requirements of this section.
2. Products: Manufacturers of Acoustical Ceiling components shall certify that their products comply with specified requirements.

D. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored in a fully enclosed, conditioned space and protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination and other causes.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
   1. Do not install acoustical ceilings until spaces are enclosed and weatherproof.
   2. Wet work and dry work in spaces is completed, dry and dust free.
   3. Work above ceilings is completed.
   4. Ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.8 SEQUENCING AND SCHEDULING

A. Coordination:
   1. Coordinate layout and installation of Acoustical Ceiling Tiles, Panels and the Suspension Systems with other construction that penetrates ceilings or is supported, including light fixtures, HVAC equipment, smoke monitoring and fire-suppression systems.

1.9 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:

a. Warranty period Five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products specified are from companies listed below, or approved equivalent. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers listed as acceptable alternative manufacturers must still comply with the requirements of the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Specified Tile and Panel product manufacturer:
   a. ARMSTRONG WORLD INDUSTRIES.
   b. Acceptable alternative manufacturers:
      1) CERTAINTEED.
      2) UNITED STATES GYPSUM COMPANY, USG INTERIORS.
2. Specified Suspension System product manufacturer:
   a. ARMSTRONG WORLD INDUSTRIES.
   b. Acceptable alternative manufacturers:
      1) CHICAGO METALLIC CORPORATION.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Tile or Panel:
1. General:
   a. Standard: Provide manufacturer's standard tile or panels of configuration indicated that comply with ASTM E 1264 "Standard Classification for Acoustical Ceiling Products" classifications as designed by type, pattern, acoustical rating, light reflectance, and fire-rating, unless otherwise indicated.
   b. Colors and Patterns: Match appearance characteristics indicated for each product type.
   c. Antimicrobial Treated:
      1) Coating-Based: Provide tile or panel face surfaces (front and back) with coated antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 "Standard Test method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber".
      2) Panel-Base: Provide tiles or panels treated with manufacturers standard antimicrobial solution that inhibits fungus, mold, mildew, gram-positive and gram-negative bacteria.
2. See the Acoustical Tile and Panel Schedule at the end of this section for specified tile or panel types.

B. Suspension Systems:
1. General:

a. Classification of Suspension System Grid is Heavy Duty in accordance with ASTM C 635 "Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and lay-in Panel Ceilings," ASTM E 580 "Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint", Section 5.1, ASCE 7 as modified by CBC Sections 1617A.1.20, 2506.2.1, and IR 25-2.13.

b. Provide Underwriter's Laboratory (UL) design number or California State Fire Marshal (CSFM) Listing number for the fire-rated ceiling assembly.

1) The components and installation details must conform in every respect with the UL or CSFM approval for the design number specified.

2) Custom designs which combine components from different approval designs but have not been tested as a complete assembly are not acceptable.

3) See Exposed Grid at end of this section for specified system numbers.

2. Wire:

a. Soft temper, Class 1 zinc coating, in accordance with ASTM A 641 "Specification for Zinc-Coated (Galvanized) Carbon Steel Wire".

1) Hanger: 12 gage (0.106 inch diameter).

2) Brace: 12 gage (0.106 inch diameter).

3. Clip Attachments:

a. General: Fabricate from corrosion-resistant material with holes or loops for attaching hanger and brace wires.

1) Ceiling Clips: 3/4" wide x 13 gage, galvanized steel.

2) Steel Straps:

a) 1" wide x length as required, 12 gage galvanized steel.

b) 3" wide x 4" long x 12 gage galvanized steel.

4. Grid:

a. Grid System shall be manufactured from commercial quality galvanized steel.

b. All Tee Grid System Numbers are from ARMSTRONG WORLD INDUSTRIES.

1) Exposed Non-Rated 15/16" Tee Grid System "Prelude XL" (P-XL).

2) Exposed Fire-Rated 15/16" Tee Grid System "Prelude XL Fire Guard" (P-XL).

3) Exposed Non-Rated 9/16" Tee Grid System "Suprafine XL" (S-XL).

4) Exposed Fire-Rated 9/16" Tee Grid System "Suprafine XL Fire Guard" (S-XL),

c. Main Runners:

1) Main Runner – Non-Rated 15/16" #P-XL 7301.

2) Main Runner – Fire-Rated 15/16" #P-XL 8301.

3) Main Runner - Non-Rated 9/16" #S-XL 7501.

4) Capped, Double-Web roll-formed from cold-rolled steel sheets, pre-painted with factory punched cross runner slots, hanger holes and integral bayonet style and couplings.

5) Fire-rated: Manufactured with fire-expansion reliefs.

d. Cross Runners:

1) 2' Non-Rated Cross Runner 15/16" #P-XL 7328.

2) 4' Non-Rated Cross Runner 15/16" #P-XL 7341.

3) 2' Fire-Rated Cross Runner 15/16" #P-XL 8323.

4) 4' Fire-Rated Cross Runner 15/16" #P-XL 8341.

5) 2' Non-Rated Cross Runner 9/16" #S-XL 7520.

6) 4' Non-Rated Cross Runner 9/16" #S-XL 7540.

7) Capped, Double-Web roll-formed from cold-rolled steel sheets, pre-painted with factory punched cross runner slots and hanger holes.

8) Fire-rated: Manufactured with fire-expansion reliefs.

e. Wall Angles:

1) "Angle" Ceiling Edge Trim, hemmed exposed edges, 7/8" x 7/8", #7800.

2) "Angle" Ceiling Edge Trim, hemmed exposed edges, 2" x 2", #7808.
3) Roll-formed of sheet metal of same gage and finish as the main runners.
4) Provide wall angles fabricated to diameter required to fit circular penetrations of ceilings exactly.

f. Panel Hold Down Clips:
1) Hold Down Clip #P-XL 414.

g. Compression Struts (Metal angles, galvanized steel):

1)	1/8 inch thick x 1 inch x 1 inch	800 lbs./1000 feet weight.
2)	3/16 inch thick x 1-1/4 inch x 1-1/4 inch	1,480 lbs./1000 feet weight.
3)	3/16 inch thick x 1-1/2 inch x 1-1/2 inch	1,800 lbs./1000 feet weight.
4)	3/16 inch thick x 1-3/4 inch x 1-3/4 inch	2,120 lbs./1000 feet weight.
5)	3/16 inch thick x 2 inch x 2 inch	2,440 lbs./1000 feet weight.
6)	3/16 inch thick x 2 inch x 2-1/2 inch	3,070 lbs./1000 feet weight.
7)	3/16 inch thick x 3 inch x 3 inch	3,710 lbs./1000 feet weight.
8)	1/4 inch thick x 3-1/2 inch x 3-1/2 inch	5,800 lbs./1000 feet weight.
9)	1/4 inch thick x 4 inch x 4 inch	6,600 lbs./1000 feet weight
10)	Alternate Compression Struts	Refer to drawings.

a) Must be submitted to and approved by DSA.

h. Seismic Clips:
1) Seismic Perimeter Clips #BERC2.

i. Cold Rolled Channels, 16 gage galvanized steel:
1) 1-1/2" x 17/32" flange 475 lbs/1000 feet weight.

2.3 ACCESSORIES

A. Fasteners:
1. Wood Construction:
a. Provide corrosion-resistant materials.
b. Eye screws, minimum 1/4 inch diameter, 1-1/4 inch minimum embedment.
c. Staples, 1-1/2 inch x 0.148 inch diameter (9 gage).
d. Nails, STRONGHOLD "J" nails.
2. Steel Framing:
a. Shot-in Anchors.
3. Metal Deck or Metal Deck without Structural Concrete:
a. Self-tapping Screws.
4. Metal Deck or Metal Deck with Structural Concrete or Concrete:
a. Shot-in Anchors (hanger wire only).
b. Drilled-in Anchors.
5. Suspension System Fasteners, runner to wall angle:
a. Pop rivets as standard with the manufacturer, heads to match the finish of the main runners.
1) Pop-rivets, screws or other attachments are not acceptable unless specifically detailed on the manufacturer's drawings and approved by UL and the CSFM.

B. Adhesives:
1. Provide adhesives that comply with all requirements of ASTM D 1779 "Standard Specification for Adhesive for Acoustical Materials", for non-rated and fire-rated assemblies, and shall be compatible with the substrate to which the tile is to be installed as well as the tile material selected, and shall be UL Labeled for Class 0 - 25 Flame Spread..

C. Sealants:

1. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834 "Specification for Latex Sealants", and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90 "Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements".
2. Acoustical Sealant for Concealed Joints: Manufacturer's standard non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

D. Other Materials: All other miscellaneous materials, not specifically described, but required for a complete and proper installation of acoustical ceilings, shall be as selected by the Contractor subject to the approval of the Architect.

2.4 FINISHES

A. Factory Finish:
1. Suspension System: Manufacturer's standard baked-on enamel finish to all members. All fasteners shall match the main runner finishes.
   a. General: Comply with NAAMM's "Metal Finishes manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Tile or Panel: Refer to Tile and Panel Schedule for finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, examine substrates, areas, and conditions, including structural framing to which acoustical ceilings attach or abut, with installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical ceilings.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
2. Coordinate proper placement of ceiling mounted tracks, accessories, light fixtures, HVAC registers and other items which are to be integrated with acoustical ceilings.
3. Measure each ceiling area and establish layout of acoustical tiles or panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles or panels at borders, and comply with layout shown on reflected ceiling plans.

B. Protection:
1. Do not begin work until all rooms have been protected against the weather.

2. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations along with CISCA's "Ceiling Systems Handbook" and USDA.
2. In accordance with approved Submittals.
3. In accordance with Regulatory Requirements.
4. Installation shall comply with ASTM C 636 ""Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels", and ASTM E 580 "Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint", Section 5.2.
5. Installation shall also comply with CBC Section 1617A.1.20, 2506.2.1, and R 25-2.13.

B. Layout:
1. Lines shall be straight and true.
2. Set plumb, level, and square.

C. Suspension System:
1. 12 gage (minimum) hanger wires may be used for up to and including 4'-0" x 4'-0" grid spacing and attached to main runners. Splices will not be permitted in any hanger wires unless specifically approved by DSA/SSS.
2. Provide 12 gage hanger wires at ends of all main and cross runners within 8" from the support or within 1/4 of the length of the end tee, whichever is least, for the perimeter of the ceiling area.
   a. End connections for runners, which are designed and detailed to resist the applied horizontal forces may be used in lieu of the 12 gage hanger wires subject to DSA/SSS review and approval.
   b. Perimeter wires are not required when the length of the end tee is 8" or less.
3. Provide trapeze or other supplementary support members at obstructions to maintain hanger spacing.
   a. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits or discontinuous areas.
   b. Hanger wires that are more than 1 in 6 out of plumb are to have counter-sloping wires.
4. Ceiling grid members may be attached to not more than 2 adjacent walls. Ceiling grid members should be at least 3/4 inch free of other walls.
   a. If walls run diagonally to ceiling grid system runners, one end of main and cross runners should be free and a minimum of 3/4 inch clear of wall.
   b. Pop rivets, screws, or other attachments in fire-rated ceilings shall not be acceptable unless specifically detailed on the manufacturer's drawings and approved by UL and DSA/FLS.
5. At the perimeter of the ceiling area where main or cross runners are not connected to the adjacent wall, provide Seismic Perimeter Clip, installed in accordance with manufacturer's instructions and ICC-ES Evaluation Report.

6. Provide bracing assemblies consisting of a compression strut and slotted angle spacer of four (4) 12 gage splayed bracing wires oriented 90 degrees from each other.
   a. Bracing assemblies shall be provided for each 144 square feet of ceiling area.
      1) Spaced not more than 12 feet by 12 feet on center.
   b. Bracing assemblies shall be located not more than 1/2 the above spacing from each perimeter wall or at the edge of vertical ceiling offsets.
   c. The slope of these wires should not exceed 45 degrees from the plane of the ceiling and should be taut without causing the ceiling to lift.
   d. Splices in bracing wires are not permitted unless specifically approved by DSA/SSS.
   e. Fire-Rated Asemblies shall have a bracing assembly for each 96 square feet.
      1) The first bracing assembly is required not more than four feet (4'-0") from each wall.
      2) A minimum of one bracing assembly is required between any two adjacent expansion cut-outs on runners being braced.
   f. Bracing assemblies are not required where the ceiling area is:
      1) 144 sq.ft. or less.
7. Fasten hanger wires with not less than 3 tight turns. Fasten bracing wires with 4 tight turns.
   a. Make all tight turns within a distance of 1-1/2 inches.
   b. Hanger or bracing wire anchors to the structure should be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire.
8. Separate all ceiling hanging and bracing wires at least 6 inches from all unbraced ducts, pipes, conduit, etc.
   a. It is acceptable to attach lightweight items, such as single electrical conduit not exceeding 3/4" nominal diameter, to hanger wires using connectors acceptable to DSA/SSS.
9. Attach all light fixtures and ceiling mounted air terminals or services to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures.
   a. Approved screws or fasteners are required.
10. Flush or recessed light fixtures weighing less than 56 pounds and mechanical terminals and services weighing less than 20 lbs. may be supported directly on the runners of a heavy duty grid system but, in addition, they must have a minimum of two (2) 12 gage slack safety wires attached to the fixture at diagonal corners and anchored to the structure above.
    a. All 4 ft. x 4 ft. fixtures must have slack safety wires at each corner.
11. All flush or recessed light fixtures weighing 56 pounds or more and mechanical terminals and services weighing 20 lbs. or more shall be independently supported by not less than four (4) taut #12 gage wires each attached to the fixture.
    a. Wires and their attachment to the structure must be capable of supporting 4 times the weight of the unit and attached to the structure above regardless of the type of ceiling grid system used.
12. Support surface mounted light fixtures by at least two positive devices which surround the runner and which are each supported from the structure above with 12 gage wire.
    a. Spring clips or clamps that connect only the runner are not acceptable.
    b. Provide additional supports when light fixtures are 8'-0" or longer.
13. Support pendant mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting four (4) times the weight of the fixture.
    a. Bracing assembly is required where the pendant hanger penetrates the ceiling.
    b. Pendant hanger is required to attach to the bracing assembly to transmit horizontal forces.
    c. Maximum spacing between supports shall not exceed 8 feet.
14. Ceiling Edge Condition:

a. Where Grid System abuts wall, fasten wall angles to framing in wall structure.
   1) At Wood Framing, attach to backing with No. 10 x 3" Screws at 16" o.c.
   2) At Metal Framing, attach to metal framing backing with No. 8 self-tapping sheet metal screws at 16" o.c.
b. Where Grid System terminates free from wall, fasten wall angles to Grid system with Fasteners. No screw or rivets shall appear on any exposed surface.

15. Supplemental Support Members:
    a. Where the width of ducts or other obstructions interfere with typical hangers and bracing assemblies, provide and install supplemental members and hangers in the form of trapeze or equivalent devices.
    b. Provide additional hangers, struts, or braces at all ceiling breaks, soffits, or discontinuous areas.
    c. Hanger wires that are more than one (1) horizontal in six (6) vertical shall have counter-sloping wires.
16. Expansion Joints:
    a. Expansion Joints shall be provided and installed in the ceiling at intersections of corridors and junctions of corridors with lobbies or other similar areas.
17. Expansion Joints shall be provided and installed in ceiling areas exceeding 2,500 sq.ft. in order to separate ceilings into areas not exceeding 2,500 sq.ft.

D. Suspended Acoustical Ceiling Panels:
1. Install acoustical ceiling panels with undamaged edges and fit accurately into suspension system runners and wall angles. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
   a. Install panels with pattern running in one direction.
2. Paint cut edges of panels remaining exposed after installation.
   a. Match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical ceiling manufacturer.
3. Install hold down clips at all Fire-Rated acoustical ceiling assemblies, food preparation areas, and at locker/shower areas.
4. Penetrations through the ceiling for sprinkler heads and other similar devices that are not integrally tied to the ceiling system in the lateral direction shall have a two (2) inch oversized ring, sleeve, or adapter through the ceiling tile to allow free movement of one (1) inch in all horizontal directions. Alternatively, swing joints may be provided per ASTM E 580, Section 5.2.8.5.

E. Adhesively applied Acoustical Tiles:
1. Installation shall comply to ASTM D 1779 "Standard Specification for Adhesive for Acoustical Materials".

3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. Testing Agency: The Owner's Testing Laboratory Agency shall perform field tests and Inspections and prepare test reports.
   a. Testing and inspecting of completed installations of acoustical ceiling fasteners and anchors shall take place in successive stages, in areas of extent and using methods as follows.
   b. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
2. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed:
   a. Concrete Anchors:

1) Must be capable of sustaining, without failure, a load equal to 200 lbs. tension for hanger wires and 440 lbs. tension for bracing wires by construction as determined by testing according to ASTM E 488 "Test methods for Strength of Anchors in Concrete and Masonry Elements", by a qualified independent testing agency.
   a) Hanger Wire Anchors 1 in 10 must be field tested.
   b) Bracing Wire Anchors 1 in 2 must be field tested.

3. Remove and replace acoustical panel ceiling hangers where test results indicate that they do not comply with specified requirements.
4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
   a. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

B. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Clean any soiled surfaces at the end of each day, minimum.
3. Finish shall be clean and ready for the application of any additional finishes.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturers written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.6 SCHEDULES

A. Tile and Panel Schedule:
1. TYPE ACT-I: (NOT USED)
2. TYPE ACT-II:
   a. Manufacturer: ARMSTRONG WORLD INDUSTRIES.
   b. Design "School Zone Fine Fissured", No. 1811, Panel.
   c. Material:
      1) Wet-Formed mineral fiber, with factory-applied vinyl latex paint surface finish.
   d. Size 24" x 48" x 5/8" panel – "Square Cut" lay-in edge.
   e. Mounting 15/16" Fire-Rated exposed tee grid.
   f. NRC Rating 0.70.
   g. CAC 40.
   h. Light Reflectance per ASTM E 1477 "Test method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers":
      1) 0.81.
   i. ASTM Classification per ASTM E 1264 "Classification for Acoustical Ceiling Products":

1) Type III, Form 2, Pattern C D.

j. Class A per ASTM E 84 "Test method for Surface burning Characteristics of Building Materials":
   1) Flame Spread Index 25 or under.
   2) Smoke Density Developed Index 50 or less.

k. Color "White", Unless noted otherwise.
   1) Panels and Grid to be Tech Black, where indicated on Interior Finish Schedule. See Remarks.

l. Antimicrobial Treatment Bio Block.

3. TYPE ACT-III:
   a. Manufacturer: ARMSTRONG WORLD INDUSTRIES.
   b. Design "Ultima Shapes for DESIGNFlex", Pattern SH 38.
   c. Material:
      1) 60 Degree Triangle.
      2) 60 Degree Left Parallelogram.
      3) 60 Degree Right Parallelogram,
      4) Wet-Formed mineral fiber, with factory-applied vinyl latex paint surface finish.
   d. Size 4" x 24" x 1" tile.
   e. Mounting 9/16" Fire-Rated exposed tee grid.
   f. NRC Rating 0.70.
   g. CAC 35.
   h. Light Reflectance per ASTM E1477 "Test method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers":
      1) 0.88.
   i. ASTM Classification per ASTM E 1264 "Classification for Acoustical Ceiling Products":
      1) Type IV, Form 2, Pattern E.
   j. Class A per ASTM E84 "Test method for Surface burning Characteristics of Building Materials":
      1) Flame Spread Index 25 or under.
      2) Smoke Density Developed Index 50 or less.
   k. Color "White".
   l. Antimicrobial Treatment Bio Block.

4. TYPE ACT-IV:
   a. Manufacturer: ARMSTRONG WORLD INDUSTRIES.
   b. Design "Lyra Square Lay-In Smooth Texture", No. 8732PB, Panel.
   c. Material:
      1) Fiber Glass with Acoustically transparent membrane with factory applied latex paint surface finish.
   d. Size 24" x 24" x 1-3/4" panel – Square lay in edge.
   e. Mounting 15/16" Non-Rated exposed tee grid.
   f. NRC Rating 0.95.
   g. CAC Range 42.
   h. Light Reflectance per ASTM E 1477 "Test method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers":
      1) 0.88.
   i. ASTM Classification per ASTM E 1264 "Classification for Acoustical Ceiling Products":
      1) Type XII, Form 2, Pattern E.
   j. Class A per ASTM E 84 "Test method for Surface burning Characteristics of Building Materials":
      1) Flame Spread Index 25 or under.
      2) Smoke Density Developed Index 50 or less.

k. Color "See Interior Finish Schedule".
l. Antimicrobial Treatment None.

5. TYPE ACT-V thru VII: (NOT USED)
6. TYPE ACT-VIII:
   a. Manufacturer: ARMSTRONG WORLD INDUSTRIES.
   b. Design:
      1) "Ceramaguard" Non-Perforated, Medium Texture "Fire Guard" No. 605, Fire-Rated Panel.
   c. Material:
      1) Ceramic and mineral fiber composite, with a scrubbable factory-applied plastic paint surface finish.
   d. Size 24" x 48" x 5/8" panel Ó "Square-Cut" lay-in edge.
   e. Mounting 15/16" Fire-Rated exposed tee grid.
   f. NRC Rating N/A.
   g. CAC 40.
   h. Light Reflectance per ASTM E 1477 "Test method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers":
      1) 0.88.
   i. ASTM Classification per ASTM E 1264 "Classification for Acoustical Ceiling Products":
      1) Type XX, Pattern G.
   j. Class A per ASTM E 84 "Test method for Surface burning Characteristics of Building Materials":
      1) Flame Spread Index 25 or under.
      2) Smoke Density Developed Index 50 or less.
   k. Color "White".
   l. Antimicrobial Treatment Inherent.
7. TYPE ACT-IX:
   a. Manufacturer: ARMSTRONG WORLD INDUSTRIES.
   b. Design:
      1) "Fine Fissured Ceramaguard", Perforated, Medium Texture "FireGuard" No. 608, Fire-Rated Panel.
   c. Material:
      1) Ceramic and mineral fiber composite, with a scrubbable factory-applied plastic paint surface finish.
   d. Size 24" x 48" x 5/8" panel Ó Square-Cut lay-in edge.
   e. Mounting 15/16" Fire-Rated exposed tee grid.
   f. NRC Rating 0.55.
   g. CAC 40.
   h. Light Reflectance per ASTM E 1477 "Test method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers":
      1) 0.82.
   i. ASTM Classification per ASTM E 1264 "Classification for Acoustical Ceiling Products":
      1) Type XX, Pattern C E.
   j. Class A per ASTM E 84 "Test method for Surface burning Characteristics of Building Materials":
   k. Color "White".
   l. Antimicrobial Treatment Inherent.
8. TYPE ACT-X:
   a. Manufacturer ARMSTRONG WORLD INDUSTRIES.
   b. Design:
      1) "METALWORKS Concealed", No. 6664 Panel.

c. Material:
   1) Aluminum Composite.
d. Size 24" x 96" Panel.
e. Mounting 15/16 Concealed Tee Grid.
f. NRC Rating 0.90 with Infill.
g. Infill: BioAcoustic Infill
   1) Size: 24 x 24 x 5/8"
   2) Color: Matte Black
h. CAC N/A.
i. Color Architect to select from manufacturers standard three colors.
j. Perforations:
   1) Pattern M10.

9. TYPE ACT-XI:
   a. Design: Open Tee Grid with Molded Reflectors
      1) Mounting: 15/16" Fire-Rated exposed tee grid
         a) Grid Pattern: 4' Main Runners w/ 4' Cross Runners.
         b) Color Black
   b. Panel: Refer to MISCELLANEOUS SPECIALTIES, Molded Reflectors, Acoustic, 48" x 48" Lay-in installation.
10. TYPE ACT-XII:
   a. Manufacturer: ARMSTRONG WORLD INDUSTRIES.
   b. Design:
      1) "Woodworks Linear" - nominal 4-1/2" Module, #6440W1
   c. Material:
      1) Veneer Wood Panels w/ Standard factory-applied acoustic fleece
   d. Size 8' x 3-3/4" x 3/4" with 3/4" Reveal.
   e. Mounting:
      1) Ceiling: 15/16" exposed tee grid in Tech Black.
      2) Wall: Direct to furring Strips, see details.
   f. NRC Rating 0.60.
   g. Class A per ASTM E84 "Test method for Surface burning Characteristics of Building Materials":
      1) Flame Spread Index 25 or under.
      2) Smoke Density Developed Index 50 or less.
   h. Veneer Selection: As selected by the Architect.
   i. Accessories:
      1) Infill Panel: BioAcoustic Infill Panel – Black
      2) Trim at Exposed egde: 6" "WoodWorks" Veneer Trim. See details.
      3) Wall Attachment: Rigid Attachment Clip - (Black).
11. TYPE ACT-XIII thru XIV: (NOT USED)
12. TYPE ACT-XV:
   a. Manufacturer: ARMSTRONG WORLD INDUSTRIES.
   b. Design "Lyra PB High CAC", No. 8752PB, Panel.
   c. Material:
      1) Fiberglass with factory-applied vinyl latex paint surface finish.
   d. Size: 24" x 48" x 1-3/4" panel – "Square Cut" lay-in edge.
   e. Mounting 15/16" Fire-Rated exposed tee grid.
   f. NRC Rating 0.95.
   g. CAC 44.
   h. Light Reflectance per ASTM E 1477 "Test method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers":
      1) 0.88.

i. ASTM Classification per ASTM E 1264 "Classification for Acoustical Ceiling Products":
   1) Type XII, Form 2, Pattern E.
j. Class A per ASTM E 84 "Test method for Surface burning Characteristics of Building Materials":
   1) Flame Spread Index 25 or under.
   2) Smoke Density Developed Index 50 or less.
k. Color "White"
l. Antimicrobial Treatment Bio Block

13. TYPE ACT-XVI:
   a. Manufacturer: ARMSTRONG WORLD INDUSTRIES.
   b. Design "Soundscapes Shapes - Hexagon"
   c. Material
      1) 7/8" thick fiberglass with DuraBrite scrim on face and sides.
   d. Size 48" x 48" Hexagon
   e. Finish: DuraBrite scrim with factory-applied paint on face and sides. DuraBrite scrim with factory-applied custom paint color on face and sides. Back of panel is unfinished with embedded metal extrusions.
   f. Mounting: Preassembled with metal extrusions in the back of the panels. Standard accessory kits for installation from the deck, through a ceiling or directly attached to drywall.
   g. Standard Shapes - 1.18 Sabins/SF; 360 degrees
   h. Finished Shapes - 1.47 Sabins/SF; color shapes have slightly reduced acoustical performance.
   i. Class A per ASTM E 84 "Test method for Surface burning Characteristics of Building Materials":
      1) Flame Spread Index 25 or under
      2) Smoke Density Developed Index 50 or less
   j. ASTM E1264 Classification: Type XII, Form 2, Pattern E
   k. Color: White
   l. Antimicrobial Treatment: None

14. TYPE-XVII:
   a. Manufacturer: ARMSTRONG WORLD INDUSTRIES.
   b. Design:
      1) "ULTIMA High NRC Fine Texture, No. 1436 Panel.
   c. Material:
      1) Wet-formed mineral fiber with DuraBrite® acoustically transparent Membrane
   d. Size:
      1) 24• " x 72"• x 7/8" panel.
   e. Mounting 15/16" Fire-Rated exposed tee grid.
   f. NRC Rating 0.80.
   g. CAC 35.
   h. Light Reflectance per ASTM E 1477 "Test method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers": 0.88.
   i. Class A per ASTM E 84 "Test method for Surface burning Characteristics of Building Materials":
      1) Flame Spread Index 25 or under.
      2) Smoke Density Developed Index 50 or less.
   j. Color "White".
   k. Trim: Axiom Vector, 4"• Straight
      1) Size: 120" x 3/4• " x 4"•
   l. Color: Blizzard White

END OF SECTION

AD5-SP01 **Refer to Specification Section 09500 – ACOUSTICAL CEILINGS.**

1. Refer to Tile and Panel Schedule, TYPE ACT-XII.
2. A substitution was received, reviewed, and found acceptable.

Manufacturer:	Geometrik Manufacturing Inc.
SKU#:	GL-415
Specie	Maple
Core	MDF FR
Blade Dimensions	3 3/4" wide x 3/4" deep
Stain	As Selected By Architect
Acoustic Backer	Black Acoustic Felt
NRC	0.60
Finish	20 Sheen Clear, Low VOC
Fire Treatment	Class A

SECTION 096466 – RESILIENT WOOD FLOOR

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all resilient wood floor systems, materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Gymnasium Wood Floor System ("ScissorLoc" System Only).
      b. Theater Wood Floor System.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 07 18 50 VAPOR-ALKALINITY CONTROL
   6. 09 91 00 PAINTING
   7. 11 66 00 ATHLETIC EQUIPMENT
   8. 12 66 13 TELESCOPING BLEACHERS
   9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. MFMA Maple Flooring Manufacturer's Association.
      b. NFHS National Federation of State High School Associations.
      c. WWPA Western Wood Products Association.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Gymnasium System Design Data:
      a. Floor system shall have been tested and passed the requirements of DIN 18032, Part II as set out below.
         1) Shock Absorption: shall be 53 percent minimum.
         2) Ball Return: shall be at least 90 percent.
         3) Deflection: shall be 2.3-mm minimum.
         4) Area Deflection: (Isolation of impact) less than 15 percent.
         5) Friction: Range 0.5 - 0.7 per DIN Test Method.
         6) Rolling Load: 337.6 lbs. Load without damage.
   2. Theater System Design Data:
      a. No requirements.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data: Submit three (3) copies of the following:
a. Maple Flooring Manufacturer's Association (MFMA) Recommendations for correct preparation, finishing and testing of concrete subfloor surfaces to receive wood flooring.
b. All manufacturer's literature for the specified flooring system, including installation and maintenance information.
c. MFMA full color brochures indicating industry recommendations for the following:
1) Sealing, Sanding, and Finishing.
2) General Information.
3) Maintenance Instructions.
4) Spec Data Sheets.
5) Life Cycle Cost Data.
d. Manufacturer's brochures indicating manufacturer's written recommendations for the items listed above, and explain any differences that may exist between industry standards and the manufacturer's standards.
2. Shop Drawings.
a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
1) Indicate Concrete Slab depression thickness required for Resilient Wood Flooring System provided prior to proposed concrete slab preparation, and indicate on submitted shop drawings that this information has been verified and coordinated.
3. Samples.
a. Provide three (3) 12 inch square samples showing lightest, medium and darkest color range of finished wood flooring.
4. Quality Assurance/Control Submittals for the Gymnasium System:
a. Design Data for all flooring systems
b. Certificates:
1) Submit three (3) copies of certificates.
a) Submit certification that the floor system to be provided has been tested by the Otto Graf Institut, Stuttgart, Germany and meets or exceeds all six of the minimum standards as established by DIN 18032 Part II.
5. Closeout Submittals in accordance with the following:
a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
b. Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
c. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
a. Products for the resilient wood flooring system shall comply with the MFMA.
2. Installer Qualifications:

a. Engage an experienced Installer who has successfully completed five (5) projects of similar scope and size to that indicated for this Project.
b. Installer is certified in writing by the manufacturer as an approved installer of the Flooring System to be provided.
c. Installer shall submit a list of names of those installing the flooring, and the name of the proposed project supervisor, who shall meet the following minimum requirements:
1) Minimum of one (1) project installed with same system as the one proposed to be provided.
2) Minimum of five (5) projects worked on of similar size and scope.
a) Provide names, titles and phone numbers of individuals representing the Owner's of the five previous projects.
3) Indicate number of years of previous experience of the project supervisor.

3. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
b. Manufacturer/Supplier shall be a member in good standing of the MFMA.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
b. CBC California Building Code (CBC 804.1 and CBC 11B-302.1)

C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start work.
a. Coordinate the work with all other related work.
b. Identify any potential problems that may impede planned progress and proper installaiton of work regarding quality of installation and warranty requirements.
c. Contractor shall coordinate with the Owner as to climatic conditions that will be set for area housing the flooring system. Discuss the characteristics of the future installed floor and it's sensitivity to temperature and humidity.
2. Progress Meetings: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored in a dry, protected area.
2. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
   b. Maintain proper humidity controls of the storage space and the installed space in accordance with MFMA recommendations.
   c. Materials shall acclimate for a period of at least two weeks in the area where they are to be installed.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
1. Temperature Control:
   a. Maintain temperature in space to receive products between sixty (60) degrees Fahrenheit and ninety (90) degrees Fahrenheit for fourteen (14) days prior, seven (7) days during, and after finish until the Owner assumes occupancy.
2. Humidity Control:
   a. Maintain humidity control in space to receive products between 35 and 50 percent for fourteen (14) days prior, seven (7) days during, and after installation until the Owner assumes occupancy.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.8 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period One (1) Year.
   b. Warranty shall not cover damage caused in whole or in part by casualty, ordinary wear and tear, abuse, use for which material is not designed, faulty construction of the building, settlement of the building walls, failure of other contractors to adhere to specifications, separation of the concrete slab and excessive dryness or excessive moisture from humidity, spillage, migration through the slab or wall, or any other source.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty period Two (2) Years.

b. The subcontractor shall obtain from the Material Manufacturer and the General Contractor a co-endorsement of the Warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Gymnasium Wood Floor System specified product manufacturer, or approved equivalent:
   a. ROBBINS SPORT SURFACES "AIR CHANNEL CLASSIC" with Subfloor System.
      1) This flooring system has been designed with an underfloor ventilating system to maintain stability and uniform performance. All approved alternative manufacturers and proposed substitutions must comply with this imortant requirement in order to be considered.
   b. Acceptable alternative manufacturers:
      1) AACER FLOORING "AACERCUSH IT" System.
      2) ACTION FLOOR SYSTEMS "ACTION CUSH II PLUSH" System.
      3) CONNOR SPORTS FLOORING "REZILLLSLEEPER SUBFLOOR" System.
2. Theater System specified product manufacturer, or approved equivalent:
   a. AACER FLOORING "AACERCUSH I PLUS" System (Modified).
   b. Acceptable alternative manufacturers:
      1) ACTION FLOOR SYSTEMS "ACTION THRUST I" System (Modified).
      2) CONNOR AGA "DURACUSHION I" System (Modified).
      3) ROBBINS SPORTS "PERMACUSHION I" System (Modified).
   c. Theater Finish Floor material specified product manufacturer, or approved equivalent:
      1) MASONITE DIV. Of WOOD FIBER INDUSTRIES "Duron 22-S."
3. Gymnasium Floor Finish Systems specified product manufacturer, or approved equivalent:
   a. BONA US:
      1) Sealer: Bona SuperSport DTS.
      2) Finish Coat(s): Bona SuperSport.
4. Theater Floor System Finish System specified product manufacturer, or approved equivalent:
   a. Paint & Sealer: Water-based, acrylic theatrical primer.
   b. ROSCO LABORATORIES "Tough-Prime".
5. Subfloor material finish specified product manufacturer, or approved equivalent:
   a. KOP-COAT, INC. "WoodLife F."

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Gymnasium System AIR CHANNEL CLASSIC" with Subfloor System.
1. Vapor Retarder: 6 mil polyethylene.
   a. Joint Sealer: Pressure sensitive tape as recommended in writing by the manufacturer.
2. Resilient Pad:
   a. EPDM "Bio-Pad", 7/16" deep.
3. Subfloor Material:
   a. Sleepers: Nominal 2" x 3" x 4' fir or pine, Kiln Dried (KD).
      1) Provide manufacturer's moisture resistant dip treatment with at least a three minute immersion process.
   b. Plywood: 1/2" thick T & G x 4' x 8'.
      1) Exposure Durability Classification EXTERIOR.
      2) STRUCTURAL 1, C-D, Group 1 Fir or Southern Pine.
      3) Kiln Dried (KD) to at least a 10 percent moisture content.
4. Flooring:
   a. Second or better Grade, continuous Tongue and Grooved on sides and ends, Kiln Dried (KD), end matching Northern Hard Maple in accordance with MFMA Standards.
      1) Thickness: 33/32".
      2) Width: 1-1/2".
      3) Face practically defect free.
      4) Strip Lengths 2 ft – 8 ft. as stock will produce.
         a) Not over 20 percent of total footage will be in 2 ft. bundles.
         b) Not over 45 percent of total footage will be under 4 ft. bundles.
         c) Not over 35 percent of total footage will be under 8 ft. bundles.
   b. Maintain a 6 percent to 9 percent average moisture content following manufacture per MFMA.
      1) Upon receipt of shipment, proper humidity controls and care shall be exercised to maintain recommended moisture content.
   c. All strip wood flooring shall be "back channeled" according to manufacturer's standards, unless otherwise indicated.
5. Fasteners: All fasteners to be coated per manufacturer's written recommendation to resist moisture and corrosion.
   a. Subfloor fasteners 2" coated staples or 2" barbed cleats.
   b. Flooring fasteners 2" barbed cleats.
   c. Sleeper Anchors 2-1/4" POWERS "SPIKE" anchors and sleeves

B. Theater System "AACERCUSH I PLUS" System (modified).
1. Vapor Retarder: 6 mil polyethylene.
   a. Joint Sealer: Pressure sensitive tape as recommended in writing by the manufacturer.
2. Resilient Pad:
   a. Mason Industries "Super W" 50 durometer pads, 3/4" x 4" x 4"
3. Subfloor Material:
   a. Sleepers: Nominal 2" x 4" x 4' lengths, fir or pine, Kiln Dried (KD).
      1) Provide manufacturer's moisture resistant dip treatment with at least a three minute immersion process.
   b. Plywood: 3/4" thick T & G x 4' x 8".
      1) Exposure Durability Classification EXTERIOR.

2) Structural 1, C-D, T & G, Group 1 Fir or Southern Pine.
3) Kiln Dried (KD) to at least a 10 percent moisture content.

4. Flooring:
   a. Wood fiber hardboard board with resin binder weighing 1.025 lbs/sq.ft., tensile strength 2,500 psi, parallel to surface, modulus of rupture 5,500 psi. Tempered both sides.
      1) Thickness: 1/4-inch.
      2) Width: 4 foot.
      3) Length: 8 foot.
5. Fasteners: All fasteners shall be coated per manufacturer's written recommendation to resist moisture and corrosion.
   a. Subfloor fasteners: Subfloor nails or staples of sufficient length to penetrate at least 1" into the sleepers.
   b. Hardboard Flooring fasteners: "Phillips Head" drywall screws of sufficient length to penetrate at least 1/2" into plywood.

2.3 ACCESSORIES

A. Perimeter Base:
1. Perimeter Base: Provide and install, as shown on the drawings, aluminum joint closures (6063-T5 alloy for aluminum extrusions and 6061-T6 alloy for aluminum plates) for floors and walls, as provided by MM SYSTEMS.
   a. Joint closures shall be the following types as indicated on the drawings:
      1) General: Align floor and wall joint closures for continuous sightline.
      2) Floor to Floor: X-U Series, aluminum mill finish (Floor joint – wood floor to wood floor and concrete floor to wood floor).
      3) Floor to Wall: X-W-Series, aluminum mill finish.- NO RUBBER WALL JOINTS ALLOWED.
         a) Provide manufacturer's recommended neoprene spacers at attachment points and at manufacturer's recommended intervals.

2.4 FINISHES

A. All subfloor materials shall be treated with "WOODLIFE F," before installation on concrete subfloor lined with Vapor Retarder and Vapor Protection.

B. Gymnasium System:
1. Finish products shall be water-based polyurethane based sealers and finish coats as manufactured by BONA US.
   a. 1st Coat Paste Filler As recommended in writing by resilient wood floor manufacturer.
   b. 2nd Coat Sanding Sealer
   c. 3rd Coat Game Line Paint & Custom Letters and Logos:
      1) As recommended in writing by resilient floor system manufacturer, compatible with sealer and finish coats.
      2) Provide custom colors as selected by the Owner, compatible with sealer and finish coats.
   d. 4th Coat Finish (1st coat)
   e. 5th Coat Finish (2nd coat)
   f. 6th Coat Finish (3rd coat)

C. Theater System:

1. Water based acrylic polymer primer & sealer.
2. Film thickness: 3 mil overall dry film thickness.
   a. 1st Coat Primer & Sealer 1.0 mil.
   b. 2nd Coat Primer & Sealer 1.0 mil.
   c. 3nd Coat Primer & Sealer 1.0 mil.

2.5 SOURCE QUALITY CONTROL

A. Fabrication Tolerances:
   1. In accordance with MFMA standards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
      a. Inspect concrete subfloors for proper tolerance and dryness, and report any discrepancies to the general contractor in writing. Slab will be level to within 1/8" in a 10' radius, and the slab Relative Humidity (RH) shall be within the written guidlines of the flooring manufacturer.
      b. Verify depressed slab dimension(s) with flooring system(s) supplied to match the system being installed.
      c. All work required to put the concrete subfloors in acceptable condition shall be the responsibility of the general contractor.
      d. Subfloor should be broom cleaned by general contractor.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
      a. Verify that any existing flooring has been removed if this project involves a remodel.
      b. Verify membrane in Specification Section VAPOR-ALKALINITY CONTROL is in place and has properly cured if needed.
      c. Verify that any cementitious leveling compound is in place and has properly cured.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Layout:
   a. Lines shall be straight and true.
6. Assistance:
   a. Installation shall be in direct consultation and review of resilient wood flooring system's manufacturer.

B. Gymnasium System:
1. Cover concrete slab with polyethylene vapor retarder, lap and seal all joints with a compatible pressure sensitive tape a minimum of 6".
2. Install sleepers (having 5 pads stapled to bottom side) installed end to end across the short dimension of the room spaced 16" on center with joints staggered at 24".
   a. Maintain a minimum 2" expansion void at all walls and other permanent obstructions.
   b. Verify that all pads are bearing on the covered concrete subfloor.
   c. **DO NOT FASTEN SLEEPERS TO SLAB**.
3. Install 1/2" plywood subfloor with the long dimension of the plywood parallel to the long dimension of the room.
   a. Subfloor shall be securely nailed to the sleepers at 12" on center with 1/4" spacing provided between the joints of the plywood.
4. Maintain a 2" expansion void at perimeter walls and other permaent obstructions.
5. Finish flooring shall be laid parallel with the main playing court with fine hairline joints and not driven tightly except for low humidity regions.
   a. Consult flooring manufacturer's representative for written humidity recommendations.
   b. Provide sufficient expansion spacers at regular intervals in surface of flooring during installation.
   c. Provide a 2" expansion void minimum at the perimeter and all vertical obstructions.
   d. Install aluminum expansion Floor Joints at openings and aluminum Wall Base at wall junctures after the floor system has been finished and cured.
      1) DO NOT impede venting of resilient wood floor systems with the installation of the aluminum expansion Wall Base.

C. Theater System:
1. Install polyethylene Vapor Retarder and Vapor Protection membranes with joints lapped a minimum of 6".
2. Install sleepers (having pads at 24" O.C. single screwed through the center upward to the bottom side of the sleeper, countersunk 3/8" minimum such that the screw head does not contact shims or the slab) installed end to end across the short dimensions of the room spaced 16" on center with joints staggered at 24".
   a. Maintain a minimum 2" expansion void at all walls and other permanent obstructions.
   b. Shim as required under pads for top of sleepers to be level, 1/8" maximum vertical variance in 10' - 0".

1) Cut windows in vapor membrane to adhesively adhear shims to concrete floor slab.

c. Verify that all pads are bearing on the covered concrete subfloor or suims.

d. **DO NOT FASTEN SLEEPERS TO SLAB**!

3. Install 4" x 4" x 5/8" thick wood Compression Blocking adjacent to pads. Fasten upward into sleepers to provide 1/8" clear gap between the block and shim or concrete floor below.

4. Install first layer of 3/4" plywood subfloor with the long dimension of the plywood parallel to the long dimension of the room. Second layer to be installed 90 degrees from first layer.

a. Subfloor shall be securely screwed to the sleepers at 12" on center with 1/4" spacing provided between the joints of the plywood.

b. Maintain a 2" expansion void at perimeter walls and other permanent obstructions.

5. Finish flooring:

a. Examine each hardboard sheet and reject sheets with damaged corners and edges.

b. Consult flooring manufacturer's representative for writteb humidity recommendations.

c. Before laying out and anchoring hardboard sheets, coat all edges fully with specified sealer to prevent entry of water and moisture during use.

d. Lay out hardboard to stagger joints between subfloor and plywood, over sleeper.

1) Space each board with perimeter wall clearance of 1/32" for expansion.

e. Anchor hardboard to plywood with black 1-1/2" "Phillips-Head" drywall screws at approximately 12" on center, 2" from panel edges, and 12" O.C. evenly spaced at center of panel. Inset screws at walls so that they are not covered by the vented base.

1) Pre-drill and countersink so that screws develop full holding capacity and seat flush or slightly below top of hardboard.

2) **USE NO ADHESIVES**!

3.4 APPLICATION (FINISHES)

A. Sanding

1. Sand flooring with drum sander, edger, buffer, and hand scraper.

a. Use coarse, medium and fine grade sandpaper.

b. After sanding with drum sander, buff entire floor using 100 grit screenback or equal grit sandpaper, with a heavy-duty buffing machine.

c. Vacuum or tack floor before first coat of finish.

d. Floor shall present a smooth surface without drum stop marks, gouges, streaks or shiners.

B. Finishing

1. Gymnasium System:

a. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.

b. Prior to finishing, installation shall be approved and certified by finish manufacturer's representative.

1) Sand floor in accordance with MFMA and finish manufacturer's written recommendations.

a) Use coarse, medium & fine grit sandpaper.

b) After sanding with drum sander, buff entire floor using 100 grit screenback or equal grit sandpaper with a heavy-duty buffing machine.

c) Vacuum or tack floor before first coat of seal.

d) Floor shall present a smooth surface without drum stop marks, gouges, streaks or shiners.

2) Immediately after sanding, apply one (1) coat floor sealer:

a) Coats applied at a rate of 450 to 550 sf per gallon.

b) Follow finish manufacturer's written recommendations in accordance with manufacturer's warranty requirements as to drying/buffing times between floor sealer coats, and buffing before additional sealer coats are applied.

c) Sand and apply any additional sealer coats if required.

3) Paint game lines, letters and any logos with approved paint in accordance with approved gymnasium marking plan and the Owner's approved letters and logo marking plan.

a) Paint game lines in accordance with NFHS Rules.

4) Apply the final finish coats:

a) Coats applied at a rate of 500 to 600 sf per gallon.

5) Follow manufacturer's written recommendations in accordance with manufacturer's warranty requirements as to drying/buffing times after each finish coat has been applied.

c. Dry mop using manufacturer's written recommended mopping products and in accordance with resilient wood floor manufacturer's written recommendations.

2. Theater System:

a. Hardboard:

1) Do not sand hardboard finish.

2) Apply Rosco Tough Prime Black to clean, dry surface. Apply by brush or roller. Apply in even, uniform coats using overlapping strokes, change roller direction often to avoid patterns and streaking. Do not apply heavy coat. Apply in a minimum of 3 thin coats, allowing each to dry thoroughly dry between applications. Apply per manufacturer's instructions. Rosco Tough Prime is final finished surface. Do not buff or sand.

3) Do not cover wood flooring after finishing until finish reaches full cure.

3.5 CLEANING

A. Clean any soiled surfaces immediately.

3.6 DEMONSTRATION

A. Maintenance Procedures:

1. Provide the Owner's maintenance personnel with the manufacturer's written care and maintenance requirements of each type of flooring system within this project.
2. Provide humidity and temperature control guidelines for each flooring system within this project, and discuss with the Owner's maintenance personnel the requirements of their new wood flooring systems.

3.7 PROTECTION

A. Protection from traffic:

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 096510 – RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Resilient Base and Accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 03 35 10 POLISHED CONCRETE FINISHING
   5. 04 20 00 CONCRETE MASONRY UNITS
   6. 06 10 00 ROUGH CARPENTRY
   7. 06 22 00 MILLWORK
   8. 06 41 23 MODULAR CASEWORK
   9. 09 24 00 CEMENT PLASTER
   10. 09 29 00 GYPSUM BOARD
   11. 09 65 16 RESILIENT SHEET
   12. 09 56 19 RESILIENT TILE
   13. 09 68 40 CARPET
   14. 09 72 00 WALL COVERINGS
   15. 09 91 00 PAINTING
   16. 10 05 00 MISCELLANEOUS SPECIALTIES
   17. 11 62 00 MUSIC EQUIPMENT
   18. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with Specification Section - Regulatory Requirements, and the following standards:
      a. ADAAG Americans with Disabilities Act Accessibilities Guidelines.
      b. RFCI The Resilient Floor Covering Institute.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data:
      a. For each type of resilient base and accessory indicated.
      b. Manufacturer's full color range (including any standard and premium colors).
      c. Design Data for all compounds, fillers, adhesives, etc.
   2. Samples.
      a. Provide 6 inch linear samples of each piece of trim material specified.

3. Quality Assurance/Control Submittals:
   a. Manufacturer's Written Installation Instructions.
   b. Certificate from resilient base installer that all products supplied for installation comply with local CARB regulations in the area where the project is located controlling the use of Volatile Organic Compounds (VOC's).
   c. Statement of Installer's Qualifications.
4. Closeout Submittals in accordance with Specification Sections in Division One:
   a. Maintenance Data (including recommended polish and buffing procedures) in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Record Documents in accordance with Specification Section – PROJECT DOCUMENTS.
   c. Warranty in accordance with this Specification Section, and Specification Section – WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project, and is competent in the techniques required by the manufacturer.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA) in the area where the project is located.
   2. CBC California Building Code (CBC 804.1)

C. Meetings:
   1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
      a. Coordinate the work with other work being performed.
      b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
      c. Review delivery, storage, and handling procedures.
      d. Review Project Conditions.
      e. Review subfloor preparation procedures.
   2. Progress: Scheduled by the Contractor during the performance of the work.
      a. Review for proper installation of work progress.
      b. Identify any installation problems and acceptable corrective measures.
      c. Identify any measures to maintain or regain project schedule if necessary.
   3. Completion: Scheduled by the Contractor upon proper completion of the work.
      a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
      b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, type, color, and size.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored in a dry, protected, interior area above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
b. Maintain temperature in the storage space between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit.
1) Seven (7) days prior to installation, acclimate products to environmental requirements of the article titled PROJECT CONDITIONS of this specification section, and the Paragraph titled "Environmental Requirements".

1.6 PROJECT CONDITIONS

A. Environmental requirements:
1. Temperature: Maintain temperature in space to receive products at sixty-eight (68) degrees Fahrenheit for two (2) days prior, during, and two (2) days following installation.
a. After this period, maintain a temperature of not less than fifty-five (55) degrees Fahrenheit.
b. After installation, at no such time shall the temperature exceed eighty-five (85) degrees Fahrenheit.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Field Measurements:
a. Take and be responsible for field measurements as required.
b. Report any significant differences between field dimensions and drawings to the Architect.

1.7 WARRANTY

A. Contractor’s General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
   a. Rubber Base Two (2) Years.
   b. Rubber Stair Tread, Risers, and Stringers Ten (10) Years.
   c. Transitions Two (2) years.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty Period Two (2) Years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Rubber Base manufacturer:
      a. MANNINGTON COMMERCIAL.
      b. Acceptable alternative manufacturers:
         1) ROPPE CORPORATION.
   2. Rubber Stair Tread, Riser, and Stringer manufacturer:
      a. MANNINGTON COMMERCIAL.
      b. Acceptable alternative manufacturers:
         1) ROPPE CORPORATION.
   3. Transitions manufacturer:
      a. MANNINGTON COMMERCIAL.
      b. Acceptable alternative manufacturers:
         1) ROPPE CORPORATION.
   4. Underlayment Compound manufacturer:
      a. ARDEX INCORPORATED.
      b. Acceptable alternative manufacturers:
         1) CHEMREX.
            a) A compatible bonding agent is needed for this product to adhere to the Vapor-Alkalinity Control System and be considered as equivalent.
   5. Crack and Joint Filler manufacturer:
      a. ARDEX INCORPORATED.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:
   1. Resilient base and accessories shall be of first quality and the product of one manufacturer.

2. Stair Treads shall be slip resistant by achieving a minimum 0.6 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM D 2047 "Test method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine".
3. Colors and patterns shall be selected from manufacturer's standard line (including premium) except as noted otherwise.
   a. Stair treads, risers, and stringers shall be of the same color or matching color and product line.
4. All resilient base and accessories shall be impervious to water damage.

B. Rubber Base:
1. Shall comply with ASTM F 1861 "Standard Specification for Resilient Wall Base", for Type TS (Vulcanized Rubber), Group 1 (Solid and Homogeneous).
   a. Critical Radiant Flux shall be Class 1, not less than 0.45 W/sq.cm. per ASTM E 648 "Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source".
2. Base shall be Coved.
3. Base height shall be 4".
4. Thickness shall be 0.125".
5. Provide pre-formed inside and outside base corners from the same dye lot as the rubber base.

C. Rubber Base, Decorative Profile 6":
1. Shall comply with ASTM F 1861 "Standard Specification for Resilient Wall Base", for Type TP (Thermoplastic Rubber), Group 1 (Solid and Homogeneous). Critical Radiant Flux shall be Class 1, not less than 0.45 W/sq.cm. per ASTM E 648 "Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source".
2. Base shall be Edge Effects- Simplicity.
3. Base height shall be 6".
4. Thickness shall be 5/16"
5. Provide pre-formed inside and outside base corners from the same dye lot as the rubber base.
6. See interior finish schedule for locations.
7. Provide mitered joints at inside and outside corners, per manufacturers written recommendation.
   a. Base to be terminated at an inside corner where adjacent to Coved base.

D. Rubber Stair Tread, Riser, and Stringer (or Skirting):
1. Stair Tread shall comply with ASTM F 2169 "Standard Specification for Resilient Stair Treads", Type TS (Vulcanized Rubber), Class 1 (Smooth) and 2 (Patterned), Group 1 (Abrasive Nosing) and 2 (Visually Impaired Nosing).
   a. Critical Radiant Flux shall be Class 1, not less than 0.45 W/sq.cm. per ASTM E 648 "Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source".
   b. Shall meet Shore A of not less than 85 per ASTM D 2240 "Standard Test method for Rubber Property – Durometer Hardness".
   c. Thickness shall be 0.125".
   d. Provide square nose.
2. Stair Riser and Stringer shall comply with ASTM F 1861 "Standard Specification for Resilient Wall Base", Type TS (Vulcanized Rubber), Group 1 (Solid and Homogeneous).
   a. Critical Radiant Flux shall be Class 1, not less than 0.45 W/sq.cm. per ASTM E 648 "Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source".

b. Thickness shall be 0.125".
c. Riser and Stringer shall be Coved.

E. Transitions:
1. Include molding caps, dividers, edges, cove supports, feature strips, reducers, stair nosings, etc.
2. Shall be composed of Thermoplastic Vinyl throughout item.
a. Stair Nosings shall be Thermoplastic Rubber (Vulcanized Rubber).
3. Critical Radiant Flux shall be Class 1, not less than 0.45 W/sq.cm. per ASTM E 648 "Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source".
4. Shall comply to dimension requirements of section 4.5.2 (changes in level) and section 4.5.3 (carpet-edge trim) of the ADAAG.
5. Stair nosings shall provide color contrasting integral insert for the visually impaired as indicated.

2.3 ACCESSORIES

A. Underlayment Compound:
1. Provide free-flowing, self-leveling, pumpable, cement based compound (ARDEX K-15) for applications from 1 inch thick to feathered edges, 4000 psi minimum in accordance with ASTM C 109-modified for air cure only "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens)".
a. ARDEX "K-15".

B. Crack and Joint Filler:
1. Provide low viscosity rigid polyurethane filler, tensile strength of 4,000 psi minimum, in accordance with ASTM D 638 "Test method for Tensile Properties of Plastics".
a. ARDEX "ARDIFIX".

C. Concrete Primer (if applicable):
1. Nonstaining type as recommended in writing by flooring manufacturer.

D. Adhesives:
1. Adhesive as recommended in writing by resilient base manufacturer.
a. Provide manufacturer's written recommended epoxy adhesive at all rubber stair accessories and rubber stair nosings.
2. Compatible with Vapor-Alkalinity Control System, if installed.
3. Shall comply with CARB requirements in the place where the project is located.
4. Shall be water and mildew resistant.
5. Shall bond to non-porous substrate surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affect the execution of work under this specification section.

2. Insure that all flooring has been installed, fitted close to the wall to provide even support to the resilient base, and to insure a tight, smooth fit along the floor.
3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
4. Execution of work under this specification section shall constitute acceptance of existing conditions.

B. Concrete Subfloors:
1. Verify that concrete slabs comply with ASTMF 710 "Practice for Preparing Concrete Floors to Receive Resilient Flooring".
2. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
4. Evaluate the RH (Relative Humidity) and pH (Alkalinity) for compliance with adhesives and resilient tile manufacturer's written substrate preparation recommendations.
   a. If a Vapor-Alkalinity Control System product has been installed to reduce water vapor emission or phosphates thereby negating the RH and pH Test Results, evaluate products for compatibility with adhesives and resilient base products.
5. Determine adhesion characteristics by performing bond tests recommended by the resilient base and accessory manufacturer.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Wall substrates to receive resilient base must be completely clean, dry, smooth and free of oil, grease, rust, paint, varnish, shellac, or any other foreign substance.
3. From floor substrates, remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that may contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the resilient base and accessory manufacturer.
   a. If a Vapor-Alkalinity Control System has been installed, do not remove this system.
4. Fill all cracks, joints, etc. with a Crack and Joint Filler according to manufacturer's written instructions.
5. Install self-leveling underlayment compound at depressed or uneven floor conditions.
6. Vacuum clean substrates to be covered immediately before installation.
7. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
8. Proceed only after unsatisfactory conditions have been corrected.
9. Perform manufacturer recommended bond test to verify adhesion of resilient base and accessory to substrate.
10. Apply any recommended primers over the leveling compounds or treated concrete slabs prior to the installation of any resilient base or accessory products if recommended by the manufacturer.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.
2. Refer to Floor Pattern Drawing(s) in the Interior Design Drawings for transitions in color.

C. Resilient Base installation:
1. For base installations on primed metal or enameled surfaces, provide manufacturer's written recommended co-adhesive method of installation applied to both surfaces with contact bond adhesive.
2. On dry, absorbent surfaces, the base shall be adhered with manufacturer's written recommended adhesive and firmly pressed to the walls.
3. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
4. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
5. Tightly adhere resilient base to substrate throughout length of piece, with base in continuous contact with horizontal and vertical substrates.
6. Do not stretch resilient base during installation.
7. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer’s recommended adhesive filler material.
8. Pre-molded Corners: Install pre-molded corners before installing straight pieces.
9. After the installation, remove all excess adhesive before it dries.
10. Allow adhesive to set firm for approximately 24 hours before washing or applying any pressure.

D. Stair Tread, Riser, and Stringer installation:
1. Each step, riser, and stringer shall be measured, scribed and trimmed to fit and dry laid on each step prior to installing.
2. Provide visually impaired stripping at nosing to each tread as indicated.
3. Stringers shall be measured, trimmed and installed prior to tread and riser.
   a. Adhere stringer in adhesive with the use of hand rollers.
4. Roll tread and riser immediately after application. Make sure each tread is tight to the nose and adhered to the nose.
5. After installation, immediately remove all excess adhesive before it dries.

E. Transition installation:
1. Measure and trim to fit transition pieces prior to installing.
2. Use appropriate approved manufacturer written adhesives for each substrate.
3. After installation, immediately remove all excess adhesive before it dries.

3.4 CLEANING

A. Cleaning:

1. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
2. Clean any soiled surfaces immediately.
3. Clean any soiled surfaces at the end of each day, minimum.
4. Finish shall be clean and ready for the application of any additional finishes.
5. In accordance with manufacturer's written instructions and recommendations.

3.5 PROTECTION

A. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 096516 – RESILIENT SHEET

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to furnish and install Resilient Sheet Flooring, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 06 41 23 MODULAR CASEWORK
   5. 07 18 50 VAPOR-ALKALINITY CONTROL
   6. 09 29 00 GYPSUM BOARD
   7. 09 65 10 RESILIENT BASE AND ACCESSORIES
   8. 09 65 19 RESILIENT TILE
   9. 09 68 40 CARPET
   10. 10 05 00 MISCELLANEOUS SPECIALTIES
   11. 10 56 26 MOBILE STORAGE UNITS
   12. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. ADAAG Americans with Dissibilities Act Accessibilities Guidelines.
      b. ASTM American Society of Testing Materials
      c. RFCI The Resilient Floor Covering Institute.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data:
      a. For each type of resilient sheet flooring indicated.
      b. Manufacturer's full color range (including any standard and premium colors).
      c. Design Data for all components, fillers, adhesives, etc.
   2. Shop Drawings:
      a. Seaming Diagrams:
         1) Changes at patterns, colors, and seams shall be identified.
   3. Samples:
      a. Provide 12 inch square sample of each color and pattern indicated.
   4. Quality Assurance/Control Submittals:
      a. Manufacturer's Written Installation Instructions.

b. Certificate from floor covering installer that all products supplied for installation comply with local CARB regulations in the area where the project is located controlling the use of Volatile Organic Compounds (VOC's).
c. Statement of Installer's Qualifications.

5. Closeout Submittals in accordance with the following:
a. Maintenance Data (including recommended polish and buffing procedures) in accordance with Specification Section - PROJECT CLOSEOUT.
b. Record Doucments in accordance with Specification Section - PROJECT DOCUMENTS.
c. Warranty in accordance with this specification and with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project and is competent in techniques required by the manufacturer.
2. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
2. CBC California Building Code (CBC 804.1)

C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
a. Coordinate the work with other work being performed.
b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
c. Review delivery, storage, and handling procedures.
d. Review the article titled PROJECT CONDITIONS of this specification section.
e. Review subfloor preparation procedures.
2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored in a dry, protected, interior area above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
   b. Maintain temperature in the storage space between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit.
      1) Seven (7) days prior to installation, acclimate products to environmental requirements of the article titled PROJECT CONDITIONS of this specification section, and the Paragraph titled “Environmental Requirements”.
   c. Store rolls upright.

1.6 PROJECT CONDITIONS

A. Environmental requirements:
1. Temperature: Maintain temperature in space to receive products at sixty-eight (68) degrees Fahrenheit for two (2) days prior, during, and two (2) days following installation.
   a. After this period, maintain a temperature of not less than fifty-five (55) degrees Fahrenheit.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Field Measurements:
   a. Take and be responsible for field measurements as required.
   b. Report any significant differences between field dimensions and drawings to the Architect.

1.7 WARRANTY

A. Contractor’s General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
   a. Vinyl Sheet Five (5) Years.

C. Installer's Warranty:
1. In accordance with the terms of the specification section - WARRANTIES:
   a. Warranty Period Five (5) Years.

1.8 MAINTENANCE

A. Extra Materials:
1. Furnish not less than one sq.yd. of floor covering of each class, wearing surface, color, pattern and size of resilient sheet flooring installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Vinyl Sheet manufacturer:
a. ARMSTRONG WORLD INDUSTRIES, INC.
b. Acceptable alternative manufacturers:
1) FORBO FLOORING, INC.
2) MANNINGTON COMMERCIAL.
2. Underlayment Compound manufacturer:
a. ARDEX INCORPORATED.
b. Acceptable alternative manufacturers:
1) CHEMREX.
a) A compatible bonding agent is needed for this product to adhere to the Vapor-Alkalinity Control System and be considered as equivalent.
3. Crack and Joint Filler manufacturer:
a. ARDEX INCORPORATED.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:
1. All resilient sheet flooring shall be the product of one manufacturer and shall to maximum extent possible be of a single batch number.
2. Resilient sheet flooring shall be slip resistant by achieving a minimum 0.6 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM D 2047 "Test method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine".
3. Colors and patterns shall be selected from manufacturer's standard line (including premium) except as noted otherwise.
4. All resilient sheet flooring shall be impervious to water damage.

B. Vinyl Sheet:
1. Shall comply with ASTM F 1913 "Standard Specification for Vinyl Sheet Floor Covering Without Backing".

2.3 ACCESSORIES

A. Underlayment Compound:
1. Provide free-flowing, self-leveling, pumpable, cement based compound (ARDEX K-15) for applications from 1 inch thick to feathered edges, 4000 psi minimum in accordance with ASTM C 109 "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens)", modified for air cure only.
   a. ARDEX "K-15".

B. Crack and Joint Filler:
1. Provide low viscosity rigid polyurethane filler, tensile strength of 4,000 psi minimum, in accordance with ASTM D 638 "Test method for Tensile Properties of Plastics".
   a. ARDEX "ARDIFIX".

C. Concrete Primer (if applicable):
1. Nonstaining type as recommended in writing by flooring manufacturer.

D. Adhesives:
1. Adhesive as recommended in writing by resilient base manufacturer.
2. Compatible with Vapor-Alkalinity Control System, if installed.
3. Shall comply with CARB requirements in the place where the project is located.
4. Shall be water and mildew resistant.
5. Shall bond to non-porous substrate surfaces.

E. Polish:
1. If applicable, provide manufacturer's written recommended acrylic floor polish, compatible with resilient flooring materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Check sub-floor variation with long straight edge.
3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
4. Execution of work under this specification section shall constitute acceptance of existing conditions.

B. Concrete Subfloors:
1. Verify that concrete slabs comply with ASTM F 710 "Practice for Preparing Concrete Floors to Receive Resilient Flooring".
2. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
4. Evaluate the RH (Relative Humidity) and pH (Alkalinity) for compliance with adhesives and resilient tile manufacturer's written substrate preparation recommendations.

a. If a Vapor-Alkalinity Control System product has been installed to reduce water vapor emission or phosphates thereby negating the RH and pH Test Results, evaluate products for compatibility with adhesives and resilient base products.

5. Determine adhesion characteristics by performing bond tests recommended by the resilient base and accessory manufacturer.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that may contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the resilient sheet manufacturer.
   a. If a Vapor-Alkalinity Control System has been installed, do not remove this system.
3. Fill all cracks, joints, etc. with a Crack and Joint Filler according to manufacturer's written instructions.
4. Install self-leveling underlayment compound at depressed or uneven floor conditions.
5. Broom and vacuum clean substrates to be covered immediately before installing resilient sheets.
6. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
7. Proceed only after unsatisfactory conditions have been corrected.
8. Perform manufacturer recommended bond test to verify adhesion of resilient sheet floor covering to substrate.
9. Apply any recommended primers over the leveling compounds or treated concrete slabs prior to the installation of any resilient sheet products if recommended by the resilient sheet manufacturer.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.

B. Layout:

1. Lines shall be straight and true.
2. Refer to Floor Pattern Drawing(s) in the Interior Design drawings for layout of Patterns.

C. Resilient sheet flooring installation:

1. Apply adhesive in accordance with manufacturer's current written recommendations.

a. Do not apply adhesive too far in advance of the floor covering installation. Adhesive must be sufficiently "tacky" in accordance with adhesive manufacturer's written recommendations for the proper installation of the floor covering.
b. Adhesive shall be applied around perimeter, at seams, and around all fixtures to provide a homogenous surface.

2. Maintain uniformity of resilient sheet direction.
3. Arrange for a minimum number of seams and place them in inconspicuous and low traffic areas, but in no case less than 6 inches away from parallel joints in flooring substrates.
4. Match edges of resilient floor coverings for color shading and pattern at seams.
5. Avoid cross seams.
6. Scribe, cut and fit resilient sheet flooring to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture, including cabinets, pipes, outlets, edgings, thresholds and nosing's.
7. Extend resilient sheet flooring into toe spaces, door reveals, closets and similar openings.
8. Hand roll resilient sheet floor covering in both directions from center out to embed in adhesive and eliminate trapped air.
   a. At wall, door casings, and other locations where access by roller is impractical, press floor coverings firmly in place with flat-bladed instrument that will not harm the flooring.
9. Prepare seams to produce tightly fitted seams without gaps or overlaps.
   a. Heat weld seams
10. Installation shall be true, level, and even with tight joints.
11. Maintain reference markers, holes or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent marking device.

D. Base:
1. Shall be integrally coved 4 inches high (unless otherwise indicated), and capped with continuous metal edge strip.

3.4 CLEANING

A. Cleaning:
1. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
2. Clean any soiled surfaces immediately.
3. Clean any soiled surfaces at the end of each day, minimum.
4. Finish shall be clean and ready for the application of any additional finishes.
5. In accordance with manufacturer's written instructions and recommendations.

B. Polishing (if applicable):
1. Prior to final acceptance for occupancy, all resilient sheet flooring surfaces shall be polished and buffed with a minimum of three coats without diminishing any polish's slip resistance characteristics in accordance with approved manufacturer's written recommendations.

3.5 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.
1. Provide the services of a manufacturer-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.
   a. Train Owner's maintenance personnel on cleaning procedures and schedules related to cleaning and preventative maintenance,

b. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.

3.6 PROTECTION

A. Protection from traffic:
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

A. Vinyl Sheet **RS-1**.
1. Manufacturer ARMSTRONG WORLD INDUSTRIES.
2. Product name MEDINTONE with Diamond 10 Finish.
3. Physical Characteristics:
   a. Wearing Surface Smooth.
   b. Overall Thickness 0.080 inch.
   c. Sheet Width 6 feet.
   d. Static Load Limit per modified ASTM F 970 "Test method for Static Load Limit":
      1) 750 psi.
4. Performance Characteristics:
   a. Critical Radiant Flux per ASTM E 648 "Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source":
      1) Class 1, not less than 0.45 W/sq.cm.
   b. Smoke Density per ASTM E 662 "Test method for Specific Optical Density of Smoke Generated by Solid Materials":
      1) Less than 450.

END OF SECTION

SECTION 096519 – RESILIENT TILE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Resilient Tile Floor Covering materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 06 10 00 ROUGH CARPENTRY
   5. 06 22 00 MILLWORK
   6. 06 41 23 MODULAR CASEWORK
   7. 07 18 50 VAPOR-ALKALINITY CONTROL
   8. 08 11 00 METAL DOORS AND FRAMES
   9. 09 29 00 GYPSUM BOARD
   10. 09 65 10 RESILIENT BASE AND ACCESSORIES
   11. 09 65 16 RESILIENT SHEET
   12. 09 68 40 CARPET
   13. 10 05 00 MISCELLANEOUS SPECIALTIES
   14. 10 56 26 MOBILE STORAGE UNITS
   15. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ADAAG Americans with Disabilities Act Accessibilities Guidelines
      b. ASTM American Society of Testing Materials
      c. RFCI The Resilient Floor Covering Institute.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. For each type of resilient tile flooring indicated.
      b. Manufacturer's full color range (including any standard and premium colors).
      c. Design Data for all components, fillers, adhesives, etc.
   2. Samples.
      a. Provide 12 inch square sample of each color and pattern selected.
   3. Quality Assurance/Control Submittals:
      a. Manufacturer's Written Installation Instructions.
      b. Certificates:

1) Certificate from floor covering installer that all products supplied for installation comply with local CARB regulations in the area where the project is located controlling the use of Volatile Organic Compounds (VOC's).

c. Statement of Installer's Qualifications.

4. Closeout Submittals in accordance with the following:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
   c. Warranty in accordance with this specification and Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project and is competent in techniques required by the manufacturer.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
      b. CBC California Building Code (CBC 804.1)

C. Meetings:
   1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
      a. Coordinate the work with other work being performed.
      b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
      c. Review delivery, storage, and handling procedures.
      d. Review the article titled PROJECT CONDITIONS of this specification section.
      e. Review subfloor preparation procedures.
   2. Progress: Scheduled by the Contractor during the performance of the work.
      a. Review for proper installation of work progress.
      b. Identify any installation problems and acceptable corrective measures.
      c. Identify any measures to maintain or regain project schedule if necessary.
   3. Completion: Scheduled by the Contractor upon proper completion of the work.
      a. Inspect and identify any ptoblems that may impede issuance of warranties or guaranties.
      b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored in a dry, protected, interior area above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
      b. Maintain temperature in the storage space between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit.
         1) Seven (7) days prior to installation, acclimate products to environmental requirements of the article titled PROJECT CONDITIONS of this specification section, and the Paragraph titled "Environmental Requirements".
      c. Do not double stack.

1.6 PROJECT CONDITIONS

A. Environmental requirements:
   1. Temperature: Maintain ambient temperature in space to receive products at sixty-eight (68) degrees Fahrenheit for two (2) days prior, during, and two (2) days minimum following installation.
      a. After this period, maintain a temperature of not less than 55 degrees Fahrenheit.
      b. After installation, at no such time shall the temperature exceed 85 degrees Fahrenheit.
      c. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Field Measurements:
      a. Take and be responsible for field measurements as required.
      b. Report any significant differences between field dimensions and drawings to the Architect.

1.7 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Luxury Vinyl Tile Ten (10) Years.
b. Rubber Tile Ten (10) years.

C. Installer's Warranty:
1. In accordance with the terms of the specification section - WARRANTIES:
2. Warranty period Five (5) years.

1.8 MAINTENANCE

A. Extra Materials:
1. Furnish not less than one box for each 50 boxes or fraction thereof, of each class, wearing surface, color, pattern and size of resilient floor tile installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Luxury Vinyl Tile manufacturer:
a. J+J FLOORING GROUP.
2. Rubber Tile manufacturer:
a. MANNINGTON COMMERICAL
b. Acceptable alternative manufacturers:
1) ROPPE
2) FLEXCO
3. Underlayment Compound:
a. ARDEX INCORPORATED.
b. Acceptable alternative manufacturers:
1) CHEMREX
a) A compatible bonding agent is needed for this product to adhere to the Vapor-Alkalinity Control System and be considered as equivalent.

2.2 Crack and Joint Filler manufacturer:MATERIALS

A. General:
1. Resilient Tile Flooring shall be the product of one manufacturer and shall to the maximum extent possible be of a single lot number.

2. Resilient Tile Flooring shall be slip resistant by achieving a minimum 0.6 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM D 2047 "Test method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine".
    a. Resilient Tile Flooring installed on ramps shall achieve a minimum 0.8 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM D 2047 "Test method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine".
3. Colors and patterns shall be selected from manufacturer's standard line (including premium) except as noted otherwise.
4. All Resilient Tile Flooring shall be impervious to water damage.

B. Luxury Vinyl Tile:
1. Shall comply with ASTM F 1700 "Specification for Solid Vinyl Floor Tile".

C. Rubber Tile:
1. Shall comply with ASTM F 1344 "Specification for Rubber Floor Tile".

2.3 ACCESSORIES

A. Underlayment Compound:
1. Provide free-flowing, self-leveling, pumpable, cement based compound for applications from 1 inch thick to feathered edges, 4000 psi minimum in accordance with ASTM C 109 "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens)", modified for air cure only.
    a. ARDEX "K-15".

B. Crack and Joint Filler:
1. Provide low viscosity rigid polyurethane filler, tensile strength of 4,000 psi minimum, in accordance with ASTM D 638 "Test method for Tensile Properties of Plastics".
    a. ARDEX "ARDIFIX".

C. Concrete Primer (if applicable):
1. Nonstaining type as recommended in writing by flooring manufacturer.

D. Adhesives:
1. Adhesive as recommended in writing by resilient tile manufacturer.
2. Compatible with Vapor-Alkalinity Control System, if installed.
3. Shall comply with CARB requirements in the place where the project is located.
4. Shall be water and mildew resistant.
5. Shall bond to non-porous substrate surfaces.

E. Polish (if applicable):
1. Provide manufacturer's written recommended acrylic floor polish, compatible with resilient flooring materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which, affect the execution of work under this specification section.
2. Check sub-floor variation with long straight edge.
3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
4. Execution of work under this specification section shall constitute acceptance of existing conditions.

B. Concrete Subfloors:
1. Verify that concrete slabs comply with ASTM F 710 "Practice for Preparing Concrete Floors to Receive Resilient Flooring".
2. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
4. Evaluate the RH (Relative Humidity) and pH (Alkalinity) test results for compliance with adhesives and resilient tile manufacturer's written substrate preparation recommendations.
   a. If a Vapor-Alkalinity Control System product has been installed to reduce water vapor emission or phosphates thereby negating the RH and pH Test Results, evaluate products for compatibility with adhesives and resilient tile products.
5. Determine adhesion characteristics by performing bond tests recommended by the resilient tile manufacturer.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that may contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the resilient tile manufacturer.
   a. If a Vapor-Alkalinity Control System has been installed, do not remove this system.
3. Fill all cracks, joints, etc. with a Crack and Joint filler according to manufacturer's written instructions.
4. Install self-leveling underlayment compound at depressed or uneven floor conditions.
5. Broom and vacuum clean substrates to be covered immediately before installing resilient tile.
6. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
7. Proceed with installation only after unsatisfactory conditions have been corrected.
8. Apply any recommended primers over the leveling compounds or treated concrete slabs prior to the installation of any resilient tile products.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.

B. Layout:
1. Lines shall be straight and true.
2. Refer to Floor Pattern Drawing(s) in the Interior Color Schedule for layout of patterns.

C. Resilient Tile installation:
1. Apply adhesive in accordance with manufacturer's current written recommendations.
   a. Do not apply adhesive too far in advance of the tile installation. Adhesive must be sufficiently "tacky" in accordance with adhesive manufacturer's written recommendations for the proper installation of the tile.
2. Start installation at center line of room, unless indicated otherwise, and work towards the borders.
3. Border tiles shall not be less than half a tile.
4. Scribe, cut, and fit resilient tile flooring to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture, including cabinets, pipes, outlets, edgings, thresholds, and nosing's.
5. Extend resilient tile flooring into toe spaces, door reveals, closets, and similar openings.
6. Installation shall be true, level, and even with tight joints.
7. Check work to see that all tile are lying down and setting in.
8. Maintain reference markers, holes or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

3.4 CLEANING

A. Cleaning:
1. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
2. Clean any soiled surfaces immediately.
3. Clean any soiled surfaces at the end of each day, minimum.
4. Finish shall be clean and ready for the application of any additional finishes.
5. In accordance with manufacturer's written instructions and recommendations.

B. Polishing:
1. Prior to final acceptance for occupancy, all resilient tile flooring surfaces shall be polished and buffed with a minimum of three coats without diminishing any polish's slip resistance characteristics in accordance with manufacturer's written recommendations.

3.5 DEMONSTRATION

A. In accordance with Specification Section – PROJECT CLOSEOUT.
1. Provide the services of a manufacturer-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.
   a. Train Owner's maintenance personnel on cleaning procedures and schedules related to cleaning and preventative maintenance,

b. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.

3.6 PROTECTION

A. Protection from traffic:
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

A. Luxury Vinyl Tile **RT-1.**
1. Manufacturer: J+J FLOORING GROUP.
2. Product Name: Alloy V5008.
3. Physical Characteristics:
   a. Wearing Surface: Smooth.
   b. Classification of Composition per ASTM F 1700 "Specification for Solid Vinyl Floor Tile":
      1) Class III Printed Film Vinyl Plank- Type B.
   c. Overall Thickness: 3mm.
   d. Wear Layer 20 mil..
   e. Plank Size: 9" x 48".
   f. Static Load Limit per ASTM F 970 "Test method for Static Load Limit":
      1) Passes.
4. Performance Characteristics:
   a. Critical Radiant Flux per ASTM E 648 "Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source":
      1) Class 1, not less than 0.45 W/sq.cm.
   b. Smoke Density per ASTM E 662 "Test method for Specific Optical Density of Smoke Generated by Solid Materials":
      1) Less than 450.

B. Luxury Vinyl Tile "Accent" **RT-2**
1. Manufacturer: J+J FLOORING GROUP
2. Product Name: Make Your Mark V5013
3. Physical Characteristics:
   a. Wearing Surface: Smooth
   b. Classification of Composition per ASTM F 1700 "Specification for Solid Vinyl Floor Tile":
      1) Class III Printed Film Vinyl Plank- Type B
   c. Overall Thickness: 3mm
   d. Wear Layer: 20 mil
   e. Plank Size: 9" x 48"
   f. Static Load Limit per ASTM F 970 "Test Method for Static Load Limit":
      1) Passes
4. Performance Characteristics:
   a. Critical Radiant Flux per ASTM E 648 "Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source":
      1) Passes
   b. Smoke Density per ASTM E 662 "Test method for Specific Optical Density of Smoke Generated by Solid Materials":

1) Passes

C. Rubber Tile **RT-3.**
1. Manufacturer: MANNINGTON
2. Product Name: ColorScape Rubber Tile
3. Physical Characteristics:
   a. Relief Pattern: Round.
   b. Classification per ASTM F 1344 "Specification for Rubber Floor Tile":
      1) Class 1A.
   c. Overall Thickness: 1/8 inch.
   d. Tile Size: 36 inch x 36 inch
   e. Slip resistance per ASTM D 2047 "Test Method for Static Coefficient of Friction of Polished-Coated Flooring Surfaces as Measured by the James Machine":
      1) Greater than 0.8
   f. Hardness per ASTM D 2240 "Standard Test Method for Rubber Property Durometer Hardness":
      1) Shore A of not less than 85.

D. Luxury Vinyl Tile "Accent" **RT-4**
1. Manufacturer: ARMSTRONG
2. Product Name: Coalesce
3. Physical Characteristics:
   a. Wearing Surface: Smooth
   b. Classification of Composition per ASTM F 1700 "Specification for Solid Vinyl Floor Tile":
      1) Class III Printed Film Vinyl Plank- Type B
   c. Overall Thickness: 3mm
   d. Wear Layer: 20 mil
   e. Finish: Diamond 10 Technology, no polish, no buff.
   f. Plank Size: 18" x 36"
   g. Static Load Limit per ASTM F 970 "Test Method for Static Load Limit":
      1) 2000 psi
4. Performance Characteristics:
   a. Critical Radiant Flux per ASTM E 648 "Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source":
      1) Meets
   b. Smoke Density per ASTM E 662 "Test method for Specific Optical Density of Smoke Generated by Solid Materials":
      1) Meets

END OF SECTION

SECTION 096566 – RESILIENT ATHLETIC FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all resilient athletic flooring materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 09 29 00 GYPSUM BOARD
   5. 06 41 23 MODULAR CASEWORK
   6. 09 65 10 RESILIENT BASE AND ACCESSORIES
   7. 09 65 16 RESILIENT SHEET
   8. 09 65 19 RESILIENT TILE
   9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ASTM American Society of Testing Materials
      b. NFPA National Fire Protection Agency
      c. RFCI The Resilient Floor Covering Institute.
      d. RMAI Rubber Manufacturers Association Inc., "Vinyl & Rubber Flooring Division Manual"

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Coordination Drawings:
      a. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
   2. Product Data.
      a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
   3. Shop Drawings.
      a. Show installation details and locations of the following:
         1) Border tiles.
         2) Floor patterns.
         3) Layout, colors, widths, and dimensions of game lines and markers.

4) Locations of floor inserts for athletic equipment installed through flooring.
5) Seam locations for sheet flooring.

4. Samples.
   a. Provide 12 inch square sample of each color and pattern selected.
   b. Seam Samples: For each vinyl sheet flooring color and pattern required; with seam running lengthwise and in center of Sample applied to a rigid backing and prepared by Installer for this Project.
   c. Game-Line and Marker Paint: Include charts showing available colors and glosses.
5. Quality Assurance/Control Submittals:
   a. Certificates:
      1) Submit three (3) copies of certificates.
   b. Manufacturer's Instructions:
      1) Submit three (3) copies of manufacturer's instructions.
6. Closeout Submittals in accordance with the following:
   a. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
   b. Warranty in accordance with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product [or system] in accordance with manufacturer's warranty requirements.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.
      b. CBC California Building Code (CBC 804.1)

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be individually wrapped.
   2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored in a dry, protected area.

1.6 PROJECT CONDITIONS

A. Environmental requirements:
1. Temperature: Maintain ambient temperature in space to receive products between sixty eight (68) degrees Fahrenheit and eighty (80) degrees Fahrenheit for two (2) days prior, during, and two (2) days minimum following installation. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.
a. Close spaces to traffic during flooring installation.
b. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.7 COORDINATION

A. Coordinate layout and installation of flooring with floor inserts for gymnasium equipment.

1.8 EXTRA MATERIALS

A. Furnish extra materials, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Furnish no less than 20 percent of area, of each type, color, pattern, and size of flooring installed.

1.9 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period Three (3) Years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Resilient Athletic Flooring, Rubber
   a. Specified product manufacturer:
      1) MONDO USA RAMFLEX
2. Resilient Athletic Flooring, Vinyl
   a. Specified product manufacturer:
      1) GERFLOR TARAFLEX SPORT M PLUS
3. Resilient Athletic Flooring Underlayment
   a. Specified product manufacturer:
      1) MONDO USA EVERLAY "T"

Resilient Athletic Flooring, Rubber
AMARCO Products **AD3-SP01**
Olympia-Pad, vulcanized rubber gym tile.
Thickness: 3/8″ thick
Size: 4′x′4′

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Resilient Athletic Sheet Flooring, Rubber:
   1. Provide prefabricated athletic rubber flooring, calandered and vulcanized with a base of natural and synthetic rubber, stabilizing agents and pigmentation.
   2. Thickness: 3/8 inch.
   3. Roll Size: 6-foot wide roll wide by longest length that is practical to minimize splicing during installation.
   4. Physical Properties:
      a. Hardness Shore A per ASTM D 2240 "Standard Test Method for Rubber Property – Durometer Hardness":
         1) 78/72.
      b. Critcal Radiant Flux per ASTM E 648 "Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source" and NFPA 101:
         1) 0.94 W/cm2, Class 1.
      c. Static Load Limit per ASTM F 970 "Test method for Static Load Limit":
         1) Less than or equal to 0.004 in.
      d. Fungal Resistance Test per ASTM G 21 "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi":
         1) No growth.
      e. Coefficient of Friction per ASTM D 2047 "Test method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine":
         1) Greater than 0.9.
      f. Color Stability: Good.
      g. Light Reflection: Average.

B. Resilient Athletic Sheet Flooring, Vinyl:
1. Dual-durometer foam-backed sheet vinyl flooring designed for fully adhered athletic flooring applications.
2. Thickness: Not less than 0.3 inch (7.5 mm)
3. Wear-Layer Thickness: Not less than 0.08 inch (2.1 mm
4. Backing:
   a. Very high density, two layer, dual-durometer, closed cell foam.
   b. Two (2) layers of fiberglass reinforcement for dimensional stability and indentation resistance. One layer of woven grid fiberglass and an additional layer of non-woven fiberglass.
5. Roll Size:
   a. Roll Width: Rolls to be a minimum width of 59 inches (1.5 m) wide.
   b. Roll Length:
      1) Wood visual rolls to be a minimum length of 86 feet, 6 inches (26.4 m) to minimize the number of end-seams.
      2) Solid color rolls to be a minimum length of 67 feet, 3 inches (20.5 m) to minimize the amount of waste if accent colors are selected for boarders, keys or center circle.
6. Seaming Method: Heat welded
7. Adhesive Method:
   a. Full-spread adhesive coverage to completely adhere flooring to substrate.
   b. Complete adhesive coverage to eliminate the possibility of gaps or space between the slab and flooring material where moisture could accumulate and create an environment conducive to mold growth.
   c. Flooring to be fully adhered to the concrete slab in all locations eliminating the possibility of waves or wrinkles forming caused by the floor shifting, moving or by rolling loads displacing it
8. Applied Finish: Manufacturer's, factory-applied, permanent and UV-cured. No wax Finish.
9. Performance Criteria:
   a. ASTM F 2772-11 Indoor Sport Floor Standard:
      1) Provide certification of compliance for the four ASTM F2772 Indoor Sport Floor Standard performance categories:
         a) Shock Absorption/Force Reduction: Class C3 (34% to 46%). Pass
         b) Ball Bounce: Minimum 90%: Pass
         c) Surface effect/Coefficient of Friction: Between 80-110: Pass
         d) Vertical deformation: Maximum 3.5mm: Pass
   b. Resistance to Rolling Load: EN 1569; Pass.
   c. Chemical Resistance: ASTM D 543; OK.
   d. Impact Resistance: EN 1517; Pass.
   e. Abrasion Resistance: EN ISO 5470; Pass.
   f. Sound Insulation: EN ISO 717; 18 dB.
   g. Gloss/Brightness: EN ISO 2813; Pass.
   h. Organic Emission: ASTM D 5116; Pass
   i. Fire Performance: ASTM E 648; Greater than 0.45 W/cm2, Class 1.
   j. Surface Maintenance Requirements: No-wax surface requiring only cleaning and rinsing.
   k. Slab Moisture Design Tolerance:
      1) Maximum relative humidity of 100% relative humidity (RH) when tested according to ASTM F 2170.
      2) Maximum moisture vapor emission rate of 25 pounds of water per 1000 sq. ft. in 24 hours when tested according to ASTM F1869.

10. Color and Pattern:
    a. As selected by Owner from manufacturer's standard colors and patterns. Refer to APPENDIX "B" INTERIOR COLOR SCHEDULE.

C. Underlayment:
1. Thickness: 1/16 inch.
2. Physical Properties:
    a. Hardness Shore A per ASTM D 2240 "Standard Test Method for Rubber Property – Durometer Hardness":
        1) 79.
    b. Critcal Radiant Flux per ASTM E 648 "Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source" and NFPA 101:
        1) 0.88 W/cm2, Class 1.

2.3 ACCESSORIES

A. Resilient Athletic Sheet Flooring, Rubber:
1. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by flooring manufacturer.
2. Adhesive: Provide adhesive certified by the manufacturer, P.U. 100 Polyurethane Adhesive. Refer to Instruction Manual of Adhesives as provided by manufacturer.
3. Game-Line and Marker Paint: Complete system including primer, if any, compatible with flooring and recommended in writing by flooring and paint manufacturers for use indicated.
4. Other accessories as required, as supplied or approved/recommended by rubber athletic flooring manufacturer.

B. Resilient Athletic Sheet Flooring, Vinyl:
1. Trowelable patching compound for standard slab surface preparation: Latex-modified, hydraulic-cement-based formulation provided by flooring manufacturer.
2. Adhesives: Water-resistant type recommended by athletic flooring manufacturer for substrate and conditions indicated.
3. Heat Welding Rod: As supplied by indoor resilient athletic flooring manufacturer. Color shall blend with resilient athletic flooring color.
4. Game-Line and Marker Paint: Complete system including primer, compatible with flooring and recommended by flooring and paint manufacturers.

2.4 FINISHES

A. Underlayment:
1. Standard colors.
2. Smooth finish.

B. Sheet Resilient Athletic Flooring:
1. Marbleized and Hammered finish.

C. Sheet Resilient Athletic Flooring, Vinyl:
1. Wood visual shall have wood grain embossed texture for a genuine wood appearance.
2. Solid colors to have “pebbled” embossed texture for an attractive appearance.

PART 3 - EXECUTION

3.1 EXAMINATION

A. RH (Relative Humidity) and Alkalinity test must be performed.

B. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's instructions and recommendations.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.
   3. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

D. Concrete Substrates: Prepare according to ASTM F 710 "Practice for Preparing Concrete Floors to Receive Resilient Flooring."
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Test in accordance with Specification Section - VAPOR ALKALINITY AND CONTROL

E. Move flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation unless manufacturer recommends a longer period in writing.
   1. Do not install flooring until they are same temperature as space where they are to be installed.

F. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set level, and square.

B. Unroll sheet flooring and allow it to stabilize before cutting and fitting.

C. Lay out sheet flooring as follows:
1. Maintain uniformity of flooring direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inchesaway from parallel joints in flooring substrates.
3. Match edges of flooring for color shading at seams.
4. Locate seams per approved Submittals.

D. Installation of Underlayment:
1. Inspect sheet for any damage or defects.
2. Install the flooring in the same direction.
3. Cut and adjust flooring prior to installation.
4. Loose lay product in accordance with instructions.
5. Apply masking tape over or under seams.
6. Repeat the same procedure for the rest of the installation.
7. Surface to be protected before, during, and after installation until project's acceptance by the owner or his agent.

E. Installation of Sheet Resilient Athletic Flooring:
1. Install athletic flooring in accordance with manufacturer's written installation instructions.
2. Unroll sheet and allow relaxation.
3. Inspect sheet for any damages or defects.
4. Always install the flooring in the same direction.
5. Lay out flooring as follows:
   a. Minimize number of seams and place them inconspicuous areas.
   b. Locate seams as shown on approved Shop Drawing.
6. Cut and adjust flooring prior to installation.
7. All edges must be straight edged before adjusting the seams.
8. Vinyl Sheet Flooring Seams: Finish seams to produce surfaces flush with adjoining flooring surfaces. Comply with ASTM F 1516. Rout joints and use heat welding rod to permanently and seamlessly fuse sections together.
9. Mix adhesive in accordance with manufacturer’s instructions.
10. Roll flooring in both directions with a 100-lbs sectional floor roller.
11. Check for air bubbles and continue rolling if needed.
12. Roll the seam with a hand roller and remove any excess adhesive that may come through the seam.
13. Hold all seams in place with suitable weights for a minimum of 12 hours.
14. Repeat the same procedure for the rest of the installation.
15. Lines to be painted as per manufacturer's written instructions.
16. Surface to be protected before, during and after installation until project's acceptance by the owner or his agent.

17. Allow adhesive to set for seventy-two (72) hours before the initial cleaning of the surface.

3.4 GAME LINES AND MARKERS

A. Mask flooring at game lines and markers, and apply paint to produce sharp edges. Where crossing, break minor game line at intersection; do not overlap lines.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. Clean any soiled surfaces at the end of each day, minimum.
   3. Finish shall be clean and ready for the application of any additional finishes.
   4. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 096723 – RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 05 12 00 STEEL AND FABRICATIONS
   5. 06 22 00 MILLWORK
   6. 07 18 50 VAPOR-ALKALINITY CONTROL
   7. 08 70 00 HARDWARE
   8. 09 29 00 GYPSUM BOARD
   9. 09 91 00 PAINTING
   10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ISO International Organization for Standardization

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Submit technical data, installation instructions, and general recommendations for each resinous flooring material required.
      b. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
         1) For initial selection of colors and finishes for consideration, submit manufacturer's color charts showing full range of colors and finishes available.
   2. Samples.
      a. Provide 4 inch square sample of each type, color and pattern selected, applied to a rigid backing, in color and finish as selected.
   3. Quality Assurance/Control Submittals:
      a. Manufacturer / Supplier Qualifications.
      b. Installer Qualifications and Certifications.
      c. Certificates:
         1) Submit three (3) copies of certificates.

2) Include ISO 9002 certification indicating that all materials, including primers, resins, curing agents, finish coats, aggregates and sealants are manufactured and tested as a registered quality system.

d. Manufacturer's written Instructions:

1) Submit three (3) copies of manufacturer's written instructions.

4. Closeout Submittals in accordance with the following:

a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

b. Warranty in accordance with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer/Supplier Qualifications:

a. Single Source Responsibility: Obtain primary resinous flooring materials including vapor barrier, primers, resins, hardening agents, finish or sealing coats from a single source manufacturer with not less than ten (10) years of successful experience in manufacturing and installing principal materials described within this section.

b. Provide secondary materials only of type and from source recommended in writing by manufacturer of primary materials.

c. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

2. Installer Qualifications:

a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

b. CBC California Building Code (CBC 804.1 and CBC 11B-302.1).

C. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.

2. Progress: Scheduled by the Contractor during the performance of the work.

a. Review for proper installation of work progress.

b. Identify any installation problems and acceptable corrective measures.

c. Identify any measures to maintain or regain project schedule if necessary.

3. Completion: Scheduled by the Contractor upon proper completion of the work.

a. Inspect and identify any problems that may impede issuance of warranties or guaranties.

b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors. No on-site weighing or volumetric measurements will be allowed.
   2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
   2. Temperature of storage area shall be maintained between 60 and 85 degrees F.

1.6 PROJECT CONDITIONS

A. Environmental requirements:
   1. Temperature: Maintain ambient temperature in space to receive products between sixty (60) degrees Fahrenheit and eighty-five (85) degrees Fahrenheit for seven (7) days prior, during, and seven (7) days minimum following installation. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Concrete substrate shall be properly cured for a minimum of 30 days.
   3. RH (Relative Humidity) and Alkalinity Test:
      a. Shall control vapor transmission up to and including 100 percent readings per RH Testing of ASTM F 2170 "Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes."
      b. Shall control alkalinity for a long term maximum resistance of pH 14 per pH Testing of ASTM F 710 "Preparing Concrete Floors to Receive Resilient Flooring."
   4. Job area to be free of other trades during floor installation.

1.7 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty period [One (1) Year.][Five (5) years.]

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified Membrane (Moisture Control System) product manufacturers:
   a. STONHARD, INC. "MVT."
   b. Acceptable alternative manufacturers:
      1) GENERAL POLYMERS "AQUAMROR."
2. Specified Resinous Flooring Type 1 product manufacturers:
   a. STONHARD, INC. "STONSHIELD HRI."
   b. Acceptable alternative manufacturers:
      1) GENERAL POLYMERS "TPM-115 U1."
3. Specified Resinous Flooring Type 2 product manufacturers:
   a. STONHARD, INC. "STONSHIELD URI."
   b. Acceptable alternative manufacturers:
      1) GENERAL POLYMERS "FASTOP S-U1."

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Membrane (Moisture Control System):
1. Two-component, high-solids, epoxy system designed to suppress excess moisture in concrete prior to an overlayment.
2. Physical Properties:
   a. Thickness: 15-16 mils.
   b. Tensile Strength (ASTM D 638) 4,400 psi.
   c. Percent Elongation (ASTM D 638) 12%.

B. Resinous Flooring Type 1: **RF-1**:
1. A nominal 3/16" thick system comprised of a penetrating two-component epoxy primer, three-component, epoxy undercoat, one coat of brightly colored, medium quartz silica aggregate broadcast and one (1) coat of high performance, two-component, clear epoxy sealer.
2. Physical Properties: Provide flooring system in which physical properties of topping including aggregate, when tested in accordance with standards or procedures referenced below, are as follows:

a. Compressive Strength (after 7 days): 10,000 psi.
   1) Per ASTM C 579 "Test methods for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
b. Tensile Strength: 2,000 psi.
   1) Per ASTM C 307 "Test Method for Tensile Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings."
c. Flexural Strength: 4,300 psi.
   1) Per ASTM C 580 "Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
d. Flexural Modulus of Elasticity: 2.0 x 10^6 psi.
   1) Per ASTM C 580 "Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
e. Hardness Shore D Durometer): 85-90.
   1) Per ASTM D 2240 "Standard Test Method for Rubber Property – Durometer Hardness."
f. Bond Strength 100 percent concrete failure): 400 psi.
   1) Per ASTM D 4541 "Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers."
g. Impact Resistant: 160 in.lbs.
   1) Per ASTM D 4226 "Test Methods for Impact Resistant of Rigid Poly Vinyl Chloride (PVC) Building Products."
h. Abrasion Resistance (CS-17 wheel): 0.06 gm max weight loss.
   1) Per ASTM D 4060 "Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser."
i. Coefficient of Friction per ASTM D 2047 "Test method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine":
   1) Standard Texture: 0.8.
   2) Medium Texture: 0.7.
j. Flammability (extent of burning 0.25 inches max): Class I.
   1) Per ASTM D 635 "Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position."
k. Thermal Coefficient of Linear Expansion: 1.3 x 10-5 in/inoC.
   1) Per ASTM C 531 "Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings and Polymer Concretes."
l. Water Absorption: 0.1 percent.
   1) Per ASTM C 413 "Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
m. Heat Resistant Limitation:
   1) For continuous exposure: 140 deg. F.
   2) For intermittent spills: 200 deg. F.
n. Cure Rate Allowance (at 77 deg. F, 24 hours for normal operations): 12 hours for foot traffic.
o. VOC Content: Not to exceed 40 grams per liter.

C. Resinous Flooring Type 2: **RF-2:**
   1. For extreme temperature fluctuations (at freezer / cooler, and oven areas).
   2. A nominal 1/4" thick system comprised of a high performance, four-component mortar consisting of urethane resin, curing agent, selected, medium graded aggregates and inorganic pigments sealed with a two-component, 100 percent solids, urethane coating.

3. Physical Properties: Provide flooring system in which physical properties of topping including aggregate, when tested in accordance with standards or procedures referenced below, are as follows:
   a. Compressive Strength (after 7 days): 5,000 psi.
      1) Per ASTM C 579 "Test methods for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
   b. Tensile Strength: 1,000 psi.
      1) Per ASTM C 307 "Test Method for Tensile Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings."
   c. Flexural Strength: 2,000 psi.
      1) Per ASTM C 580 "Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes".
   d. Flexural Modulus of Elasticity: 1.1 x 10^6 psi.
      1) Per ASTM C 580 "Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
   e. Hardness (Shore D Durometer): 80-84.
      1) Per ASTM D 2240 "Standard Test Method for Rubber Property – Durometer Hardness."
   f. Bond Strength (100 percent concrete failure): 400 psi.
      1) Per ASTM D 4541 "Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers".
   g. Impact Resistant: 160 in.lbs.
      1) Per ASTM D 4226 "Test Methods for Impact Resistant of Rigid Poly Vinyl Chloride (PVC) Building Products."
   h. Abrasion Resistance (CS-17 wheel): 0.06 gm max weight loss.
      1) Per ASTM D 4060 "Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser."
   i. Coefficient of Friction: Dependent on texture selection.
      1) Per ASTM D 2047 "Test method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine."
   j. Flammability (extent of burning 0.25 inches max): Class I.
      1) Per ASTM D 635 "Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position."
   k. Thermal Coefficient of Linear Expansion: 1.3 x 10-5 in/in deg. F.
      1) Per ASTM C 531 "Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings and Polymer Concretes."
   l. Water Absorption: 0.01 percent.
      1) Per ASTM C 413 "Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
   m. Heat Resistant Limitation:
      1) For continuous exposure: 200 deg. F.
      2) For intermittent spills: 250 deg. F.
   n. Cure Rate Allowance (at 77 deg. F, 24 hours for normal operations): 6 hours for foot traffic.

2.3 ACCESSORIES

A. Joint Sealant Materials:

1. Manufacturer's compatible joint sealant materials in compliance with standards specified within Specification Section – SEALANTS.
   a. STONHARD, INC. STONFLEX MP7.
   b. Acceptable alternative manufacturers:
      1) GENERAL POLYMERS: As recommended in writing by manufacturer, compatible with floor product.

B. Metal Trim:
   1. Manufacturer's standard metal trim (cove strip), for terminating cove base.
   2. Acceptable alternative manufacturers:
      a. General Polymers: As recommended in writing by manufacturer, compatible with floor product.

2.4 FINISHES

A. Color as selected by the Architect from manufacturer's standard colors.

B. Textures: Provide appropriate texture as recommended in writing by the manufacturer.
   1. T-1: Texture that is appropriate for Restroom applications, unless otherwise noted.
   2. T-2: Texture that is appropriate for Kitchen applications, unless otherwise noted.
   3. T-3: Texture that is appropriate for Shower applications, unless otherwise noted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which, affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of the surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Concrete subfloor shall be dry in accordance with RH and Alkalinity tests, as tested in accordance with Specification Section – VAPOR-ALKALINITY CONTROL.

3. Chipping around existing floor drains & floor sinks shall be in accordance with coating manufacturer's written recommendations for proper interface of resinous flooring so there is no standing water around drains after the resinous flooring system is applied.
4. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
   a. Follow manufacturer's written recommendations using mechanical means (such as use of a scabbler, scarifier or shot blast machine) for removal of bond inhibiting materials such as curing compounds or laitance.
5. Remove any surface irregularities by lightly abrading and vacuuming the floor surface.
6. Control Joints:
   a. After floor is blasted/prepared, pre-fill the joints with STONSET PM5 (or GENERAL POLYMERS equivalent) epoxy patching mortar.
7. Expansion Joints:
   a. Mark expansion joint widths on walls where proposed base would cover the marks so that one can find them again after the floor is applied.

3.3 APPLICATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.

B. Layout:
   1. Lines shall be straight and true.

C. Application:
   1. Apply osmotic resistant grout to all slabs.
      a. Troweled Mortar: Mix mortar material according to manufacturer's written recommended procedures.
         1) Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates.
            a) Coordinate timing of primer application with application of troweled mortar to ensure optimum adhesion between resinous flooring materials and substrate
         2) Apply immediately after mixing.
         3) Pour a bead of material and rake out with a 1/2" x 1/2" V-notched rake.
         4) Apply the material at a thickness of 1/8".
         5) Roll the material with a spiked roller to release any entrained air and produce a smooth finish layer.
         6) Keep a wet edge so that each subsequent mix may be knit into the previous mix within a 20 minute period.
         7) Allow to cure for 24 hours in accordance with manufacturer's written recommendations.
         8) Prepare the membrane surface after curing by shot blasting to ensure proper adhesion. Edges and confined spaces must be ground with a diamond cup-stone. Once prepared, treat the membrane like a concrete surface.
   2. Apply cove base and terminate to cove strip at +5" above finished floor for both coating types.

D. Resinous Flooring Type 1 application:

1. Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates.
    a. Coordinate timing of primer application with application of Resinous Flooring Type 1 to ensure optimum adhesion between resinous flooring materials and substrate.
2. Mix Resinous Flooring Type 1 and then screed apply and trowel to a tightly closed finish.
3. Allow for at least an 8 hour cure.
4. Next, lightly grind the mortar Base.
5. Mix and apply the undercoat to the floor surface using a steel squeegee, followed by rolling with a looped roller.
6. Immediately broadcast aggregate using manufacturer's written recommended equipment and techniques into the freshly applied undercoat.
7. Allow at least 8 hours (or longer depending on manufacturers recommendations) to cure between coats.
8. Scrape and sweep the floor to remove all loose aggregate particles, then vacuum.
9. Mix and apply sealer with strict adherence to manufacturer's installation procedures, and the texture type selected by the Architect.
10. Allow the sealer to cure in accordance with the manufacturer's written recommendations.

E. Resinous Flooring Type 2 application:
1. Follow the detailed manufacturer's printed instructions mixing and applying Resinous Flooring Type 2.
2. Material shall be used immediately after mixing.
3. A "Screed Applicator" shall be used to distribute the mixed Resinous Flooring Type 2 onto the floor.
4. Notched finishing trowels and spiked rollers as recommended in writing by the manufacturer shall be used to smooth the surface of the material to the required thickness.
5. Texture aggregate shall then be broadcast into the wet mortar, in texture finish as selected by the Architect.
6. Allow to cure 6 – 8 hours and apply sealer coat.

F. Expansion Joints:
1. Once the floor has been applied and has cured, find the Expansion Joint marks on the wall and saw cut to the width of the joint and fill with STONFLEX PM7 (or GENERAL POLYMERS equivalent).

3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.
2. RH and Alkalinity Tests – see Specification Section – VAPOR-ALKALINITY CONTROL.
3. The right is reserved to invoke the following material testing procedure at any time, and any number of times during the period of flooring installation:
    a. The Owner will engage the service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in the presence of the Contractor.
        1) Testing laboratory will perform tests for any of the characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer's product data.

2) If test results show materials being used do not comply with specified requirements, the Contractor may be directed by the Owner to stop work; remove non-complying materials; pay for re-testing; re-apply flooring materials to properly prepared surfaces which had previously been coated with unacceptable materials until the work is right.

4. Floor Thickness Verification:
   a. At the owner's discretion and under his supervision, the contractor shall take plus or minus 1" random cores per 1,000 sq. ft. through the system into the substrate to verify proper system thickness. Cored areas less than specified thickness shall be removed and replaced or increased in thickness by the installing contractor, in a manner that does not affect the performance or integrity of the system. Cored areas which comply with the written recommended system thickness shall be built up to match the surrounding surface elevation prior to applying the seal coat(s). Cores taken and patched will be noticeable, therefore, cores should be taken from areas where aesthetics are less critical

B. Inspection:
   1. As required by Regulatory Requirements.
   2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
   3. No work shall be without the inspections required by Regulatory Requirements.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately using cleaning materials and procedures recommended in writing by resinous flooring manufacturer.
   2. DO NOT clean the epoxy floors for a period of seven (7) days after installation in order to allow proper curing of the epoxy floor systems for full resistance to chemicals.

3.6 PROTECTION

A. Protection from traffic:
   1. Job area to be free of other trades for a period of twenty-four (24) hours after floor installation.
   2. Protect resinous flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's written recommendations for protective materials and method of application.
   3. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 096840 - CARPET

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all carpet materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 03 35 10 POLISHED CONCRETE FINISHING
   5. 06 10 00 ROUGH CARPENTRY
   6. 06 41 23 MODULAR CASEWORK
   7. 07 26 13 VAPOR-ALKALINITY CONTROL
   8. 08 11 00 METAL DOORS AND FRAMES
   9. 09 22 16 METAL FRAMING
   10. 09 29 00 GYPSUM BOARD
   11. 09 30 00 TILE
   12. 09 65 10 RESILIENT BASE AND ACCESSORIES
   13. 09 65 16 RESILIENT SHEET
   14. 09 65 19 RESILIENT TILE
   15. 09 72 00 WALL COVERINGS
   16. 09 91 00 PAINTING
   17. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. AATCC American Association of Textile Colorists and Chemists.
      b. ASTM American Society of Testing Materials.
      c. CRI Carpet and Rug Institute Recommendations and Standards.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. For each type of carpet indicated:
      b. Manufacturer's full color range (including any standard and premium colors).
      c. Design data for all adhesives, tape, etc. for all carpet accessories.
   2. Shop Drawings.
      a. Pattern diagrams.
         1) Show location of each Carpet type to be installed.
         2) Refer to ID Sheets.

3. Samples.
   a. Provide Full Size sample of each color and pattern indicated.
4. Quality Assurance/Control Submittals:
   a. Manufacturer's Written Installation Instructions.
   b. Certificates:
      1) Certificates from the manufacturer that the installation was in compliance with manufacturer's written instructions.
   c. Statement of Installer's Qualifications.
5. Closeout Submittals in accordance with the following:
   a. Maintenance Data (indicating all recommended cleaning and maintenance instructions) in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Project Record Documents in accordance with Specification Section - PROJECT RECORD DOCUMENTS.
   c. Warranty in accordance with this specification and Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
      b. CBC California Building Code (CBC 804.1 and CBC 11B-302.1 and 11B-302.2)
      c. NFPA National Fire Protection Agency

C. Meetings:
   1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
      a. Coordinate the work with all other related work.
      b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
      c. Review delivery, storage and handling procedures.
      d. Review project conditions.
      e. Review subfloor preparation procedures.
   2. Progress: Scheduled by the Contractor during the performance of the work.
      a. Review for proper installation of work progress.
      b. Identify any installation problems and acceptable corrective measures.
      c. Identify any measures to maintain or regain project schedule if necessary.
   3. Completion: Scheduled by the Contractor upon proper completion of the work.
      a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
      b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be individually wrapped in the original protective wrapping with legible registration labels indicating manufacturer's name, style, color and dye lot.

B. Storage and protection:
   1. Products shall be stored in a dry, protected interior area.
      a. Carpet shall be stored flat and shall not have anything stacked on top.
      b. Maintain temperature in the storage space between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit.
         1) Seven (7) days prior to installation, acclimate products to environmental requirements of the article titled PROJECT CONDITIONS of this specification section, and the Paragraph titled “Environmental Requirements”.

1.6 PROJECT CONDITIONS

A. Environmental requirements:
   1. Temperature: Maintain ambient temperature in space to receive products between sixty-eight (68) degrees Fahrenheit and eighty (80) degrees Fahrenheit for seven (7) days prior, during, and seven (7) days minimum following installation.
      a. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.
   2. Humidity: Maintain humidity in space to receive products between 6 percent to 9 percent for four (4) days minimum prior, during, and following installation in accordance with manufacturer's written recommendations.
      a. Inform the Owner of humidity requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Space shall be dry.
      a. Concrete slab shall be a minimum of 4 months old.
   3. Field Measurements:
      a. Take and be responsible for field measurements as required.
      b. Report any significant differences between field dimensions and drawings to Architect.

1.7 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:

a. Modular Tile Life of the Carpet.
b. Walk-Off Fifteen (15) Years.

2. Shall cover Wear, Anti-shock, Edge Ravel, Tuft Bind, Dimensional Stability, Zippering, Static Protection, and Backing Delamination.

C. Installer's Warranty:
1. In accordance with the terms of the specification section - WARRANTIES:
a. Warranty Period Two (2) Years.
b. Shall be co-endorsed by the General Contractor.

1.8 OWNER'S INSTRUCTIONS

A. Provide the services of a manufacturer's-authorized service representative to demonstrate and train the Owner's maintenance personnel prior to substantial completion as specified below:
1. Proper maintenance and cleaning procedures in accordance with manufacturer's written recommended instructions.

1.9 MAINTENANCE

A. Extra Materials:
1. Modular Tile:
a. Provide five percent (5 percent) of each color, in accordance with Specification Section - PROJECT CLOSEOUT.
2. Walk-Off:
a. Provide five percent (5 percent) of each color, in accordance with Specification Section - PROJECT CLOSEOUT.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified underlayment compound manufacturer:
a. ARDEX INCORPORATED
b. Acceptable alternative manufacturer: CHEMREX
1) A compatible bonding agent is needed for this product to adhere to the Vapor-Alkalinity Control System and be considered as equivalent.
2. Specified crack and joint filler manufacturer:
a. ARDEX INCORPORATED.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:
1. All materials shall be newly manufactured and of a quality consistent with industry standards and this specification.
2. Colors and patterns shall be selected from manufacturer's standard line (including premium) except as otherwise specified. See Carpet Schedule at the end of this section for carpet types required.
3. Carpet shall have integral static protection.
4. Carpet shall be impervious to water damage.
5. The stain resistant properties must be permanent and cannot be removed by commercial cleanings or abrasive wear. Test data as follows:
   a. Red Dye 40 must be released by water only, after exposure to 150,000+ cycles in a tetra pod walker and after sample is allowed to soak in 10:1 solution of water and ammonia.
6. Topical stain resistant treatments will not be acceptable. Stain resistant properties must be inherent.
7. Carpet must meet or exceed qualifications for environmental standards of the Carpet and Rug Institute's Green Label Program.

2.3 ACCESSORIES

A. Underlayment Compound:
1. Provide free-flowing, self-leveling, pumpable, cement based compound (ARDEX K-15) for applications from 1 inch thick to feathered edges, 4,000 psi minimum in accordance with ASTM C 109 "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens)", modified for air cure only.
   a. ARDEX "K-15".

B. Crack and Joint Filler:
1. Provide low viscosity rigid polyurethane filler, tensile strength of 4,000 psi minimum, in accordance with ASTM D 638 "Test method for Tensile Properties of Plastics".
   a. ARDEX "ARDIFIX".

C. Concrete Primer (if applicable):
1. Nonstaining type as recommended in writing by flooring manufacturer.

D. Adhesives:
1. Adhesive as recommended in writing by carpet manufacturer.
2. Compatible with VAPOR-ALKALINITY CONTROL SYSTEM, if installed.
3. Shall comply with CARB requirements in the place where the project is located.
4. Shall be non-staining and water and mildew resistant.
5. Complies with flammability requirements for installed carpet.
6. Shall bond to non-porous substrate surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
2. Check sub-floor variation with long straight edge.
3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
4. Execution of work under this specification section shall constitute acceptance of existing conditions.

B. Concrete Subfloors:
1. Verify that concrete slabs comply with ASTM F 710 "Practice for Preparing Concrete Floors to Receive Resilient Flooring".
2. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
4. Evaluate the RH (Relative Humidity) and pH (Alkalinity) test results for compliance with adhesives and carpet manufacturer recommendations.
   a. If a Vapor-Alkalinity Control System product has been installed to reduce water vapor emission or phosphates thereby negating the RH and pH test results, evaluate products for compatibility with adhesives and carpet products.
5. Determine adhesion characteristics by performing bond tests recommended by the carpet manufacturer.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work.

C. Surface preparation:
1. General: Comply with CRI, Section 7, "Site Conditions- All Installations" and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.
2. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the carpet manufacturer.
   a. If a Vapor-Alkalinity Control System has been installed do not remove this system.
3. Use crack and joint filler according to manufacturer's written instructions, to fill cracks, holes, and spalls in substrates.
4. Install self-leveling underlayment compound at depressed or uneven floor conditions.
5. Broom and vacuum clean substrates to be covered immediately before installing carpet.
6. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
7. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.

2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.

B. Layout:
1. Lines shall be straight and true.
2. Refer to Wall and Floor Pattern Drawing(s) in the Interior and Exterior Color Schedules for layout of patterns.

C. Carpet Installation:
1. Direct-Glue-Down Installation: Comply with CRI, Section 13, "Direct Glue-Down Installation."
2. Double-Glue-Down Installation: Comply with CRI, Section 14, "Double Glue-Down Installation."
3. Comply with carpet manufacturer's written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
   a. Level adjoining edges.
4. Do not bridge building expansion joints with carpet.
5. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosing's. Bind or seal cut edges as recommended in writing by carpet manufacturer.
6. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
7. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet as marked on subfloor. Use nonpermanent, nonstaining marking device.

D. Modular Tile:
1. Pattern: Monolithic, unless otherwise noted.

E. Walk-Off:
1. Pattern: Monolithic, unless otherwise noted.

3.4 CLEANING

A. Perform the following operations immediately after installing carpet:
1. Remove and dispose of debris and recycle all unusable scrap.
2. Remove excess adhesive and other surface blemishes using cleaner recommended in writing by carpet manufacturer.
3. Remove yarns that protrude from carpet surface.
4. Vacuum carpet using commercial machine with face-beater element.

3.5 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.
1. Provide the services of a manufacturer-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.
   a. Train Owner's maintenance personnel on cleaning procedures and schedules related to cleaning and preventative maintenance.
   b. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.

3.6 PROTECTION

A. Protect installed carpet to comply with CRI, Section 20, "Protecting Indoor Installations."

B. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

3.7 SCHEDULES

A. Modular Tile **MT-1**.
1. Manufacturer: TARKETT.
2. Product Name: Maelstrom 04849
3. Physical Characteristics:
   a. Construction Type: Tufted
   b. Fiber System: Dynex SD Nylon
   c. Pile Characteristic: Pattern loop pil
   d. Pile Thickness: 0.085"
   e. Stitches: 9.60/ in
   f. Gauge: 5/64"
   g. Face Weight: 18 oz/yd2
   h. Primary Backing: Synthetic Non wov
   i. Secondary Backing: Modular ER
   j. Size: 24 x 24
4. Performance Characteristics:
   a. Critical Radiant Flux per ASTM E 648 "Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source".
      1) Class 1, Not less than 0.45 W/sq. cm.
   b. Smoke Density per ASTM E 662 "Test method for Specific Optical Density of Smoke Generated by Solid Materials".
      1) 450 or less
   c. Methenamine Pill Test per ASTM D 2859 "Test method for Ignition Characteristics of Finished Textile Floor Covering Materials".
      1) Shall be self-extinguishing.
   d. Tuft Bind per ASTM D 1335 "Test Method for Tuft Bind of Pile Yarn Floor Coverings"
      1) Not less than 10 lbf.
   e. Delamination per ASTM D 3936 "Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering"
      1) Not less than 2.5 lbf/in.
   f. Electrostatic Propensity
      1) Less than 3.5 kV per AATCC 134

B. Modular Tile **MT-2**.
1. Manufacturer: SHAW CONTRACT
2. Product Name: Source Tile 5T315
3. Physical Characteristics:
   a. Construction Type: Multi-Level Pattern Loop
   b. Fiber: Eco Solution Q Nylon
   c. Density: 9000 oz/yd 2
   d. Pile Thickness: 0.068 in

e. Stitches: 10 per in
f. Gauge: 1/10 in
g. Face Weight: 17 oz/yd2
h. Primary Backing: Synthetic
i. Secondary Backing: Ecoworx Til
j. Size: 9" x 36"
k. Soil Resistance Treatment: SSP Shaw Soil Protection

4. Performance Characteristics:
   a. Critical Radiant Flux per ASTM E 648 "Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source".
      1) Class 1
   b. Smoke Density per ASTM E 662 "Test method for Specific Optical Density of Smoke Generated by Solid Materials".
      1) 450 or less
   c. Methenamine Pill Test per ASTM D 2859 "Test method for Ignition Characteristics of Finished Textile Floor Covering Materials".
      1) Pass
   d. Electrostatic Propensity
      1) Less than 3.5 KV per AATCC 134

C. Modular Tile **MT-3**.
1. Manufacturer: SHAW CONTRACT
2. Product Name: Contact Hexagon, 5T160
3. Installation: Random
4. Physical Characteristics:
   a. Construction Type: Multi-Level Pattern Cut/Loop
   b. Fiber: Eco Solution Q100 Nylon
   c. Density: 10065 oz/yd 2
   d. Pile Thickness: 0.093 in
   e. Stitches: 9.0 per in
   f. Gauge: 1/12 in
   g. Face Weight: 26 oz/yd2
   h. Primary Backing: Synthetic
   i. Secondary Backing: Ecoworx Til
   j. Size: 28.8 in x 24.9 in
   k. Soil Resistance Treatment: SSP Shaw Soil Protection
5. Performance Characteristics:
   a. Critical Radiant Flux per ASTM E 648 "Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source".
      1) Class 1
   b. Smoke Density per ASTM E 662 "Test method for Specific Optical Density of Smoke Generated by Solid Materials".
      1) 450 or less
   c. Methenamine Pill Test per ASTM D 2859 "Test method for Ignition Characteristics of Finished Textile Floor Covering Materials".
      1) Pass
   d. Electrostatic Propensity
      1) Less than 3.5 KV per AATCC 134

D. Walk-Off **WO-1**
1. Manufacturer: TANDUS
2. Product Name: Abrasive Action II.
3. Physical Characteristics:
   a. Construction Type: Accuweave Patterned Loop

b. Fiber System: TDX Nylon
c. Pile Height: 0.187 inches
d. Stitches per inch: 8.0 per inch
e. Guage: 1/12 ends per inch
f. Face Weight: 24 oz/sq. yd.
g. Primary Backing: Non-woven synthetic fabric
h. Size: 24" x 24"
i. Soil Resistance Treatment: Ensure
j. Dye Method" 100% Solution Dyed.

4. Performance Characteristics:
   a. Critical Radiant Flux per ASTM E 648 "Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source• ".
      1) Class 1, Not less than 0.45 w/sq. cm.
   b. Smoke Density per ASTM E 662 ÓTest method for Specific Optical Density of Smoke Generated by Solid Materials• .
      1) Less than 450.
   c. Surface Flammability Test per ASTM D 2859 ÓTest method for Ignition Characteristics of Finished Textile Floor Covering Materials• .
      1) Passes CPSC FF-1.70.
   d. Electrostatic Propensity: 1.5 kV or less per AATCC 134.

END OF SECTION

SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all materials, labor, equipment and services necessary to furnish and install FRP Panels, Vinyl Covered Tackboard Panels, Vinyl Wallcoverings, Acoustical Panels, Custom Wall Graphics, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 06 41 23 MODULAR CASEWORK
   4. 09 24 00 CEMENT PLASTER
   5. 09 29 00 GYPSUM BOARD
   6. 09 50 00 ACOUSTICAL CEILINGS
   7. 09 65 10 RESILIENT BASE AND ACCESSORIES
   8. 09 68 40 CARPET
   9. 10 11 00 VISUAL DISPLAY BOARDS
   10. 10 26 00 WALL AND CORNER GUARDS
   11. 10 28 13 TOILET ACCESSORIES
   12. 10 44 00 FIRE PROTECTION SPECIALTIES
   13. 11 62 00 MUSIC EQUIPMENT
   14. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Submit manufacturer's full color range (including any standard, premium and custom colors) of all Wall Coverings for selection by the Architect.
   2. Samples.
      a. Provide 6 inch square sample of each Wall Covering product for color and pattern selected.
      b. Provide 6 inch lineal samples of each Wall Covering trim material specified.
      c. Custom Graphic Vinyl Wall Covering samples:
         1) Submit one reduced scale color proof showing the overall image of each mural for approval prior to manufacture.
         2) Submit 24" x 24" min. ground strike-off of each mural design for approval prior to manufacture.
         3) Submit memo size samples cut from current production of ground wall covering selected to demonstrate quality, weight and embossing.
   3. Closeout Submittals in accordance with the following:
      a. Warranty in accordance with Specification Section - WARRANTIES.

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
      b. CBC California Building Code (CBC 803.1.1).

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be individually wrapped.
   2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.5 PROJECT CONDITIONS

A. Environmental requirements:
   1. Temperature: Maintain ambient temperature in space to receive products between sixty (60) degrees Fahrenheit and eighty (80) degrees Fahrenheit for three (3) days prior, during, and three (3) days minimum following installation. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.6 SCHEDULING

A. Custom Graphic Wallcovering: Verify lead time with manufacturer. Assume no less than six week lead time from approved submittals.

1.7 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified FRP Panel product manufacturer:
      a. SEQUENTIA, INC. with NUDO Aluminum Trim Accessories.
      b. Acceptable alternative manufacturers:
         1) BP CHEMICALS with NUDO Aluminum Trim Accessories.
         2) MARLITE with NUDO Aluminum Trim Accessories.
         3) NUDO PRODUCTS, INC. with NUDO Aluminum Trim Accessories.
   2. Specified Vinyl Covered Tackboard product manufacturer:
      a. KOROSEAL SCHOOL COLLECTION as manufactured by KOROSEAL WALLCOVERINGS, as distributed through WESTERN BUILDING MATERIALS.
      b. Acceptable alternative manufacturers:
         1) CHATFIELD-CLARKE COMPANY, INC., a Divison of KOROSEAL WALLCOVERINGS, as distributed through WESTERN BUILDING MATERIALS.
         2) LAMVIN INC.
   3. Specified Acoustical Panel product manufacturer:

a. High Impact Panels:
1) LAMVIN INC.
b. Ultra High Impact Panels:
1) LAMVIN INC.
4. Specified Glass Marker Wall System product manufacturer:
a. CLARIDGE "Claridge Glass Marker Walls"
b. Acceptable alternative manufacturers:
1) CLARUS "Wall2Wall"
5. Specified Custom Graphic Vinyl Wall Covering product manufacturer:
a. KOROSEAL INTERIOR PRODUCTS LLC. "Digital Lab"

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. FRP Panels:
1. Width 48 inches.
2. Thickness 0.090 inches.
3. Fire Rating in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials" (Class C):
a. Flame Spread Maximum 175.
b. Smoke Developed Maximum 270.
4. Finish:
a. Pattern Pebble finish.
5. Color as selected from manufacturer's full color palette (including standard, premium and custom colors).
6. Accessories:
a. Adhesive as recommended in writing by manufacturer that meets the CARB requirements of the place where the Project is located.
b. Sealant.
1) Set all perimeter J-Mold trim in a continuous bead of silicon sealant.
7. Aluminum Trim by NUDO PRODUCTS, INC.:
a. Provide inside, outside, division and edge trim moldings as required for the conditions present in the project.
b. Lengths 96 inches
c. Thickness 0.090 inch
d. Trim Shapes:
1) J-Mold NUDO A-28.
2) Divider NUDO A-30.
3) Inside Corners NUDO A-32.
4) Outside Corners NUDO A-34.
e. Finish: Powder Coated, in colors to match the field color of the FRP Panels.

B. Vinyl Covered Tackboard:
1. Tackboard:
a. Size:
1) Full Wall Application: 1/2" x 48" wide by maximum practical height to minimize joints.
2) Boards: 1/2" thick, see to Drawings for width and height.

b. Wood fiber substrate tackboard shall be 1/2" thick, cellulose fiberboard sheathing, beveled side edges and square end edges, in accordance with ASTM C 208 “Specification for Cellulosic Fiber Insulating Board ,complying with the minimum standards listed below:

1)	Weight, lb/1000 ft^2	640.
2)	Transverse strength, lbf	14.5.
3)	Tensil Strength, lb/in^2	242.
4)	MOR, lb/in^2	380.
5)	"k" Factor	0.37.
6)	Maximum Flame Spread - Class B	75.
7)	Maximum Smoke Developed - Class B	175.

2. Finish: Architect to select from manufacturer's standard textures and colors. Refer to Interior Color Schedule.
   a. All vinyls used are to be 15 oz. total weight per lineal yard (Type I) with a cloth backer to insure consistent emboss.
      1) Class A vinyls shall be tested in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials", with the following maximum requirements:
         a) Maximum Flame Spread - Class A 25.
         b) Maximum Smoke Developed - Class A 5.
3. Edge:
   a. Full Wall Application: Beveled, long side edges with vinyl wrapped to back side. Short end edges to be square cut with vinyl flush with end of substrate board.
   b. Boards: Square edges with Vinyl wrapped to backside.
4. Accessories:
   a. Full Wall Application: Provide vinyl covered PVC moldings in the following configurations: edge, inside and outside corner, and intermediate splice moldings. Provide colors to match the field panels. Use of moldings and locations shall be indicated on the drawings.
5. Overall panel when wrapped with Class A vinyls shall meet flame spread and smoke developed index approval in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials", as follows:
   a. Maximum Flame Spread - Class B 75.
   b. Maximum Smoke Developed - Class B 175.
6. Adhesive:
   a. In accordance with tackboard panel manufacturer's written recommendations, and in compliance with CARB Standards and VOC requirements.

C. Acoustical Panels:
1. Low Impact:
   a. Design: Standard Acoustical Panel by LAMVIN INC., or approved equivalent.
   b. Material: 7 lb density, rigid fiberglass covered by an acoustically transparent 100% woven polyester, 66 inches wide, 2-ply, 16 ounce fabric. Fabric is bonded directly to the panel face with all edges wrapped a minimum of 1-1/2 inches to the back of the panel to ensure a flat, wrinkle-free surface with tailored corners.
   c. Size: 1" thick panel with beveled edges - see drawings for widths and lengths.
   d. Mounting: Laid directly against wall surface and secured mechanically with "Z" clips per manufacturer's written recommendations.
   e. In accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials":
      1) Flame Spread Index: Class A with a Flame Spread of 25 or under.
      2) Smoke Density Index: 0.
   f. NRC in accordance with ASTM C 423 "Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method."

1) 0.85 to 0.95.

g. Color: As selected by Architect from manufacturer's standard colors

2. High Impact:
   a. Design: Tackable High-Impact Acoustical Panel by LAMVIN INC., or approved equivalent.
   b. Material: 7 lb density/10-20 lb density smooth fiberglass face / fabric, rigid fiberglass covered by 100% Ployester "Murmur" as manufactured by MAHARAM. Fabric is bonded directly to the panel face with all edges wrapped a minimum of 1-1/2 inches to the back of the panel to ensure a flat, wrinkle-free surface with tailored corners.
   c. Size: 1-1/8" thick panel with square edges - see drawings for widths and lengths.
   d. Mounting: Laid directly against wall surface and secured with Impailing Clips and Adhesive per manufacturer's written recommendations.
   e. NRC in accordance with ASTM C 423 "Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method".
      1) 0.85 to 0.95.
   f. Color: Refer to Interior Color Schedule.
3. Ultra High Impact:
   a. Design: Sonic Ultra High-Impact Acoustical Panel by LAMVIN INC., or approved equivalent.
   b. Material: 7 lb density smooth fiberglass laminated with 1/16 inch thick perforated co-polymer plastic face covered by microperforated vin 100% Polyester Fabric "Open House" and "Framework" as manufactured by Guilford of Maine. Fabric is bonded directly to the panel face with all edges wrapped a minimum of 1-1/2 inches to the back of the panel to ensure a flat, wrinkle-free surface with tailored corners.
   c. Size: 1-1/16" thick panel with square edges. See drawings for widths and lengths.
   d. Mounting: Laid directly against wall surface and secured with Adhesive and Impaling clips per manufacturer's written recommendations.
   e. Flame Spread Index: Class A with a Flame Spread of 25 or under.
      1) In accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials".
   f. Smoke Density Index: 0.
      1) In accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials."
   g. NRC in accordance with ASTM C 423 "Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method."
      1) 0.90.
   h. Color: Refer to Interior Color Schedule.

D. Glass Marker Wall System:
   1. Design: "Claridge Glass Marker Walls" by CLARIDGE, or approved equivalent.
   2. Material: Magnetic 1/4" tempered safety glass with a full steel backer.
      a. Color: As selected by Architect from manufacturer's standard and custom colors.
   3. Size: 1/4" thick panelh - see drawings for widths and lengths.
   4. Mounting: Adhesivley applied with commercial grade adhesive per manufacturers written instructions.
   5. Trim: 1/4" Satin Aluminum, powder coated
      a. Color: As selected by Architect from manufacturer's standard and custom colors.

E. Custom Graphic Wall Covering:
1. Digital Image: Owner/Architect to provide PDF file of image.
2. Type: Type II.
3. Size: 54 inches wide.
4. Total Weight: 21 oz. per linear yard.
   a. Fabric Weight 2.7 oz. per linear yard.
   b. Vinyl Weight 18.3 oz. per linear yard.
   c. Vinyl Gage 9 mils.
5. Fabric Backing "Osnaburg".
6. Ground: "Fine Texture SMSDCDS01031".
7. Wallcovering Options:
   a. "Early Warning Effect" formulation warning of impending fire before flames develop.
   b. Formulation releases a colorless, odorless vapor which automatically activates ionization smoke detectors.
   c. Standard top coating for cleanability and UV protection.
8. Flame Spread, per ASTM E84: Maximum 15.
9. Smoke Development, per ASTM E84: Maximum 20.
10. Accessories:
   a. Adhesives: manufacturer's clear strippable wall covering adhesive recommended, "Koroseal A-848-B"Heavy Duty Premixed Vinyl adhesive, or approved equivalent.
   b. Substrate primer/sealer compatible with GYPSUM BOARD: white pigmented alkyd or acrylic/latex base primer specially for use with vinyl wallcoverings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.

2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Glass Marker Wall System:
1. Seam: In accordance with manufacturer's written instructions and recommendations, use Claridge plastic t-mold to protect the edge of the glass and seam while it is being moved into position. Place the t-mold in backwards between the glass panels, slide the panels together, pull the t-mold out and gently move the glass into its final position.

C. Layout:
1. Lines shall be straight and true.

3.4 FIELD QUALITY CONTROL

A. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.
3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 099100 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to furnish and install Painting, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
      a. Material and Equipment to be Painted: Paint all piping, unwrapped ductwork, electric conduits exposed to view. Prime and paint all factory finished mechanical and electrical equipment and accessories exposed to view.
      b. Material and Equipment not to be Painted: Do not paint piping, ductwork, equipment and machinery located in attic spaces, above furred or suspended ceilings, in furred pipe or duct spaces. Do not paint factory finished equipment or machinery located in mechanical rooms or mechanical buildings, attics, furred or suspended ceilings.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 05 12 00 STEEL AND FABRICATIONS
   5. 05 30 00 METAL DECK
   6. 05 52 00 RAILING SYSTEMS
   7. 06 22 00 MILLWORK
   8. 06 41 23 MODULAR CASEWORK
   9. 07 40 00 METAL PANELS
   10. 07 60 00 SHEET METAL (Shop Priming)
   11. 07 72 00 ROOF ACCESSORIES
   12. 07 92 00 SEALANTS
   13. 08 11 00 METAL DOORS AND FRAMES
   14. 08 14 16 WOOD DOORS
   15. 08 31 13 ACCESS DOORS AND FRAMES
   16. 08 33 00 COILING DOORS
   17. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   18. 08 70 00 HARDWARE
   19. 08 80 00 GLASS
   20. 09 24 00 CEMENT PLASTER
   21. 09 29 00 GYPSUM BOARD
   22. 09 50 00 ACOUSTICAL CEILINGS
   23. 09 64 66 RESILIENT WOOD FLOOR
   24. 09 65 10 RESILIENT BASE AND ACCESSORIES
   25. 09 67 23 RESINOUS FLOORING
   26. 09 68 40 CARPET
   27. 10 05 00 MISCELLANEOUS SPECIALTIES
   28. 10 21 13 TOILET PARTITIONS
   29. 10 26 00 WALL AND CORNER GUARDS
   30. 10 44 00 FIRE PROTECTION SPECIALTIES
   31. 11 62 00 MUSIC EQUIPMENT

32. 11 66 00 ATHLETIC EQUIPMENT
33. 14 24 23 HYDRAULIC ELEVATORS
34. 32 12 00 PAVEMENT
35. 32 19 19 ORNAMENTAL METAL
36. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
1. In accordance with the following standards:
   a. CA-CHPS California High Performance Schools
      1) 2011-CA-CHPS Addendum.
   b. MPI Master Painters Institute
      1) MPI - Architectural Painting Specification Manual.
      2) MPI – Maintenance Repainting Manual.
         a) MPI RSP Master Painters Institute Repaint Surface Preparation Standards, Chapter 6, Section 2.
      3) MPI – Glossary.
   c. PDCA Painting and Decorating Contractors of America, latest edition of the Architectural Specification Manual, as prepared by Specification Services, Inc., Washington State Council of the PDCA.

1.3 DEFINITIONS

A. The following definitions are just some of the more important definitions used within this section, and were taken from the MPI Glossary Manual, or used to simplify language used by the Architect. These definitions and others stated within the Manual apply for this Specification Section.
1. Acrylic Latex An aqueous dispersion of acrylic resins.
2. Acrylic Resin A/R - Synthetic resins made by polymerizing esters of acrylic acid.
3. A/U Aliphatic Urethane
4. A/A/U Aliphatic Acrylic Urethane
5. Blocking Sticking or bonding together of two painted surfaces that are in direct contact. Most often caused by stacking painted articles before dry or reaching a "block free" (or "non-blocking") stage.
6. DFT Dry Film Thickness – the depth or thickness of a coating in the dry state. Expressed in mils (1/1000 inch) or microns.
7. DRY FALL A Fog Paint designed to be applied by spray and dries fast enough that the overspray will be a dry powder after falling a certain distance. The dust can then be swept or vacuumed up.
8. ODFT "Overall Dry Film Thickness" – the depth or thickness of a complete coating system in the dry state. Expressed in mils (1/1000 inch) or microns.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
   a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
   b. Material Safety Data Sheets will be turned over to the Owner in compliance with local rules and regulations, but will not be reviewed.
   c. Materials Lists:

1) Format in accordance with Article in this section titled "Paint Finish Schedule".

d. Additional submittals to substantiate proposed equivalent systems.

2. Samples.

a. Brushouts: In accordance with Specification Section - SUBMITTAL PROCEDURES.

b. For each color and finish selected provide paint brushouts showing color tint graduation of each coat to and including the final color coat.

1) Selected colors and finishes:

a) Size: 8 1/2" x 11" boards.

b) Quantity: 3 boards of each color and finish.

c) Board material wherever possible and for transparent finishes shall be same as material to be finished. Opaque finishes may be on heavy card stock.

3. Closeout Submittals in accordance with the following:

a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

b. Project Documents in accordance with Specification Section - PROJECT DOCUMENTS.

c. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Material Qualifications:

a. Where possible (except for specified materials), paint materials shall be products of only one manufacturer.

b. All materials, preparation and workmanship shall conform to requirements of the specified edition of the Architectural Painting Specification Manual by the Master Painters Institute (hereafter referred to as the MPI Painting Manual), unless otherwise indicated.

c. Flame Spread Ratings in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials":

1) Paint finishes in required exit stairways, corridors and exitways must meet flame spread ratings as required by regulatory agencies.

2) Class A - Tunnel Test 0-25 for enclosed required exit stairways and other exit ways.

3) No interior paint or wall finish will be permitted having a tunnel test in excess of 200. All paint materials must be certified that materials meet these requirements.

d. Manufacturer's Written Instructions - One for the Architect, Contractor and the Owner:

1) Submit three (3) copies of manufacturer's written instructions.

e. Compatibility:

1) Paint materials and equipment shall be compatible in use.

2) Finish coats shall be compatible with prime coat.

3) Prime coats shall be compatible with surface to be coated.

4) Tools and materials shall be compatible with coating to be applied.

f. Air Quality:

1) Paint materials and equipment used for application will comply with CARB Air Quality Control Standards in effect at the Project Site and at the time of application.

2. Installer Qualifications:

a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

1) Only qualified journeypersons, as defined by local jurisdiction, shall be engaged in painting and decorating work. Apprentices may be employed provided they work under the direct supervision of a qualified journeyperson in accordance with trade regulations.

3. Manufacturer/Supplier Qualifications:

a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

a. CAL/OSHA California/Occupational Safety and Health Act

b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

c. CBC California Building Code (CBC 803.1.1)

C. Mockups: Provide a full-coat benchmark finish sample for each type of coating and substrate required for Architect's review. Duplicate finish of approved sample Submittals.

1. Wall Finishes shall be at least 100 sq. ft., suitably marked "MOCKUPS" and protected for the duration of the construction Project.

2. Small areas and items can be selected by the Contractor, suitably marked "MOCKUPS" and protected for the duration of the construction Project.

3. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.

4. Approved mockups (wall areas and small areas or items) may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.

a. Coordinate the work with all other related work.

b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.

a. Review for proper installation of work progress.

b. Identify any installation problems and acceptable corrective measures.

c. Identify any measures to maintain or regain project schedule if necessary.

3. Completion: Scheduled by the Contractor upon proper completion of the work.

a. Inspect and identify any problems that may impede issuance of warranties and guaranties.

b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.

2. Damaged products will not be accepted.

B. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units, in a locked, clean and neat, well ventilated area.
   a. All receiving, opening and mixing shall be done in this area.
   b. Oily rags and waste shall be removed from area each night and all other precautions shall be taken to avoid danger of fire.
   c. Empty containers shall not be removed from site, unless otherwise approved by the Architect.
   d. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
1. Rain or Fog:
   a. No work under this section shall be started or maintained under threat of rain.
   b. Surfaces shall be painted only when they are free from moisture.
   c. No painting of exterior surfaces shall be done less than 72 hours of actual drying weather after a rain or during periods of dew or fog.
   d. Perform no painting or decorating work when the maximum moisture content of the substrate exceeds:
      1) 12 percent for concrete and masonry (clay and concrete brick / block).
      2) 15 percent for wood.
      3) 12 percent for plaster and gypsum board.
   e. Perform no painting or decorating work when the relative humidity is above 85 percent or when the dew point is less than 5 degrees F variance between the air / substrate temperature.
2. Temperature: No painting shall be done when ambient air and substrate temperatures are below 50 degrees F.
3. Alkalinity: An alkali level of between 7.0 and 8.5 pH is suitable for painting. Any reading above that level, then the surface shall be neutralized as required for the surface to be painted.
   a. Methods shall be consistent with MPI - Architectural Painting Specification Manual, and shall not result in any adverse condition causing inadequate adhesion, improper curing and drying, or durability of paint system.
4. No exterior painting shall be done during winds or dusty conditions.
5. Perform no exterior painting and decorating work unless environmental conditions are within MPI and paint manufacturer's requirements or until adequate weather protection is provided.
   a. Where required to meet project schedules, suitable weatherproof covering and sufficient heating facilities shall be in place to maintain minimum ambient air and substrate temperatures for 24 hours before, during and after paint application.
6. Perform no interior painting or decorating work unless adequate continuous ventilation and sufficient heating facilities are in place to maintain minimum ambient air and substrate temperatures above minimum requirements for 24 hours before, during and after paint application.
   a. Where required to meet project schedules, provide supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Concrete and masonry surfaces shall be installed at least 28 days prior to painting and decorating work and shall be visually dry on both sides.
   3. Conduct all moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple cover patch test.
   4. Test concrete, masonry and plaster surfaces for alkalinity as required.
   5. Contractor shall provide a minimum lighting level of 323 Lux (30 foot candles) on surfaces to be painted or decorated.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.
      a. Original adherence of all materials and no evidence of any surface defect shall be maintained during warranty period.
      b. Color at end of warranty period shall remain free from serious fading and any discernible variations shall be uniform.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
   2. Provide Paint Manufacturer's special ten (10) year Material Warranty co-endorsed by the installer for exterior paint application of cement plaster surfaces.
      a. Warranty period: Ten (10) Years.
   3. Provide Water-Repellent Manufacturer's special Weatherproofing Warranty co-endorsed by the installer for exterior sealer application of concrete or concrete block surfaces.
      a. Warranty period: Ten (10) Years.

C. Installer's Warranty:
   1. Paint Installer's Warranty:
      a. Installer will certify that a Paint Manufacturer's Representative tested the substrate according to Paint Manufacturer's standard procedures and have submitted project information and test patch forms.
      b. Installer shall certify that Paint Manufacturer's products were installed on the structure in accordance with manufacturer's specification requirements.
      c. Installer further agrees that if installer fails to fulfill their obligation under this certification statement within 30 days notice of the complaint, Paint Manufacturer may proceed with the investigation and repairs and shall pay the entire material cost, providing it wasn't the installer's responsibility.
   2. Water-Repellent Installer's Warranty:
      a. Warranty period: Two (2) Years.
      b. Installer will certify that a Water-Repellent Manufacturer's Representative tested the substrate according to Water-Repellent Manufacturer's standard procedures and have submitted project information and test patch forms.
      c. Installer shall certify that Water-Repellent Manufacturer's products were installed on the structure in accordance with manufacturer's specification requirements.
      d. Installer agrees:

1) Investigate all complaints of leakage and/or water absorption on surfaces to which Water-Repellent Manufacturer's weatherproofing products were applied and provide a written report of the cause to Water-Repellent Manufacturer within thirty (30) days of the complaint.
2) Re-apply Water-Repellent Manufacturer's weatherproofing products according to Water-Repellent Manufacturer's standard procedures at installer's cost for labor and material if the leakage and/or water absorption is due to improper surface preparation, application and/or improper use of material.
3) Request authority from Water-Repellent Manufacturer to re-apply Water-Repellent Manufacturer's weatherproofing products at Water-Repellent Manufacturer's expense to areas, which were not rendered hydrophobic due to imperfect weatherproofing materials.

e. Installer further agrees that if installer fails to fulfill their obligation under this certification statement within 30 days notice of the complaint, Water-Repellant Manufacturer may proceed with the investigation and repairs and shall pay the entire cost, providing it wasn't the installer's responsibility.

1.9 MAINTENANCE

A. Extra Materials:
1. Quantity: 10 percent of quantity needed to paint Project, but not to exceed one gallon, of each type and color of finish coat used.
2. Identification: At project completion, provide an itemized list complete with manufacturer, paint type and color coding for all colors used, and locations within the Project for Owner's later use in maintenance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified paint coating product manufacturer, or approved equivalent:
a. PPG PAINTS.
1) Composed of the following companies: AMERITONE PAINT, DECRATREND, DEFT, DEVOE COATINGS, DEVOE PAINT, FLOOD WOOD CARE, FULLER O'BRIEN, GLIDDEN, and SINCLAIR PAINT.
b. Also specified: GEMINI and MONOPOLE.
c. Acceptable alternative manufacturers:
1) DUNN EDWARDS, KELLY MOORE PAINTS, SHERWIN WILLIAMS, BENJAMIN MOORE and VISTA PAINT. Submittals by these manufacturers, subject to specification requirements, must be in accordance with Section - SUBMITTAL PROCEDURES.
a) Paint material quality and systems shall be equal to numbers and systems listed in Paint Finish Schedule at the end of this section.

b) If submitted paint numbers differ from Darden Architects, Inc. Paint Equivalency List, additionally submit explanation of difference and certification letter from the installer attesting that the different product is equal to or better than specified; i.e. equivalent or better percentage of solids, system ODFT, and VOC compliant. Paint Equivalency List published by Darden Architects, Inc. is available only for this project at written request.

2. Specified water-borne Alkyltrialkoxy Silane water repellent product manufacturer, or approved equivalent:
   a. EVONIK DEGUSSA CORPORATION.
3. Specified Graffiti coating manufacturer, or approved equivalent:
   a. Sacrificial:
      1) VISUAL POLLUTION TECH, INC.
   b. Non-sacrificial:
      1) BASF HYDROZO.
      2) EVONIK DEGUSSA CORPORATION.
      3) THIS STUFF WORKS - TSW
4. Specified Intumescent Paint Manufacturer, or approved equivalent:
   a. ISOLATEK INTERNATIONAL
5. Specified High Gloss Epoxy Pool Paint and Primer Manufacturer, or approved equivalent:
   a. RAMUC.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   1. Shop Primers or Coil-Coated Primers: It shall be assumed that all Shop Primed or Coil-Coated primed metals do not meet the requirements for primer material and mil thickness as defined herein. As such, all Shop Primed or Coil-Coated primed metals shall be field primed as indicated in the schedule.

B. Material Quality: Provide manufacturer's best-quality coating material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
   1. All materials used shall be lead and mercury free and shall have low VOC content to meet the applicable CARB standards in the area where the Project is located.
   2. All paint materials shall have good flowing and brushing properties and shall dry or cure free of blemishes, sags, air entrapment, etc.
   3. All Water-Repellant Coatings shall comply with the following:
      a. Provide Alkyltrialkoxy Silane combination with a ratio concentration and application procedure as recommended by the manufacturer with the ability to cover in one or more applications for a ten year warranty in accordance with the following substrates:
         1) Thin Brick.
         2) Concrete.
         3) Concrete Masonry Units
         4) Split-Faced Concrete Masonry Units.

b. Color: Clear.
c. Active Substance: Alkyltrialkoxy Silane.
d. Active Content: 100 percent.
e. Solvent: Water.
f. Flash Point (Concentrate): 93 degrees F.
g. Flash Point (Mixed): 200 degrees F.
h. Density: 7.77 lbs./gallon.
i. VOC (19:1): 50 g/liter (Maximum).
j. VOC (9:1): 100 g/liter (Maximum).
k. VOC (6:1): 200 g/liter (Maximum).

4. All Bituminous Paint:
   a. Shall comply with Cold-Applied Asphalt-Mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil thickness per coat.

2.3 MIXES

A. Mixing and Tinting:
1. Unless otherwise specified herein or pre-approved, all paint shall be ready-mixed and pre-tinted at the factory. Re-mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.
2. Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
3. Where thinner is used, addition shall not exceed paint manufacturer's written recommendations.
4. Do not use kerosene or any such organic solvents to thin water-based paints.
5. Thin paint for spraying in strict accordance with paint manufacturer's written instructions. If directions are not on the container, obtain instructions in writing from the manufacturer and provide one copy of instructions to the Project Inspector.

2.4 FINISHES

A. Finish Colors:
1. Unless otherwise specified herein, all painting work shall be in accordance with MPI Premium Grade finish requirements as a minimum.
2. Determined by Architect prior to or as work progresses.
   a. Colors to be selected from paint manufacturer's full color systems, including standard, premium and custom colors.
3. When deep or 'Ultra colors' are selected, submit to Architect proposed revision to specified system product numbers, according to manufacturer's written recommendations.
   a. When deep or ultra colors are selected for use on walls or special color treatments such as graphics or many color changes are desired, the areas and extent of use will be clarified upon request of the Contractor.
4. Gloss standards, in accordance with MPI standards, using the ASTM D 523 "Test for Specular Gloss", are as follows:

Gloss Level	**Description**	**Units at 60 degrees**	**Units at 85 degrees**
G1	Matte or Flat Finish	0 to 5	10 max.
G2	Velvet Finish	0 to 10	10 to 35
G3	Eggshell Finish	10 to 25	10 to 35

Gloss Level	Description	Units at 60 degrees	Units at 85 degrees
G4	Low Sheen or Satin Finish	20 to 35	35 min.
G5	Semi-Gloss Finish	35 to 70	
G6	Gloss Finish	70 to 85	
G7	High-Gloss Finish	Greater than 85	

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
   a. Thoroughly examine (and test as required, if necessary) all conditions and surfaces to be painted and report in writing to the Contractor and the Architect any conditions or surfaces that will adversely affect the work of this section.
   b. The Installer is responsible for verifying the compatibility of items primed by others and the finish coat or coats required by the Contract Documents. Should an incompatibility occur, the Installer (along with the manufacturer's technical representative) will recommend compatible alternatives for the Architect's approval.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Protection before Application:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
2. Removal of Hardware and Miscellaneous Items:
   a. Coordinate the work with other trades so that they remove electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings, fastenings, and the like prior to starting work under this Section.
   b. Store during painting work. Coordinate cleaning and reinstallation after painting work is finished.
   c. Do not use solvent or cleaning agents detrimental to permanent finishes.
   d. Remove doors before painting to paint bottom and top edges, and then re-hang.
3. Protect adjacent surfaces against damage from painting operations. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
   a. Protective means include: Drop cloths, shields, masking templates, etc.
   b. Exterior surfaces include: landscaping, walks, drives, adjacent building surfaces, glazing, aluminum surfaces, etc.
   c. Interior surfaces include: rating and instruction labels on doors, frames, equipment, piping, etc.

B. Surface preparation:
1. General:

a. In accordance with MPI Standards.
b. Surfaces to be finished shall be clean, dry and free of dirt, passivators, oils, loose paint and any other contamination that would adversely affect adhesion, protective properties or appearance of the coating.
c. All oil, grease, dirt or other foreign matter shall be removed by washing with a solution of cleaner and water, rinse and allow to dry.
d. If efflorescence, alkali or glazed surfaces exist, neutralize with acid wash followed by thorough water rinsing.
   1) Protect all adjacent substrates or materials that could be affected by acid washing or water rinsing. Collect all washing & rinsing residue and dispose of away from structures.

2. Wood Substrates - (New and Repaint Surfaces):
   a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
   b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
   c. Fill holes and other imperfections with putty or plastic wood to match natural finish before and after application of prime or seal coat.
   d. Provide necessary extra treatment over knots, pitch pockets, sappy portions and other defects to produce a proper base for painting.
   e. Sand down raised grain or rough surfaces.
   f. Clean surfaces free of dust, soil and other foreign material.
3. Gypsum Board Substrates - (New and Repaint Surfaces):
   a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
   b. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
   c. Do all necessary minor sanding.
   d. Fill minor cracks, scratches, holes and nail heads.
4. Plaster Substrates - (New and Repaint Surfaces):
   a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
   b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
   c. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
   d. Neatly patch, flush and smooth, minor cracks, holes, pits and other imperfections in plaster or concrete surfaces.
5. Concrete Substrates - (New and Repaint Surfaces):
   a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
   b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
   c. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
   d. Neatly patch, flush and smooth, minor cracks, holes, pits and other imperfections in plaster or concrete surfaces.
6. Metal Substrates - (New and Repaint Surfaces):
   a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
   b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
   c. Shop Primed or Factory Primed Surfaces:
      1) Shop Primed or Factory Primed Surfaces are considered "un-primed" due to their mil thicknesses provided, and common incompatibility issues with specified coating system; and are suitable only for protection during transit (shipment and storage) until incorporated into the Project.
      2) Remove dust, oil and rust.
      3) Sand surface lightly.
      4) Touch up imperfections, scratches, surface damage, etc. with the appropriate primer.
      5) Field connection welds, soldered joints, burned and abraded portions shall be spot primed with the appropriate primer.
   d. Coil-Coated Product Surfaces:

1) Coil-Coated Product Surfaces are considered "un-primed" due to their mil thicknesses provided, and the common incompatibility issues with specified coating system; and are suitable only for protection during shipment and storage until incorporated into the Project.
2) Remove dust, oil and rust.
3) Touch up imperfections, scratches, surface damage, etc. with the appropriate primer.
4) Field connection welds, burned and abraded portions shall be spot primed with the appropriate primer.
5) Field apply manufacturer's written recommended primer coat over entire surface compatible with substrate finish and finish coats indicated on the paint schedule.

e. Un-primed Surfaces:
1) Remove dust, rust, mill scale, grease and foreign matter by sand blasting or wire brushing.
2) Surfaces to be smooth and ready to receive coatings.

f. Non-Ferrous Metal, Galvanized, Aluminum, and Copper Surfaces:
1) Metal Etch and Solvent Clean per SSPC-SP 1 or clean with TSP or other appropriate cleaner followed by thorough water rinsing.
2) Brush Blast to standards of SSPC-SP 16, or if blasting is not feasible, sand thoroughly, wipe clean and apply a test patch for the coating specified.
3) Allow system to cure at least one week, then test adhesion per ASTM D 3359 "Standard Test Methods for Measuring Adhesion by Tape Test".

7. Concrete Block Surfaces - (New and Repaint Surfaces):
a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
c. Clean and free of all dirt, dust, rust, oil and free from all foreign matter.
d. Test for moisture content.
1) Do not coat if moisture is present.
2) Concrete Blocks to be thoroughly dry and cured prior to coating.

e. Do not coat Masonry wall if joints are not properly pointed, has excessive mortar drippings cracked units or shows signs of excessive efflorescence.
1) Notify Architect promptly through General Contractor.
2) Do not coat until unsatisfactory and unacceptable Concrete Block surfaces are corrected suitable for coating.

f. Do not apply opaque finishes to Concrete Block with airless sprayer unless "backrolled".

3.3 APPLICATION

A. Standards:
1. In accordance with MPI Painting Manual.
2. In accordance with manufacturer's specifications.

B. Method:
1. Apply by brush, roller or spray in accordance with MPI Painting Manual and the coating manufacturer's written recommendations except where specified otherwise in Schedule of Paint Finishes.
2. Painting of doors by rollers shall only be allowed only if the applicator uses a 1/4 inch nap or less roller.

C. Coatings:

1. All coatings shall be applied without reduction except as specifically required by label directions, or required to be reduced by this Specification. In such cases, reduction shall be the minimum permitted and shall not exceed VOC limits.
2. Apply each coat evenly and allow each coat to dry prior to applying succeeding coats. Each coat to have enough consistency to conceal work to which it is applied.
   a. Follow manufacturer's recommendations for recoat windows when using high performance coatings, epoxys, and urethanes.
3. Cut into a true line and leave smooth and clean without overlapping. Coat doors and windows in open position.
4. Sand finishes on smooth surfaces to assure proper adhesion of subsequent coats.
5. Tint each undercoat a lighter shade to facilitate identification of each coat, if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
6. Apply coating systems so as to obtain not less than the dry film mil thickness recommended by the manufacturer.
7. Sand metal work only as necessary to provide for the complete bonding of coats.
8. Project Inspector to inspect and approve each coat and operation before succeeding coats are applied.
9. Finish work to be free from runs, sags, defective application and improper workmanship.
10. Back prime all woodwork and casework coming in contact with plaster, masonry or concrete immediately upon delivery to project.
11. Post sign promptly following application of coatings.

3.4 FIELD QUALITY CONTROL

A. All surfaces, preparation and paint applications shall be inspected by the Project Inspector:
   1. Painted exterior and interior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the Painting Inspection by the Project Inspector:
      a. Brush / Roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
      b. Evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
      c. Damage due to touching before paint is sufficiently dry or any other contributory cause.
      d. Damage due to application on moist surfaces or caused by inadequate protection from the weather.
      e. Damage and / or contamination of paint due to blown contaminants (dust, spray paint, etc.).
   2. Painted surfaces shall be considered unacceptable if any of the following are evident under natural lighting source for exterior surfaces and final lighting source (including daylight) for interior surfaces:
      a. Visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 39 inches.
      b. Visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 39 inches.
      c. Visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
      d. When the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.

3. Painted surfaces rejected by the Project Inspector shall be made good at the expense of the Contractor. Small affected areas may be touched up; large affected areas or areas without sufficient dry film thickness of paint shall be repainted. Runs, sags of damaged paint shall be removed by scraper or by sanding prior to application of paint.

3.5 CLEANING

A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS and PROJECT CLOSEOUT.
   1. Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
   2. Keep work area free from unnecessary accumulation of tools, equipment, surplus materials and debris.
   3. Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.
   4. Clean equipment and dispose of wash water / solvents as well as all other cleaning and protective materials (e.g., rags, drop cloths, masking papers, etc.), paints, thinners, paint removers / strippers in accordance with the safety requirements of authorities having jurisdiction in the place where the Project is located.
   5. Protect and safeguard work of other trades.

3.6 PROTECTION

A. Protection from Weather:
   1. Protect newly installed work from moisture for a period of time as recommended by the manufacturer after application.

B. Protection from Traffic:
   1. Erect barriers or screens and post signs to warn of or limit or direct traffic away or around work area as required.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

A. Refer to Exterior and Interior Finish Schedules on Drawings for applicable finishes used. This is a guide only and paint sub-contractor is responsible to check all drawings and be responsible for all paint work required to cover the complete painting and finishing of the interior and exterior including specialty items.

B. It is the intent of the specifications and drawings to cover the complete painting and finishing of the Project whether or not it is specifically called for in the Specifications, Schedule of Paint Finishes, or indicated on the Drawings. Surfaces not specified in Paint Finishes Schedule shall be in accordance with manufacturer's written recommendations.
   a. The following schedule was compliant with CARB Air Quality Standards at press time.
      1) Inform the Architect of any changes caused by stricter Air Quality Standards as part of the submittal process.
      2) Provide products compliant with CARB Air Quality Standards and Local Air Quality Control District requirements at the time of installation.

C. Exception: When the Project involves remodel work, the scope of work is limited to the remodel area and adjacent existing substrates to minimize visible color incompatibility.

D. Provide coating system minimum ODFT specified.
1. Provide ODFT per system specified.
   a. Do not apply thicker coats than specified to achieve ODFT. Apply additional coats if necessary for unifrom color.
2. "Ultra Color" Note: A fourth and/or fifth coat may be required to achieve uniform chromatic hue without ghosting from undercoat or substrate.
   a. The Contractor shall consider all Metal Paint Finishes noted "Ultra-color" as requiring as many as five (5) total coats.

E. INTERIOR PAINT FINISHES:
1. INTERIOR WOODWORK
   a. W-1 Flat Latex Minimum ODFT 4.2 MILS.
      1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
      2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
      3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
   b. W-2 Semi-Gloss Acrylic Non-Blocking Enamel Minimum ODFT 4.0 MILS.
      1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
      2) 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
      3) 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
   c. W-3 Gloss Waterborne Acrylic Non-Blocking Enamel Minimum ODFT 9.4 MILS.
      1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
      2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
      3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
   d. W-4 Semi-Transparent Resin Stain Minimum ODFT 1.9 MILS.
      1) 1st Coat Resin Wiping Stain DEFT Int. Stain
      2) 2nd Coat Clear Acrylic DEFT Clear Wood
   e. W-5 Semi-Transparent Resin Stain Minimum ODFT 3.3 MILS.
      1) 1st Coat Resin Wiping Stain DEFT Int. Stain
      2) 2nd Coat Clear Acrylic DEFT Clear Wood
      3) 3rd Coat Clear Acrylic DEFT Clear Wood
   f. W-6 Stained and Water Clear Lacquer Minimum ODFT 3.8 MILS.
      1) 1st Coat Resin Wiping Stain DEFT Int. Stain
      2) 2nd Coat Lacq. Sanding Sealer DEFT WB Sanding Sealer
      3) 3rd Coat Clear Acrylic DEFT WB 109/S
      4) 4th Coat Clear Acrylic DEFT WB 109/S
   g. W-7 Filled and Sealed Floor Finish Minimum ODFT 3.0 MILS.
      1) 1st Coat Paste Filler As recommended by Flooring Manufacturer
      2) 2nd Coat Satin Polyurethane DEFT 26
      3) 3rd Coat Satin Polyurethane DEFT 26
   h. W-8 Velvet Lacquered Finish Minimum ODFT 4.7 MILS.
      1) 1st Coat Lacq. Sanding Sealer DEFT WB Sanding Sealer
      2) 2nd Coat Clear Acrylic DEFT WB 109/S
      3) 3rd Coat Clear Acrylic DEFT WB 109/S
      4) 4th Coat Clear Acrylic DEFT WB 109/S
2. INTERIOR GYPSUM BOARD
   a. DW-1 Flat Latex Minimum ODFT 4.2 MILS.
      1) 1st Coat SPEEDHIDE ZERO (SPH-0) P/S 6-4900XI
      2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
      3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
   b. DW-2 Eggshell Acrylic Non-Blocking Enamel Minimum ODFT 4.0 MILS.

1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
2) 2nd Coat Eggshell 0 VOC (SPH-0) 6-4310XI
3) 3rd Coat Eggshell 0 VOC (SPH-0) 6-4310XI

c. DW-3 Gloss Acrylic Non-Blocking Enamel Minimum ODFT 9.4 MILS.
1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310

d. DW-4 Gloss Epoxy Polyamide (Corrosion Resistant) Minimum ODFT 7.6 MILS.
1) 1st Coat Acrylic Primer SEAL GRIP 17-921
2) 2nd Coat Epoxy Gloss AQUAPON WB-EP 98E-1
3) 3rd Coat Epoxy Gloss AQUAPON WB-EP 98E-1

e. DW-4 WB Semi-Gloss Epoxy (Corrosion Resistant) Minimum ODFT 4.6 MILS.
1) 1st Coat Acrylic Primer SEAL GRIP 17-921
2) 2nd Coat Epoxy Semi-Gloss PITT-GLAZE 16-510
3) 3rd Coat Epoxy Semi-Gloss PITT-GLAZE 16-510

f. DW-5 Semi-Gloss Acrylic Non-Blocking Enamel Minimum ODFT 4.0 MILS.
1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
2) 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
3) 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI

3. INTERIOR CEMENT PLASTER, VENEER PLASTER OR GYPSUM PLASTER

a. P-1 Flat Latex Minimum ODFT 5.4 MILS.
1) 1st Coat Acrylic Primer-Sealer 4-603XI
2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI

b. P-2 Eggshell Acrylic Non-Blocking Enamel Minimum ODFT 5.6 MILS.
1) 1st Coat Acrylic Primer-Sealer 4-603XI
2) 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-5310
3) 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-5310

c. P-3 Gloss Acrylic Non-Blocking Enamel Minimum ODFT 10.6 MILS.
1) 1st Coat Acrylic Primer-Sealer 4-603XI
2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310

d. P-4 Gloss Epoxy Polyamide (Corrosion Resistant) Minimum ODFT 7.6 MILS.
1) 1st Coat Acrylic Primer SEAL GRIP 17-921
2) 2nd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series
3) 3rd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series

e. P-4 WB S/G Epoxy (Corrosion Resistant) Minimum ODFT 4.6 MILS.
1) 1st Coat Acrylic Primer SEAL GRIP 17-921
2) 2nd Coat WB Epoxy Semi-Gloss PITT-GLAZE 16-510
3) 3rd Coat WB Epoxy Semi-Gloss PITT-GLAZE 16-510

f. P-5 Semi-Gloss Acrylic Non-Blocking Enamel Minimum ODFT 5.2 MILS.
1) 1st Coat Acrylic Primer-Sealer 4-603XI
2) 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI / 6-5510
3) 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI / 6-5510

4. INTERIOR CONCRETE OR CONCRETE MASONRY UNITS

a. CB-1 Clear Water Repellent Sealer
1) One Coat Alkyltrialkoxy Silane
a) EVONIK DEGUSSA "Aqua-Trete®CONCENTRATE".
2) Follow manufacturer's recommended coverage rate and installation recommendations for type of substrate to be covered.
3) Provide manufacturer's 10 year warranty for Concrete Masonry Units and Split Faced Concrete Masonry Units.

b. CB-2 Flat Latex - Fine Texture Minimum ODFT 9.9 MILS.
   1) 1st Coat Acrylic Block Filler (SPH-0) 6 - 7
      a) Omit at concrete surfaces.
   2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
   3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI

c. CB-3 Semi-Gloss Acrylic Enamel:
   1) Concrete Masonry Units: Minimum ODFT 9.7 MILS.
      a) 1st Coat Acrylic Block Filler (SPEEDHIDE INT/EXT BLOCK FILL)
      b) 2nd Coat Flat 0 VOC (SPH-0) 6-4510XI
      c) 3rd Coat Flat 0 VOC (SPH-0) 6-4510XI
   2) Concrete Surfaces: Minimum ODFT 4.6 MILS.
      a) 1st Coat Acrylic Primer-Sealer 3210
      b) 2nd Coat Flat 0 VOC (SPH-0) 6-4510XI
      c) 3rd Coat Flat 0 VOC (SPH-0) 6-4510XI

d. CB-4 Color High-Gloss Polyamide Epoxy:
   1) Concrete Masonry Units: Minimum ODFT 15.6 MILS.
      a) 1st Coat W/B Epoxy Block Fill SPEEDHIDE HI-FILL INT/EXT BLOCK FILL
      b) 2nd Coat Acrylic Primer SEAL-GRIP 17-921
      c) 3rd Coat Epoxy Gloss AQUAPON WB EP 98E-1
      d) 4th Coat Epoxy Gloss AQUAPON WB EP 98E-1
   2) Concrete Surfaces: Minimum ODFT 7.6 MILS.
      a) 1st Coat Epoxy Primer SEAL-GRIP 17-921
      b) 2nd Coat Epoxy Gloss AQUAPON WB EP 98E-1
      c) 3rd Coat Epoxy Gloss AQUAPON WB EP 98E-1

e. CB-4 Color WB Semi-Gloss Epoxy:
   1) Concrete Masonry Units: Minimum ODFT 15.6 MILS.
      a) 1st Coat W/B Epoxy Block Fill SPEEDHIDE 6-15
      b) 2nd Coat Epoxy Primer SEAL-GRIP 17-921
      c) 3rd Coat Epoxy S/G PITT-GLAZE 16-510
      d) 4th Coat Epoxy S/G PITT-GLAZE 16-510 DFT 3.0 mils.
   2) Concrete Surfaces: Minimum ODFT 7.6 MILS.
      a) 1st Coat Epoxy Primer SEAL-GRIP 17-921
      b) 2nd Coat Epoxy S/G PITT-GLAZE 16-510
      c) 3rd Coat Epoxy S/G PITT-GLAZE 16-510

f. CB-5 Clear High-Gloss Polyamide Epoxy Minimum ODFT 5.0 MILS.
   1) 1st Coat Epoxy Gloss MONOPOLE Permashield 200
   2) 2nd Coat Epoxy Gloss MONOPOLE Permashield 200

5. INTERIOR METALS
   a. PRIMER NOTE: Metals that are shop primed shall be considered "un-primed" and shall be primed with appropriate primer and thicknesses listed below:
      1) Ferrous Metal:
         a) PPG PITT-TECH PLUS 4020 "Red" Mult-Purp. Metal Primer DFT 3.0 mils.
      2) Non-Ferrous Metal, Galvanized Metal or Aluminum:
         a) PPG PITT-TECH PLUS 4020 "White" Mult-Purp. Metal Primer DFT 3.0 mils.
   b. COIL-COATED PRODUCTS NOTE: Metal products primed with coil-coated products are to be assumed to be "un-primed" products and shall be additionally coated (or primed again) as follows:
      1) Coil-Coated Products:

a) Field apply manufacturer's recommended primer coat and mil thickness over entire surface compatible with substrate finish and finish coats indicated on paint schedule.

c. M-1 Flat Latex Minimum ODFT 5.8 MILS.
1) 1st Coat Primer See primer note above.
2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI

d. M-2 Semi-Gloss "Ultra Color" Industrial Acrylic Minimum ODFT 11.0 MILS.
1) 1st Coat Primer See primer note above.
2) 2nd Coat Acrylic Semi-Gloss DEVFLEX 4216
3) 3rd Coat Acrylic Semi-Gloss DEVFLEX 4216

e. M-3 Gloss "Ultra Color" Waterborne Acrylic Minimum ODFT 11.0 MILS.
1) 1st Coat Primer See primer note above.
2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310

f. M-4 Semi-Gloss Epoxy Polyamide Minimum ODFT 6.0 MILS.
1) 1st Coat Primer See primer note above.
2) 2nd Coat Epoxy Semi-Gloss PITT-GLAZE 16-510
3) 3rd Coat Epoxy Semi-Gloss PITT-GLAZE 16-510

g. M-5 Gloss Epoxy Polyamide Minimum ODFT 4.6 MILS.
1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
2) 2nd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series
3) 3rd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series

h. M-5 Water Base S/G Epoxy (Corrosion Resistant) Minimum ODFT 7.6 MILS.
1) 1st Coat Acrylic Primer SEAL GRIP 17-921
2) 2nd Coat WB Epoxy S/G PITT-GLAZE 16-510
3) 3rd Coat WB Epoxy S/G PITT-GLAZE 16-510

i. M-6 Flat Waterborne Paint Minimum ODFT 4.4 MILS.
1) 1st Coat Flat Dry Fall Prime SUPER TECH 6-726XI
2) 2nd Coat Flat Dry Fall Finish SUPER TECH 6-726XI

j. M-7 Semi-Gloss Waterborne Paint Minimum ODFT 4.4 MILS.
1) 1st Coat S/G Dry Fall Primer SUPER TECH 6-724XI
2) 2nd Coat S/G Dry Fall Finish SUPER TECH 6-724XI

Primarily used on items that will have minimal contact.

k. M-8 Satin Industrial Acrylic Minimum ODFT 11.0 MILS.
1) 1st Coat Primer See primer note above.
2) 2nd Coat Acrylic Satin PITT-TECH PLUS 90-1110
3) 3rd Coat Acrylic Satin PITT-TECH PLUS 90-1110

6. INTERIOR ACOUSTICAL TILE

a. A-1 Matte Flat Vinyl Acrylic Minimum ODFT 1.3 MILS.
1) 1st Coat Flat Vinyl Acrylic PRO-EV 0-VOC 12-110

F. EXTERIOR PAINT FINISHES

1. EXTERIOR WOOD

a. EW-1 Flat 100 percent Acrylic Minimum ODFT 6.0 MILS.
1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
3) 3rd Coat 100 percent Acrylic Flat 72-Series

b. EW-2 Semi-Gloss 100 percent Acrylic Minimum ODFT 5.6 MILS.
1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
2) 2nd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
3) 3rd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series

c. EW-3 100 percent Acrylic Resin (A/R) Stain Minimum ODFT 3.0 MILS.
   1) 1st Coat 100 percent A/R Stain Coat FLOOD SWF
   2) 2nd Coat 100 percent A/R Stain Coat FLOOD SWF

2. EXTERIOR SOFFIT BOARD
   a. ESB-1 Lo-Sheen 100 % Acrylic Resin (A/R)-Heavy Stipple Minimum ODFT 5.8 MILS.
      1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
      2) 2nd Coat 100 percent Acrylic SUNPROOF SATIN 76-Series
      3) 3rd Coat 100 percent Acrylic SUNPROOF SATIN 76-Series
      4) *Note: 2nd Coat to have medium size aggregate added to achieve heavy stipple texture.
3. EXTERIOR CEMENT PLASTER
   a. EP-1 Flat 100 percent Acrylic Minimum ODFT 7.0 MILS.
      1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
      2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
      3) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
   b. EP-2 Semi-Gloss 100 percent Acrylic Minimum ODFT 6.6 MILS.
      1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
      2) 2nd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
      3) 3rd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
   c. EP-3 Gloss Styrene Acrylic Minimum ODFT 5.6 MILS.
      1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
      2) 2nd Coat Gloss ADVANTAGE 900 INT/EXT STYRENE ACRYLIC GLOSS
      3) 3rd Coat Gloss ADVANTAGE 900 INT/EXT STYRENE ACRYLIC GLOSS
   d. EP-4 Smooth Elastomeric, Lo Sheen Acrylic/Resin (A/R) Minimum ODFT 11.9 MILS.
      1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
      2) 2nd Coat Smooth Elastomeric PITT-FLEX 4-110
         a) Spray and Backroll
      3) 3rd Coat 100 percent Acrylic Resin Semi Gloss 76-Series
   e. EP-5 Satin Elastomeric, S/G Acrylic/Resin (A/R) Minimum ODFT 11.8 MILS.
      1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
      2) 2nd Coat Matte Flex Elastomeric PITT-FLEX 4-110
         a) Spray and Backroll
      3) 3rd Coat 100 percent Acrylic semi-gloss SUNPROOF SEMI-GLOSS 78-Series
   f. EP-6 Coarse Elastomeric, Satin Acrylic/Resin (A/R) Minimum ODFT 11.8 MILS.
      1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
      2) 2nd Coat Elastomeric Finish 4-110
         a) Spray and Backroll
      3) 3rd Coat 100 percent Acrylic Satin SUNPROOF SATIN 76-Series
4. EXTERIOR CONCRETE OR CONCRETE MASONRY UNITS:
   a. ECB-1 Clear Water Repellent Sealer:
      1) One Coat Alkyltrialkoxy Silane:
         a) EVONIK DEGUSSA "Aqua-Trete®CONCENTRATE".
      2) Provide manufacturer's 10 year warranty for Concrete Masonry Units and Split Faced Concrete Masonry Units.
   b. ECB-2 Flat 100 percent Acrylic Minimum ODFT 11.5 MILS.
      1) 1st Coat W/B Acrylic Block Filler SPEEDHIDE 6-7

a) Omit at concrete surfaces

2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series

3) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series

c. ECB-3 Flat 100 percent Acrylic Minimum ODFT 5.5 MILS.

1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI

2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series

3) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series

5. EXTERIOR METAL

a. PRIMER NOTE: Metals shop primed shall be considered “un-primed and shall be primed with appropriate primer and thicknesses listed below:

1) Ferrous Metal, Type 1 Typical:

a) PITT TECH PLUS 4020 "Red" Multi-Purpose Metal Primer DFT 3.0 mils.

2) Ferrous Metal, Type 2 as specified in Specification Section – STEEL AND FABRICATIONS:

a) AMERCOAT 68HS Reinforced Inorganic Zinc-Rich Urethane Metal Primer DFT 5.0 mils.

3) Ferrous Metal, Type 3 when Urethane is used as a finish:

a) AMERLOCK 2VOC/400 VOC Epoxy Metal Primer DFT 6.0 mils.

4) Non-Ferrous Metal, Type 4 Galvanized Metal or Aluminum:

a) PITT TECH PLUS "White" Multi- Purpose Metal Primer DFT 3.0 mils.

5) Non-Ferrous Metal, Type 5 Galvanized Metal or Aluminum, when Urethane is used as a finish.

a) AMERLOCK 2VOC/400 VOC Epoxy Metal Primer DFT 6.0 mils.

b. COIL-COATED PRODUCTS NOTE: Metal products primed with coil-coated products are to be assumed to be unprimed products and shall be re-primed as follows:

1) Coil-Coated Products:

a) Field apply manufacturer's recommended primer coat and mil thickness over entire surface compatible with substrate finish and finish coats indicated on paint schedule.

c. EM-1 Flat 100 percent Acrylic Minimum ODFT 7.4 MILS.

1) 1st Coat Primer See primer notes above.

2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series

3) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series

d. EM-2 Semi-Gloss "Ultra Color" 100 percent Acrylic Minimum ODFT 7.2 MILS.

1) 1st Coat Primer See primer notes above.

2) 2nd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series

3) 3rd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series

e. EM-3 Gloss "Ultra Color" 100 percent Acrylic WaterborneMinimum ODFT 11.0 MILS.

1) 1st Coat Primer See primer notes above.

2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310

3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310

f. EM-4 Gloss "Ultra Color" Aliphatic Acrylic Urethane (A/A/U) Finish, Spray Applied, Deep Tone, Custom Color Minimum ODFT 16.0 MILS.

1) 1st Coat Primer See primer notes above.

2) 2nd Coat A/A/U Gloss Color AMERSHIELD VOC

3) 3rd Coat A/A/U Gloss Color AMERSHIELD VOC

g. EM-5 Gloss "Ultra Color" Aliphatic High Solids Finish, Spray Applied, Deep Tone, Custom Color with clear protective coats Minimum ODFT 18.0 MILS.

1) 1st Coat Primer See primer notes above
2) 2nd Coat A/A/U Gloss Color AMERSHIELD VOC
3) 3rd Coat A/A/U Gloss Color AMERSHIELD VOC
4) 4th Coat A/A/U Gloss Clear AMERSHIELD VOC
5) 5th Coat A/A/U Gloss Clear AMERSHIELD VOC

h. EM-6 Semi-Gloss "Ultra Color" Aliphatic Urethane (A/U) Finish, Spray Applied, Deep Tone, Custom Color Finish Minimum ODFT 20.0 MILS.
1) 1st Coat Primer See primer notes above.
2) 2nd Coat A/A/U Semi-Gloss AMERCOAT 240
3) 3rd Coat A/A/U Semi-Gloss AMERSHIELD VOC

G. SPECIALTY PAINT FINISHES:
1. PROVIDE SPECIALTY PAINT FINISHES AS SHOWN OR AS FOLLOWS:
a. **Finish No. X-1:** Minimum ODFT 15.0 MILS.
1) Lines on Concrete or Asphaltic Concrete Paving Exit and Entrance Signs - 10" width lines, maximum. Reflectorize as required.
2) PPG ZoneLine
b. **Finish No. X-2:** Minimum ODFT 15.0 MILS.
1) Lines on Walk Top. Colors as selected by Architect.
2) PPG ZoneLine
c. **Finish No. X-3:** Minimum ODFT 2.2 MILS.
1) Space above Vents or Grilles.
2) 1st Coat 100 percent Acrylic Flat Black 72-Series
d. **Finish No. X-4:** Minimum ODFT 7.0 MILS.
1) Piping Black Steel or Cast Iron.
2) 1st Coat Multi-Purpose Metal Primer:
a) PITT TECH PLUS 4020 "Red"
3) 2nd Coat Acrylic Gloss Finish 2406G
e. **Finish No. X-5:** Minimum ODFT 7.0 MILS.
1) Piping Galvanized.
2) 1st Coat General Purpose Metal Primer.
a) PITT TECH PLUS 4020 "White"
3) 2nd Coat Gloss Enamel Finish:
a) PITT TECH PLUS 90-1310
f. **Finish No. X-6:** Minimum ODFT 11.0 MILS.
1) Machinery and Equipment (Coil Coated Products):
2) 1st Coat General Purpose Metal Primer:
a) PITT TECH PLUS 4020 "White"
3) 2nd Coat Gloss Enamel PITT TECH PLUS 90-1310
4) 3rd Coat Gloss Enamel PITT TECH PLUS 90-1310
g. **Finish No. X-7:** Minimum ODFT 7.0 MILS.
1) Sheet Metal Ducts:
2) 1st Coat General Purpose Metal Primer:
a) PITT TECH PLUS 4020 "White"
3) 2nd Coat 100 percent Acrylic Flat:
a) PITT TECH PLUS 90-1310
h. **Finish No. X-8:** Minimum ODFT 7.0 MILS.
1) Fire Hydrants:
2) 1st Coat General Purpose Metal Primer
a) PITT TECH PLUS 4020 "White"
3) 2nd Coat 100 percent Acrylic Flat
a) PITT TECH PLUS 90-1310
i. **Finish No. X-9:** Minimum ODFT 7.4 MILS.

1) Following items listed will receive Finish No. X-9 (including, but not limited to), Louvers, Grilles, or Access Panels.
2) 1st Coat General Purpose Metal Primer:
   a) PITT TECH PLUS 4020 "White"
3) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
4) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series

j. **Finish No. X-10:** Minimum ODFT 1.9 MILS.
1) Striping under Acoustical Board Surrounding Structure:
2) 1st Coat 100 percent Acrylic Flat Black SUNPROOF FLAT 72-Series

k. **Finish No. X-11:** Minimum ODFT 2.2 MILS.
1) Acoustical Board and Exposed Striping and Structural:
2) 1st Coat 100 percent Acrylic Flat Black SUNPROOF FLAT 72-Series

l. **Finish No. X-12:**
1) Minimum ODFT as recommended by graffiti coating manufacturer.
2) Graffiti Coating, non-toxic, liquid, sacrificial wax-based Coating:
3) 1st Coat Graffiti Coating:
   a) Graffiti-Pruf by VISUAL POLUTION TECH, INC.
4) 2nd Coat Graffiti Coating:
   a) Only if recommended by manufacturer for substrate material type.
   b) Graffiti-Pruf by VISUAL POLUTION TECH, INC.

m. **Finish No. X-13** (NOT APPLICABLE).

n. **Finish No. X-14** (NOT APPLICABLE).

o. **Finish No. X-15:**
1) Clear Graffiti Coating, non-toxic, liquid, multi-polymer, non-sacrificial, single component sealer by BASF, or approved equivalent: One Coat
   a) **NOTE #1:** Test a small area of the existing substrate in an out-of-the-way spot, as determined by the Architect, for compatibility. Inform the Architect if an incompatibility is found for further direction. If found to be compatible, proceed as follows:
2) 1st Coat Clear, flat matte coat TAGGUARD by BASF.
   a) **NOTE #2**: Follow manufacturer's recommendations for proper installation over various substrates. Applicator must be certified by the manufacturer as an approved applicator for this product over various substrate materials. Protect at least 24 hours minimum the treated surface until manufacturer's recommended curing time has been achieved against graffiti.
3) REMOVAL COAT TAGGUARD Cleaner.
   a) **NOTE #3:** Provide remover in small containers equal to 8-16 oz. containers of material for the Owner's use. Instruct the designated representative of the Owner as to proper application of the remover, and all procedures for removing graffiti.

p. **Finish No. X-16:** Non-sacraficial, aqueous, silane chemistry, ready-to-use, zero VOC high performance anti-graffiti treatment for masonry, concrete and natural stone, dries clear and will not yellow.
1) Follow manufacturer's printed recommendations prior to use.
2) Do not apply to wet surfaces. If surface is wet, let dry for a minimum of 24 hours prior to application. Do not use if temperature is below 40 degrees F or above 100 degrees F.
3) Protect non-porous surface substrates from overspray. Always do a test patch to confirm the treatment before using to deterimine if there is any problems prior to full coverage of the porous surfaces.

4) Concrete shall be allowed to cure a minimum of 28 days. All pointing or re-pointing shall be completed and allowed to cure for at least 3 days prior to coverage. All patching materials, caulking, sealing materials and traffic paint shall be fully cured before application.
5) 1st Coat Clear, flat matte coat PROTECTOSIL ANTIGRAFFITI.
   a) 175 to 250 sq. ft. per gallon, diluted by 14 parts of water, using a 1" nap roller.
6) 2nd Coat Clear, flat matte coat PROTECTOSIL ANTIGRAFFITI.
   a) 175 to 250 sq. ft. per gallon, un-diluted, using a 1" nap roller.
7) 3rd Coat Clear, flat matte coat PROTECTOSIL ANTIGRAFFITI.
   a) 175 to 250 sq. ft. per gallon, un-diluted, using a 1" nap roller.
   b) 3rd Coat shall always be figured in as part of the Base Bid. 3rd Coat may be deleted if it is determined by all concerned that the two coats were sufficient to protect the surfaces. If not needed, then figure on a credit back to the Owner.
8) Most graffiti removal can be achieved with standard non-hazardous cleaners and low-pressure waterblasting. Contact manufacturer for stubborn markings for removal.

q. **Finish No. X-17:** Non-sacraficial, 100 percent active silane treatment with oleophobic additive, clear penetrating breathable VOC Compliant (400 g/L) surface treatment for use on concrete, brick masonry, concrete masonry units and natural stone.
1) For flat (horizontal) concrete walks.
   a) Manufacturer's printed recommendations for rate of coverage, and type of application method to protect porous surfaces from graffiti and for ease of walk-way clean-up.
   b) Follow manufacturer's printed recommendations prior to use.
   c) Do not apply to wet surfaces. If surface is wet, let dry for a minimu of 24 hours prior to application. Do not use if temperature is below 40 degrees F or above 100 degrees F.
   d) Protect non-porous surface substrates from overspray. Always do a test patch to confirm the treatment before using to deterimine if there is any problems prior to full coverage of the porous surfaces.
   e) Concrete surfaces shall be allowed to cure a minimum of 28 days. All pointing or re-pointing shall be completed and allowed to cure for at least 3 days prior to coverage. All patching materials, caulking, sealing materials and paint shall be fully cured before application.
2) 1st Coat Clear, flat matte coat PROTECTOSIL BHN PLUS.

r. **Finish No. X-18:** Non-sacraficial, Graffiti Coating, non-toxic, liquid, semi-permanent, acrylic based Coating - Minimum ODFT as recommended by graffiti coating manufacturer.
1) For application on sealed surface, including but not limited to CMU scheduled to be sealed, verify compatibility with sealer manufacturer prior to application of Sealer.
   a) Only if recommended by manufacturer for substrate material type.
   b) For application on natural porous surface, thin first coat with 40 percent water. All other coats shall be full strength.
2) 1st Coat Graffiti Coating TSW4.
3) 2nd Coat Graffiti Coating TSW4.
4) 3rd Coat Graffiti Coating TSW4.
5) 4th Coat Graffiti Coating TSW4.
6) Provide Manufacturer's recommended TSW2G Graffiti Removal Kit.

s. **Finish No. X-19:** Intumescent Paint - Minimum ODFT per fire rating required.
1) Primer: Per manufacturer's Written Recommendations, ODFT as required.

2) 1st Coat Water Based Polymer, ISOLATEK INTERNATIONAL "CAFCO Spray Film WB3" for Interior Spaces and CAFCO Spray Film WB4" for Exterior Spaces.
3) 2nd Coat As required if needed - no greater than 62 mils per coat.
4) 3rd Coat As required if needed - no greater than 62 mils per coat.
5) 4th Coat Premium Exterior Latex Semi-Gloss GL68XX in thickness as recommended by manufacturer, and in color as selected by the Architect.

t. **Finish No. X-20:** Pool Paint High Gloss Epoxy - Minimum ODFT Approximately 3.6 mils.
1) Primer: RAMUC "Clean and Prep Solution" per manufacturer's Written Recommendations
2) 1st Coat Pool Paint by RAMUC
3) Finish Coat Pool Paint by RAMUC

u. **Finish No. X-21:** "Ceramic Carpet" Flooring System
1) Fresno Unified School District Standard.
2) Surface Preparation:
   a) Refer to Specification Section - VAPOR ALKALINITY CONTROL and manufacturer's written instructions.
   b) Provide shot-blasted or mechanically abraded surfaces (CSP-4-9).
   c) Prepare any metal substrates per SSPC-SP10 "Near White Metal".
   d) Threshold preparation: Key in material for flush transition.
3) SHERWIN WILLIAMS / General Polymers, 1/4" Thick "Ceramic Carpet" Flooring System:
   a) 1st Coat - Primer: SHERWIN WILLIAMS GP3477 Epoxy Water Emulsion Primer / Sealer (Part A and Part B).
   b) 2nd Coat - Slurry: SHERWIN WILLIAMS Fastop Urethane Slurry 12S-GP4080 with 55lbs GP 5080 aggregate per 1.8-gallon kit. Applied at 3/16, 5900F aggregate broadcast to excess approx. 0.6 lbs. per sq. ft.
   c) 3rd Coat - Broadcast Alum Oxide: SHERWIN WILLIAMS GP 3744 applied at 100 sq ft per gallon with 5900F aggregate broadcast to excess approx. 0.6 lbs. per sq. ft.
   d) 4th Coat - Grout Coat: GP 3744 applied at 100 sq. ft per gallon.
   e) 5th Coat - Finish Coat: GP 3744 applied at 100 sq. ft per gallon
4) Coved Bases: Extend the "Ceramic Carpet" Flooring System up the coved base, to an extent 6" minimum above the finish floor. Terminate the cove material at an existing grout joint, or at the top of the coved wall base.

END OF SECTION

SECTION 100500 – MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provision for and installation of specialty and built-in items required for this Work as indicated on the Drawings.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 05 12 00 STEEL AND FABRICATIONS
   6. 05 30 00 METAL DECK
   7. 06 10 00 ROUGH CARPENTRY
   8. 06 22 00 MILLWORK
   9. 06 41 23 MODULAR CASEWORK
   10. 07 60 00 SHEET METAL
   11. 08 11 10 METAL DOORS AND FRAMES
   12. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   13. 08 56 59 SERVICE WINDOWS
   14. 08 70 00 HARDWARE
   15. 08 80 00 GLASS
   16. 09 11 00 METAL FRAMING
   17. 09 24 00 CEMENT PLASTER
   18. 09 29 00 GYPSUM BOARD
   19. 09 50 00 ACOUSTICAL CEILINGS
   20. 09 65 10 RESILIENT BASE AND ACCESSORIES
   21. 09 65 16 RESILIENT SHEET
   22. 09 65 19 RESILIENT TILE
   23. 09 72 00 WALL COVERINGS
   24. 09 91 00 PAINTING
   25. 10 26 00 WALL AND CORNER GUARDS
   26. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   27. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete and operable system of all products or systems listed within this specification section. Any items not specifically noted but necessary for a complete and operable product or system shall be provided under this section.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Shop Drawings:
a. Submit Shop Drawings and catalog cuts to the architect showing all details of installation and assembly and all requirements for work by other trades.
2. Product Data:
a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Storage and protection:
1. Use all means necessary to protect all specialty items before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacements:
1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

1.5 PROJECT CONDITIONS

A. Existing Conditions:
1. Surface Conditions:
a. Coordination: Coordinate with all other trades as required to ensure proper and adequate provision in framing and wall finish for the installation of the selected specialties in the locations required.
2. Inspection:
a. Prior to Installation, inspect all specific locations and verify that all necessary provisions have been made.
b. In the event of discrepancy, immediately notify the Architect.
c. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.6 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period Five (5) years.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all specialty items where indicated on the Drawings and in full accordance with all pertinent regulations and the manufacturer's written recommendations, anchoring all components firmly in place for long life under hard use, and in accordance with IR (Interpretation of Regulations, "Division of the State Architect• ")Manual.

3.2 ADJUSTING

A. Upon completion of the installation, and as a condition of its acceptance, visually inspect the entire work of this Section, adjust all components for proper alignment and use, and touch up all abrasions and scratches to make them completely invisible.

3.3 SCHEDULES

A. All items shall be as scheduled or approved equivalent items as set forth in the Substitution Section of these specifications, and all provisions of Division 00 - GENERAL CONDITIONS, and the sections of Division 01.

B. Appliances:
1. These products listed herein establish the size, pattern, color range and function (including accessibility requirements) selected by the Architect for this Project. The listed acceptable alternative manufacturers or substitutions and their products must still comply with the requirements of this project in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers, substitutions and the products listed that are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
2. Specified dishwasher product manufacturer:
   a. KENMORE Model #12333.
      1) Voltage 120V.
      2) Dishwasher Features:
         a) Controls "Up-Front" for accessibility.
         b) Adjustable height to fit under accessible counter top (32-1/2" - 34-7/8")
         c) Stainless Steel Interior.
         d) Stainless Steel Exterior.
         e) Short delay and Time running display.
      3) Acceptable alternative dishwasher manufacturers:
         a) General Electric
         b) Maytag

3. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

C. Bicycle Lockers:
1. "Single Bike Locker BV-1" as manufactured by HUNTCO SITE FURNISHINGS.
   a. Dimensions
      1) 75"• Length
      2) 39"• Width
      3) 48"• Height
   b. Capacity: 1 bicycle.
   c. Construction Material: 16-gage steel.
   d. Hinges: Stainless steel piano style hinges.
   e. Hardware: Stainless steel pistol-grip style handle with "U" lock Box.
   f. Perforation Patterns: Custom perforated pattern as selected by Architect.
   g. Mounting: Surface mount vertically adjusting stainless steel feet for leveling and bolting to concrete.
   h. Finish: Factory applied powder coat finish.
      1) Color: As selected by the Architect from the manufacturers full color line, including any custom colors.
2. Shop Drawings: Indicate materials, dimensions, tolerances, welding, fasteners, hardware, mounting, finish, and accessories.

D. Bird Deterrent Devices:
1. Provide Bird Deterrent Devices from ECOPIC CORP. as distributed through D & S BIRD CONTROL PRODUCTS.
2. Intent is to protect the tops of light poles and prevent Crows and Seagulls from sitting, nesting or roosting without harming them.
   a. Provide Model Number that is appropriate to the shape and will cover the tops of light poles that will not interfere with the proper operation or ventilation of the light fixtures atop the poles. Attach with Structural Silicone after properly preparing the surface for silicone adhesion.

E. Dimensional Letters:
1. "Cast Letters":
   a. Provide and install, where shown on the drawings, Dimensional Letters as manufactured by GEMINI SIGN PRODUCTS,, or approved equivalent.
      1) Dimensional Letters shall be Solid Cast Aluminum Alloy.
      2) Letters shall be 1/2-inch thick and 6" high, Microgramma Bold, extended with 1-1/2 inch to 1-13/16 inch stroke.
      3) Dimensional Letters shall have a "Baked Enamel" finish to match color chip provided by the Architect.
   b. Letters shall be mounted with stud with spacer mount for 1/2-inch clearance
   c. Coordinate solid wood backing at location receiving Dimensional Letters.
      1) Submit a sample Dimensional Letter and mounting device in the finish selected. Approval by the Architect is required prior to fabrication and installation of all other letters. Sample, upon approval of the Architect, may be incorporated into the work.
2. "Cut and Fabricated Letters":
   a. Provide and install, where shown on the drawings, Dimensional Letters as manufactured by GEMINI SIGN PRODUCTS, or approved equivalent.
      1) Dimensional Letters shall be fabricated from #304 Stainless Steel with 18-gage "Cut and Fabricated" letters and 22-gage backer plate.

2) Letter style shall be a "Cut and Fabricated"10" high or 4" high by 2" thick (unless otherwise noted in the Drawings) "Bank Gothic MD BT", height and stroke as indicated on the drawings.
3) Letters shall have straight edges and buckle free faces.
4) Dimensional Letters shall have #4 Satin Stainless Steel finish.

b. Mounting:
1) Bottom mounted letters shall be mounted with engineered studs.
2) Face mounted letters shall be mounted with stud and spacer for 1/2" clearance.

c. Coordinate backing at location receiving Dimensional Letters.
1) Submit a sample Dimensional Letter and mounting device in the finish selected. Approval by the Architect is required prior to fabrication and installation of all other letters. Sample, upon approval of the Architect, may be incorporated into the work.

3. "Resin Letters":
a. Manufacturer: 3-FORM "Chroma", or approved equal.
b. Material: Resin Panels
c. Size: 4'x8' Sheet Custom Cut, Refer to Drawings
d. Thickness: 1/2"
e. Finish: Vellum
f. Hardware: Hidden Point Adapter
g. Installation: Per Manufacturers Written instructions and recomendations.

F. Expansion Joint Closure:
1. Provide and install, as shown on the Drawings, aluminum and vinyl expansion joint closures as manufactured by ARCHITECTURAL ARTS MANUFACTURING, INC. for walls and ceilings.
2. Expansion joint closures shall be types as indicated on Drawings with clear anodized finish:
a. A20-38-11.
b. A20-18-11.
c. K20-32-11.
3. The system shall show a constant face dimension completely around the opening to be closed, with corners mitered.

G. Lock Box: Provide Rapid Entry System Recessed Lock Box as manufactured by KNOX CO. Model #3200-R, Heavy-Duty, Medium Capacity, holds 10 keys maximum, 4" W x 5" H x 3-1/4" D.
a. Door shall be 1/2" steel plate with neoprene weather seal, has 3-point locking and heavy stainless steel lock cover.
b. Housing shall be 100% welded 1/4" plate steel.
c. Finish shall be Aluminum polyester powder coat with undercoat primer.
d. Unit shall include a door tamper switch to connect to the building alarm system.
e. Color: Aluminum
f. Mounting: Recessed Mounted into plaster wall.

H. Metal Louver Wall System:
1. Manufacturer: B&N INDUSTRIES or approved equivalent: Paragon V Elec Metal louver wall system.
2. Product: Fortina
3. Profile :TLKS-5015
4. Back Rail: CLKU-50
5. Attachment: Direct

6. Size: Refer to drawings.
7. Accessories:
   a. Provide matching Endcaps.
   b. Include all necessary accessories or components to provide a complete installation.
8. Finish: To be selected from Manufacturers standard colors. Refer to Interior Color Schedule
9. Install according to manufacturer's written instructions and recommendations for direct attachment.
   a. Refer to drawings.

I. Projection Screen:
1. Heavy-Duty Motorized:
   a. Provide unit with screen size 9' x 12', recessed installation in the ceilings, "Rollermatic" screens by DRAPER SHADE AND SCREEN CO., INC. or approved equivalent. Verify with manufacturer overall housing dimension 9-5/8" by 168" by 9-5/8" deep All screens shall be electrically operated, 60 cycle, 110-120 volt AC motor to be 3 wire, instantly reversible, designed specifically for the purpose, with lifetime lubrication. Screens shall be equipped with internal thermal over-load protector, and mechanical brake. Motor to be mounted on rubber vibration insulators, and to have pre-set but easily accessible limit switches. The entire drive unit must be easily removable from case. Three-position control switch shall stop or reverse screen at any point in its operating cycle. Controls to be furnished complete with box and cover plate. Roller to be heavy gage metal 5" O.D. Zinc plated roller brackets to have double row radial ball bearings. Viewing surface to be fiberglass matt white (glass beaded), fire retardant and mildew resistant. Wood case, with hinged panel for motor compartment, finished with primer coat of paint. Motor compartment to be metal lined. Bottom of case to be fully enclosed except for slot allowing fabric passage. Steel mounting brackets shall be at least 1/4 inch thick and wrap under bottom edge of case. Entire unit shall be listed by UL, Inc., and shall bear the UL label.

J. Projector Support Panel:
1. Model No. CMA455 "Suspended Ceiling Tile Reinforcing Kit" as manufactured by CHIEF MANUFACTURING, INC. Include all necessary accessories or components to provide a complete installation.
2. UL Listed.
3. Size: 1.1" X 23.8" X 23.8".
4. Color: White.
5. Provide one 10 foot safety cable, so foot strand wire, two outlet knockouts, four turnbuckles, wood eye bolts and concrete anchors.
6. Install according to manufacturer's written instructions and recommendations.
   a. Panel shall be installed in place of 2 foot x 2 foot ceiling tile.
   b. Secure to the structure above with four tie wires.

K. Stair Stripping:
1. Adhesively Applied Striping for the Visually Impaired:
   a. Provide SETON:

1) "Setonwalk Anti-Slip Tape" two (2) inch wide adhesively applied striping in colors contrasting from the stair tread surface as selected by the Architect from manufacturer's standard "Red, Brown, Yellow or Black" colors. Tape shall be provided with manufacturer's durable grit surface and comply with OSHA 1910.265 (3) (iv) and CBC Section 1123A.5. Install the self adhesive 2" wide strip not more than 1-inch from the nosing of each step with a color contrasting against each step.

L. "Unistrut" Support System:

1. UNISTRUT CHANNEL SYSTEM - The metal framing shall be by UNISTRUT CORPORATION or approved equivalent. Provide Model #P 5500 (and #P 3300SL - Stainless Steel) channels or as noted on the Drawings. Channels shall be 1-5/8" wide with 7/8" continuous slot opening and with in-turned edges to engage spring mounted gripping nuts. Nuts shall be made of hardened steel with serrated grooves to prevent longitudinal movement. Fittings shall be accurately formed from 1/4" thick steel. Channels and fittings shall be cleaned, phosphated and coated with a rust inhibiting custom color enamel paint. Hardware shall be zinc plated in accordance with ASTM B 633 “Specification for Electrodeposited Coatings of Zinc on Iron and Steel , Type SC-1.
2. Materials used in the manufacture of framing components shall be in accordance with the following:
   a. Channel Members in accordance with ASTM A 1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength", SS Grade 33.
   b. Fittings in accordance with ASTM A 575 "Specification for Steel Bars, Carbon, Merchant Quality, M-Grades".
   c. Fitting Steel conforms to ASTM A 1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength", SS Grade 33.
   d. Channel Nuts in accordance with ASTM A 675 "Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties", Grade 60.
   e. Bolts in accordance with ASTM A 1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength• ," SS Grade 33.
   f. Screws, SAE J429 Grade 2, and ASTM A 307 "Specification for Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength".
3. All Nuts and Bolts 1/2 inch in diameter and greater shall be torqued to a minimum of 50 ft-lbs each.
4. Refer to Architectural X Drawings for above ceiling Trapeze Details.

M. Seamless Monitor Wall

SEE END OF SPEC FOR ADDED AD1 REQUIREMENTS

1. Seamless Monitor Wall
   a. Manufacturer: DAKTRONICS or approved equivalent
   b. Model: NPN-6200-2.5MN-1500-BR1-HC-1620X2880
      1) Size: 13.51' high x 24.01' wide
      2) Pixel Pitch: 2.5mm
      3) Matrix: 1620 pixels high x 2880 pixels wide
   c. Accessories:
      1) Daktronics Media Player, 4k Output
         a) Rackmount content server
      2) Provide all accessories and integrated controls to provide a complete installation
   d. Installation: Seamless

1) Install per manufacturers written instruction.
2) Mounting: See Drawings

N. Opaque Graphic Film:
1. Provide and install, where indicated on the drawings, Controltac Graphic Film with Comply Adhesive 180mC as manufactured by 3M, or approved equivalent.
2. General: 2-mil, cast vinyl film field-applied application to glass or painted gypsum board as visual opaque film.
   a. Opacity: Opaque
   b. Adhesive: Pressure-activated with air release channels, Removable with Heat
   c. Liner: Polyethylene-coated paper
   d. Thickness: 2 mil without adhesive, 3-4 mil with adhesive
   e. Color: 10 White
3. Fire Performance: Surface burning characteristics per ASTM E84, Class A:
   a. Flame Spread: 25 maximum.
   b. Smoke Developed: 450 maximum.
4. Custom Number Cutout: Refer to Interior Design Sheets, G6-H/I212 for location, size and font.
5. Installation: Per Manufacturer written instructions

O. Slatwall:
1. Provide and install, where indicated on the drawings, "Wave" 3D Textured Slatewall as manufactured by DIMENSIONAL IMPACT, or approved equivalent.
2. General:
   a. Material: Solid MDF and Engineered Wood.
   b. Panel Size: 24" x 96" x 3/4" Thick, Horizontal Configuration with 6" on Center Slats.
      1) Refer to Drawings.
   c. Accessories: Heavy Duty Aluminum Inserts
   d. Panel Color: White
3. Fire Performance: Class 3 (C)
4. Installation: Per Manufacturer written instructions.

P. Molded Reflectors, Acoustic:
1. Manufacturer: KINETICS NOISE CONTROL
2. Description: Pyramidal Ceiling Sound Diffuser consisting of .0125" thermoformed plastic with fiberglass batt insulation (unfaced R-13) bonded to concave rear surface of diffusers.
3. Diffuser Size, refer to Drawings:
   a. 24"' x 24", Nominal
   b. 48" x 48", Nominal
4. Diffuser Shape: Offset Pyramid, unless otherwise indicated.
5. Diffuser Finish: Field Paintable finish.
6. Diffuser Installation, Refer to Drawings:
   a. Install in accordance with manufacturer's written specifications and recommendations.
   b. Lay-in with 15/16" suspension system, refer to ACOUSTICAL CEILINGS, and Reflection Ceiling Plan for ACT Type.
      1) Edges shall be flanged for laying into a suspension grid.
   c. Suspended per manufacturers written recommendation. See Drawings for Detail.
      1) Factory installed 1-1/2" Steel Angle along inside of Diffuser.
      2) Provide 2" hole drilled out at the apex of each reflector.
7. Surface burning characteristics, per ASTM E84: Class A.

Q. Cable Support Hanger
1. Provide and install vinyl coated steel cable management hook
2. Manufacturer: McMaster-Carr
3. Model: 1730A92
4. Approximate dimensions:
   a. Height: 6"
   b. Depth: 3 3/4"
   c. Width: 1"
5. Weight capacity: 85 lbs.

R. Retail Display Unit
1. Manufacturer: OPTO Systems
2. See drawings for configuration and quanities
3. Model: Edge Post Wall System
   a. Height 8'- 8"
   b. Wall-to-Wall Mount
   c. 24"W Modules
   d. Premier Metal Shelf
   e. Accessory Rail
   f. Straight Arm with (5) hooks for rail
   g. Cubby with Laminated Top/Bottom
4. Colors: Architect to select from manufacturer's full range of offering.

S. Wire Wall Shelving
1. Provide and install where indicated wire shelving.
2. Manufacturer: Metro Shelving.
3. Model: Metro Regular Erecta Shelvings.
   a. Single Shelf
   b. 18" D x 48" W
   c. Chrome Plated Finish
4. Weight capacity 200lb per shelf.
5. Provide and install wall mounts and brackets for complete installation.

T. Trellis:
1. Manufacturer: FEENEY, INC. "Somerset-II Trellis".
2. Wall-Mounted Trellis:
   a. Top and bottom Angle Brackets: 1-1/2 by 1/8 inch powder coated aluminum angles with stand-off blocks; predrilled for mounting hardware and cable installation.
   b. Cables: 1/8 inch diameter, type 316 stainless steel, polished finish, commercial, dry grade; include attachment fittings.
   c. Rods: 1/8 inch diameter, type 316 stainless steel.
3. Accessories: As recommended by manufacturer to secure rods and provide finish details, and as shown on Drawings to mount angle brackets.

END OF SECTION

AD1-SP03 **Refer to Specification Section 100500 MISCELLANEOUS SPECIALTIES.**

3. Refer to Article 3.3, M. Seamless Monitor Wall.
4. Add the following.

Rackmount Content Server
Distributes pre-produced content and real-time data to display(s)
One (1) Daktronics Video Processor:
Daktronics video processor and diagnostics converter
Multiple 1080p inputs, video scaling, 2 channel M/E, TX Video to (RX diagnostics from) display.

AD1-SP04 **Refer to Specification Section 100500 MISCELLANEOUS SPECIALTIES.**

1. Add the following equipment.

Building M, Wash Equipment for PE Laundry Room M133 and M143
Commercial Dryer: Milnor M758V Electric.
Commercial Washer: Milnor 30022 VRJ.
Notes: Anchor frame to concrete floor per manufacturer recommendations

AD2-CPA02 Refer to Addendum 1, Item AD1-SP04 for the Commercial wash equipment. Omit this addendum item.

1. Omit this addendum item. The district will provide and install this equipment.

AD2- CPA01 Refer to Addendum 1, Addendum Item AD1-SP01
Specification Section 01 64 00 OWNER-FURNISHED ITEMS

1. Refer to Article 3.4 SCHEDULES.
2. Add the following item to the list.

	ITEM	STATUS
1.		
a.	***Building M – Practice Gym Scoreboard and Shot Clocks.***	***OFOI***
	1. *Refer to Drawing M/A633*	
	2. *Provide infrastructure and backing for the Practice Gym equipment.*	
	3. *The equipment will be installed in the future by the district.*	
b.	***Building M – Washer and Dryer.***	***OFOI***
	1. *Refer to PE Laundry Rooms M133 & M143*	
	2. *The District will provide and install the following equipment.*	
	3. *G.E. Commercial 7.4 cu. ft. Electric Dryer VTD52EASRWB.*	
	4. *G.E. Commercial 4.2 cu. ft. capacity Washer VTW525ASRWB.*	

AD5-SP02 Refer to Specification Section 10 05 00 – MISCELLANEOUS SPECIALTIES

1. Refer to Article 3.3, E. Dimensional Letter, and revise "3. Resin Letters:" to read as follows:

3. **"Flat Cut Letters":** (or where referred to as "Resin Letters" or "Dimensional Graphic")
    1. Provide and install, where shown on the drawings, Dimensional Letters as manufactured by GEMINI SIGN PRODUCTS, or approved equivalent.
        a. Material: Flat Cut Acrylic.
        b. Logo/Text: Architect to provide digital image. Refer to Drawings.
        c. Finish: Custom Painted. Refer to Drawings
        d. Letter Sheen: Gloss, unless otherwise noted. Digital Print to have clear coat.
        e. Size: Refer to Drawings.
        f. Thickness: 1/4" Thick, Unless Noted Otherwise. Refer to Drawing.
        g. Mounting: Refer to Drawings. Provide Double-Sided Tape and Silicone or hidden fasteners as recommended. Install per manufacturers written recommendation.
        h. Provide accessories required for a complete system.
    2. Submittals in accordance with Part 1 of this Specification Section, and:
        a. Sample each finish selected.
        i. Approval by the Architect is required prior to fabrication and installation of all other letters.
    3. Execution in accordance with Part 3 of this Specification Section, and:
        a. Coordination of mounting condition requirements:
        b. Coordinate backing at location receiving Dimensional Letters.

2. Refer to Article 3, 3.3, Add:

U. Semi-Transparent Film Overlay:
1. Specified Decorative Film Overlay product manufacturer, or approved equivalent:
    a. 3M CRYSTAL Glass Finishes.
2. General: Glass finishes field-applied application to glass or plastic material as visual opaque or decorative film.
3. Film: Vinyl
4. Adhesive: Acrylic, Pressure Sensitive, Permanent
5. Liner: Silicone-coated Polyester
6. Thickness (Film and Adhesive without Liner): Dusted - 3.2 mils (81 microns)
7. Fire Performance: Surface burning characteristics per ASTM E84, Class A:
    a. Flame Spread: 25 maximum.
    b. Smoke Developed: 450 maximum.
8. Custom Graphics with Cutouts: Refer to Drawings. Digital File to be provided by Architect.
9. Installation: Per Manufacturer written instructions

SECTION 101100 – VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to furnish and install Visual display boards and Tackboards, Accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 05 12 00 STEEL AND FABRICATIONS
   5. 06 10 00 ROUGH CARPENTRY
   6. 09 22 16 METAL FRAMING
   7. 09 24 00 CEMENT PLASTER
   8. 09 29 00 GYPSUM BOARD
   9. 09 72 00 WALL COVERINGS
   10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   11. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Samples:
      a. Submit one sample each of Manufacturer's standard finish colors (including standard, premium and custom colors).

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section Regulatory Requirements, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
      b. AIES American and Illuminating Engineering Society.

1.4 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer¢¢s Warranty:

1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified Liquid Marker Board Panel product manufacturers:
      a. EGAN VISUAL "Dimension 13".
         1) EGAN VISUAL Marker Tray ACD
   2. Specified Tack Board Panel product manufacturers:
      a. EGAN VISUAL "Dimension Tack"
   3. Specified Recessed Display Case product manufacturers:
      a. CLARIDGE

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES

2.2 MATERIALS

A. Tack Board ("Dimension Tack"):
   1. Warp-free 3/8" tackable construction, factory mounted on 3/4" lightweight, recycled honeycomb core board, with mounting cleats included.
   2. Tackable Fabric: To be selected from Maharam Grade A.
   3. Size:
      a. Type 1: 72" w x 48" h x 1-1/8"" d, with White Edges - all board edges shall hover 3/8" off the wall.
      b. Type 2: 60" w x 48" h x 1-1/8"" d, with White Edges - all board edges shall hover 3/8" off the wall.
      c. Type 3: 36" w x 48" h x 1-1/8"" d, with White Edges - all board edges shall hover 3/8" off the wall.
   4. Orientation of the installed board panel: As indicated on the drawings.

B. Liquid Marker Board Panel ("Dimension 13"):
   1. "EVS" surface, steel substrate, dry erase and projection capable, and can accept standard magnetic accessories, with a White Edge, with mounting cleats included.
      a. Provide "Flush Finish" for Left or Right End Panels.
      b. Provide standard two (2) assorted color Dry-Erase Markers and one (1) "EganCloth".
   2. Size:

a. Type 1: 96" w x 48" h x 1/2" d, with White Edges - all board edges shall hover 3" off the wall.
b. Type 2: NOT USED.
c. Type 3: 60" w x 48" h x 1/2" d, with White Edges- all board edges shall hover 3" off the wall.

3. Orientation of the installed board panel: As indicated on the drawings.
4. Accessories:
   a. Magnetic Marker Tray: One for each Board.

C. Recessed Display Cases:
1. Model #390, 6' x 10' x 18" deep, as manufactured by CLARIDGE, with four tempered glass sliding display doors with ball bearing rollers, three adjustable tempered glass shelves, three fluorescent down light units with "Plexiglass" diffusers in the top. Finish as selected from manufacturers full list of finsihes
   a. Finishes:
      1) Frame: Powder Coat.
         a) Refer to Interior Color Schedule for Color.
      2) Wood Box: Walnut Oil.
      3) Tackable Back Panels: Claridge Cork.
         a) Refer to Interior Color Schedule for Color.

2.3 FABRICATION

A. Laminate facing sheet and backing sheet to core material under pressure with manufacturer's written recommended flexible, waterproof adhesive.

B. Assembly: Provide factory-assembled visual display board units except where filed-assembled units are required.
1. Make joints only where total length exceeds maximum manufactured length. Fabricate with the minimum number of joints, balanced around the center of ht board, as acceptable to the Architect.
2. Provide the manufacturer's standard vertical joint system between abutting sections of display boards.

2.4 FINISHES

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Deliver factory-built visual display board units completely assembled in one piece without joints, wherever possible. Where dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to the Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.

B. Install units in locations and at mounting heights indicated and in accordance with the manufacturer's written instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for a complete installation.

C. Coordinate with other sections for metal or wood backing.
   1. Contractor to coordinate all blocking required for sizes indicated on Drawings prior to enclosing stud cavities.

D. Install boards top and bottom with wall clips screwed to backing at 24 inches on center at blocking.

3.2 ADJUSTING

A. Verify that accessories required for each unit have been properly installed and that operating units function properly.

3.3 CLEANING

A. Clean units in accordance with the manufacturer's written instructions.

END OF SECTION

SECTION 101400 – IDENTIFYING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Identifying Devices Interlocking Metal Signs, Plastic Signs, Acrylic Signs and Decals, materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 06 10 00 ROUGH CARPENTRY
   6. 08 11 00 METAL DOORS AND FRAMES
   7. 08 14 16 WOOD DOORS
   8. 08 80 00 GLASS
   9. 09 22 16 METAL FRAMING
   10. 09 24 00 CEMENT PLASTER
   11. 09 29 00 GYPSUM BOARD
   12. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   13. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Definitions pertaining to signage are as follows:
   1. Characters Shall mean all letters, numbers, symbols or pictograms.

1.3 SYSTEM DESCRIPTION

A. Design Requirements for Tactile Signage:
   1. Characters and Graphics:
      a. Finish and Contrast: Characters and their background shall have a non-glare finish. Characters shall contrast with their background, either light characters on a dark background or dark characters on a light background – CBC Section 11B-703.5.1, 11B-703.6.2, and 11B-703.7.1.
      b. Character Type: Characters on signs shall be raised 1/32 inch (0.794 mm) minimum and letters and numbers shall be sans serif uppercase characters accompanied by contracted (Grade 2) Braille complying with CBC Section 11B-703.3 and Table 11B-703.3.1.
      c. Character Size: Raised characters (letters and numbers) shall be a minimum of 5/8 inch (15.9 mm) and a maximum of 2 inches (51 mm) high.

d. Pictorial symbol signs (pictograms): Pictorial symbol signs (pictograms) shall be accompanied by the verbal description placed directly below the pictogram. the outside dimension of the pictogram field shall be a minimum of 6 inches (152 mm) in height.

e. Character Placement: Characters and Braille shall be in a horizontal format. Braille shall be placed a minimum of 3/8 inch (9.5 mm) and a maximum of 1/2 inch (12.7 mm) directly below the tactile characters; flush left or centered. When tactile text is multilined, all Braille shall be placed together below all lines of tactile text.

f. Proportions: Raised characters on signs shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I". Stroke thickness of the uppercase "I" shall be 15 percent maximum of the height of the character.

1) For Braille Text, capitalization shall conform to CBC Section 11B-703.3.1.

2. Braille:

a. California Contracted Grade 2 Braille shall be used wherever Braille is required in other portions of these standards. Braille shall accompany all raised characters – CBC Section 11B-703.3 and Table 11B-703.3.1.

1) Dots shall be rounded or domed.

2) Below measured as a minimum in inches and maximum in inches:

3) Dot Base Diameter: 0.059 (1.5 mm) to 0.063 (1.6 mm).

4) Distance between two dots in the same cell: 0.100 (2.5 mm).

5) Distance between corresponding dots in adjacent cells: 0.300 (7.6 mm).

6) Dot Height: 0.025 (0.6 mm) to 0.037 (0.9 mm).

7) Distance between corresponding dots from one cell directly below:

a) 0.395 (10 mm) to 0.400 (10.2 mm).

3. Signs shall be installed on the wall adjacent to the latch side of the door.

a. Where there is no space on the latch side, including at double leaf doors, signs shall be placed on the nearest adjacent wall, preferably on the right.

b. Mounting height shall be as indicated in details on the drawings and in compliance with 11B-703.4.1 and 11B-703.4.2.

4. Inspection: Tactile Signage shall be field inspected after installation per CBC 11B-703.1.1.2.

B. Performance Requirements: It is the intention of this specification section and the drawings to form a guide for a complete, operable system signage system that is compliant with State and Federal Accessibility Regulations. Any items not specifically noted but necessary for a complete, operable and accessible system shall be provided under this section.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Product Data.

a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect within thirty days of receipt of the NOTICE TO PROCEED.

1) Provide actual 2-inch x 2-inch sample colors and patterns available from the manufacturers for color selection.

2. Shop Drawings.

a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work, including accessibility dimensions for mounting heights.

b. Submit drawings indicating Room numbers shown on the Contract Documents coordinated with Owner's Room Numbers.

3. Samples.
   a. Provide actual 2-inch x 2-inch sample of each sign type specified.
4. Quality Assurance/Control Submittals:
   a. Certificates:
      1) Submit four (4) copies of certificates.
      2) Upon completion of the installation, submit a Certificate from the Contractor (on the Contractor's Letterhead) and co-endorsed by the manufacturer/supplier, sub-contractor/installer that the signage supplied for this project requiring braille complies with the California Contracted Grade 2 Braille and the CBC Section 11B-703.3.
         a) Those attesting to the compliance certificate above shall also acknowledge that they are aware of the Submission Under Penalty Of Perjury per California Government Code Section 12650, et seq, pertaining to false claims, and further know and understand that submission of certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.
   b. Manufacturer's Instructions:
      1) Submit three (3) copies of manufacturer's instructions.
5. Closeout Submittals in accordance with the following:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
   c. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
   d. Warranty in accordance with Specification Section - WARRANTIES and this section.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has been approved by the manufacturer.
   2. Manufacturer's/Supplier's Qualifications:
      a. Firm's experienced in successfully producing/supplying products similar to those indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - Regulatory Requirements, and the following:
      a. ADA Americans with Disabilities Act of 1990.
      b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
      c. CBC California Building Code - California Contracted Grade 2 Braille when required.
   2. Inspections: Tactile signs shall be field inspected by the Project Inspector for compliance with the code (11B-703.1.1.2) and installation in accordance with the DSA approved plans.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored in a dry, protected area.
2. Products shall be stored in locked storage building.
3. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   a. Cover materials and protect against wetting prior to use.
   b. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Metal Signs:
   a. KING ARCHITECTURAL PRODUCTS. "KMS Modular Signs".
2. Plastic Signs:
   a. MOHAWK SIGN SYSTEMS.
   b. Acceptable alternative manufacturer:
      1) BEST MANUFACTURING COMPANY.

3. Acrylic Signs:
   a. SIGNS OF SUCCESS, INC.
      1) (805) 925-7545 or www.signsofsuccess.net.
4. Decals:
   a. SETON NAME PLATE COMPANY.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Metal Signs:
1. Exterior:
   a. Extruded aluminum signs with a bonded zinc plate having bonded zinc characters, graphics or Braille dots, capable of handling high heat conditions up to 150 degrees facing due West. Front Plate shall be interchangeable. Front Plate and Back Plate shall have interlocking dovetails with locking strip inserts, and vandal resistant 4-40 "allen" set screw for secure application.
      1) Characters and Pictograms / Symbols:
         a) Style: Helvetica Regular upper case.
         b) Tactile: Raised 1/32" from sign face.
         c) Braille: California Contracted Grade 2 located below lettering.
      2) Perimeter:
         a) Style: 6 mm square fastening profile top and bottom.
         b) Corners: Square.

B. Plastic Signs:
1. Interior:
   a. MP (Melamine Plastic) both sides with contrasting phenolic resin core color. The MP shall be scratch resistant, non-static, fire retardant, washable melamine surface laminate with a non-glare surface with artwork and graphics carved into the face surface.
   b. Performance Requirements:
      1) Weight: 1 lb./sq. Ft.
      2) Maximum Continuous Operating Temperature: -225 degrees F.
      3) Flexural Strength Flat: 25,000 psi.
      4) Tensile Strength: 22,000 psi.
      5) Compressive Strength Flat: 47,000 psi.
      6) Shear Strength: 16,800 psi.
      7) Dielectric Strength Short Time: 330 Volts/Mil.
         a) Per ASTM D 229 "Sheet Plate Electrical Insulation Testing Equipment / Test Resources".
      8) NEMA rating: "Self-extinguishing".
   c. Mylar, Photopolymers and Polymer Materials are not allowed.
   d. "Sand Carved" MP plates (including phenolic core):
      1) Characters and Pictograms/Symbols:
         a) Style: Tactile Helvetica Regular upper case.
         b) Tactile: Raised 1/32" from sign face.
         c) Braille: California Contracted Grade 2 located below characters:
         d) Style: Framed.
         e) Corners: Square.
      2) Thickness: Approximately 1/8 inch thick.

e. Frame and back-up (mounting) plates:
   1) Interior Plastic Frames and back-up plates:
      a) High Impact Plastic Styrene frames.
      b) Back-up plates shall be manufacturer's standard 1/8" thick melamine plastic laminate, suitable for interior use only and mechanical attachment to substrates.
      c) Corner Style: Square.
      d) Size: 1/2" deep x 1/8" thick walls.
      e) Reveal: 3/32", black color.
   2) Aluminum Frames and back-up plates:
      a) Extruded aluminum angle.
      b) Back-up plates shall be manufacturer's standard 1/8" thick MP Plates suitable for exterior [and interior] use, and mechanical attachment to substrates.
      c) Corner Style: Square.
      d) Size: 1/2" deep x 1/16" thick walls.
      e) Reveal: 3/32", black color.

C. Acrylic Signs:
   1. Exterior Frameless, Profile Material bonded to Substrate Backup Material.
      a. All signs shall be made of exterior acrylic materials regardless of location (exterior or interior) within the Project.
      b. Profile Material:
         1) GRAVO-TAC "Exterior", modified acrylic material, 1-ply, 1/32 inch, matte finish, integral color as selected by the Architect.
      c. Substrate Material:
         1) 1/4 inch clear cast acrylic backup sheet.
         2) Aluminum Frames and back-up plates:
            a) Extruded aluminum angle.
            b) Back-up plates shall be manufacturer's standard 1/8" thick aluminum Plates suitable for exterior [and interior] use, and mechanical attachment to substrates.
            c) Corner Style: Square.
            d) Size: 1/2" deep x 1/16" thick walls.
            e) Reveal: 3/32", black color.

D. Decals:
   1. Provide outdoor grade permanent vinyl material with die cut graphics, characters and self-adhesive back for bonding to clean, smooth surfaces.

2.3 ACCESSORIES

A. Fasteners:
   1. Concealed Attachment: Provide appropriate flathead countersunk stainless steel screws for the substrate backing in which the sign is to be applied.
   2. Exposed Attachment – provide appropriate tamper resistant, flathead countersunk stainless steel screws with grommet finish washers for the substrate backing in which the sign is to be applied.
   3. Adhesive: "Silastic Adhesive".
   4. Foam Tape: SCOTCH MOUNT FOAM TAPE.

2.4 FABRICATION

A. Shop Assembly:
   1. Braille Compliance:
      a. See Part 1 of this specification – SYSTEM DESCRIPTION, and comply with the "Design Requirements for Tactile Signage that requires California Contracted Grade 2 Braille.
   2. Metal Signs:
      a. Extrude the Interlocking Metal Signs and backing plates to the sizes and profiles as indicated. Provide bonded plates, graphics, characters and California Contracted Grade 2 Braille Text when required, and assembling all the components and finishing in accordance to the specifications. All components of the signage system shall be ready to install in the field.
   3. Plastic Signs:
      a. Fabricate the plastic signs and backing plates, and then "Sand Carve" the MP plates in accordance with the manufacturer's recommendations and as indicated. Comply with ADA requirement for symbols and California Contracted Grade 2 Braille characters when required, and finish in accordance to the specifications. All components of the signage system shall be ready to install in the field.
   4. Acrylic Signs:
      a. Manufacturer's standard Profile Material, computer engineered, adhesive backed, raised graphics, complying with the latest CBC and ADA Accessibility Chapters and Sections, and ANSI A 117.1.
         1) Pictograms: All symbols shall match as closely as possible the published "International" symbols. Other interpretations will not be deemed acceptable. All symbols shall be approved prior to fabrication.
         2) Do not exceed the depth of profiling as recommended by the manufacturer for the thickness of the material to be profiled.

2.5 FINISHES

A. Metal Signs:
   1. Sign profiles shall be anodized with baked-on acrylic polyurethane matte finish, color as selected by the Architect from the manufacturer's full color line, including any custom colors.
   2. Allow for two color application – one color for the field, top and bottom rails, and one color for the characters.

B. Plastic Signs:
   1. Finish: Non-glare, face and core as selected by the Architect from the manufacturer's full color line, including any custom colors form complying with the requirements for contrasting colors of field to Symbols and Braille Text.
   2. Allow for two color application without the frame – one color for the field, top and bottom rails, and one color for the characters.

C. Acrylic Signs:
   1. Finish: Non-glare, face and core as selected by the Architect from the manufacturer's full color line, including any custom colors complying with the requirements for contrasting colors of field to Symbols and Braille Text.
   2. Allow for two-color application – one color for the field, and one color for the characters.

D. Decals:
1. Integral non-glare finish from outdoor vinyl and die cut vinyl graphics, characters, in contrasting colors as selected by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work specified under this specification section.
2. Contractor to provide internal wall blocking for all attached identifying devices.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instruction and recommendations unless specifically noted otherwise.
2. In accordance with approved Submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:
1. Lines of all signs shall be straight and true.
2. Set plumb, level, and square.
3. Temporary positioning with foam tape.

C. Metal Signs:

1. "Blind" screw the back-up plate with four (4) flathead countersunk screws so as not to interfere with the signs interlocking mechanism. No tape attachment is allowed.
2. Front Plate and Back Plate shall have interlocking dovetails with locking strip inserts, and vandal resistant 4-40 "allen" set screw for secure application.

D. Plastic Signs:
1. "Blind" screw the back-up plate with four (4) flathead countersunk screws (minimum) so as not to interfere with face plate. Tape attachment is not allowed.
2. Anchor face plate to back-up plate with Silastic Adhesive for permanent attachment.
3. Seal all exposed edges at exterior conditions with compatible sealant, same color as sign back-up plate.

E. Acrylic Signs:
1. "Blind" screw the back-up plate with four (4) flathead countersunk screws (minimum) so as not to interfere with face plate. Tape attachment is not allowed.
2. Anchor face plate to back-up plate with Silastic Adhesive for permanent attachment.
   a. Tape attachment is not allowed.
3. Seal all exposed edges at exterior conditions with compatible sealant, same color as sign substrate backup plate.

F. Mounting Conditions:
1. Metal Stud Framed Wall: Provide solid metal backing, attached to studs, adequate for fastening at all corners of sign.
2. Wood Stud Framed Wall: Provide solid wood backing, attached to studs, adequate for fastening at all corners of sign.
3. Concrete and Concrete Masonry: Provide drilled 1/4" diameter concrete or concrete masonry stainless steel anchors at all corner s of signs.
4. Glass: Provide "Silastic Adhesive" for permanent attachment of back-up plate. Provide blank plate of same material and size as the sign itself. Place on opposite side of glass and aligned with sign. Color as selected by the Architect.
5. Door: Fasten to door with tamper resistant flathead countersunk screws, minimum three (3) stainless steel screws with grommet finish washers per sign.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.

3.5 CLEANING

A. Clean in accordance with Specification Sections - TEMPORARY FACILITIES AND CONTROLS and PROJECT CLOSEOUT.
1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
2. Clean any soiled surfaces at the end of each day, minimum.
3. Finish shall be clean and ready for the application of any additional finishes.
4. In accordance with manufacturer's written instructions and recommendations.

3.6 PROTECTION

A. Protection from traffic:

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

A. General:
1. All signs with text shall have California Contracted Grade 2 Braille unless otherwise noted.
2. Refer to Plumbing drawings for number and approximate location for "Gas Valve" signs. Signs shall be mounted +2" above Finished Floor.
3. Refer to drawings for various backing requirements.

B. Sign Material:
1. EM = Exterior Metal.
2. IM = Interior Metal.
3. EP = Exterior Plastic.
4. IP = Interior Plastic.
5. A = Acrylic
6. D = Decal.

C. Mounting Condition:
1. 1 = Metal Stud Framed Wall.
2. 2 = Wood Stud Framed Wall.
3. 3 = Concrete or Concrete Masonry.
4. 4 = Glass.
5. 5 = Door Mounted.

D. Mounting Location
1. Strike side adjacent (S-1).
   a. Strike side adjacent reverse swing (SR-1).
2. Strike side away (S-2).
   a. Strike side away reverse swing (SR-2).
3. Strike side adjacent wall reverse swing (SR-3).
   a. Strike side adjacent wall (S-3).
4. Hinge side adjacent (H-1).
   a. Hinge side adjacent reverse swing (HR-1)
5. Hinge side away (H-2).
   a. Hinge side away reverse swing (HR-2).
6. Hinge side adjacent wall (H-3).
   a. Hinge side adjacent wall reverse swing (HR-3).
7. Door mounted (D-1).
   a. Door mounted reverse swing (DR-1).

E. Sign Types:
1. Sign Type 1 - Accessibility Entrance:
   a. 7"H x 7" L nominal square shape.
      1) 6" high non-Tactile International Symbol of Accessibility required.
      2) No Text or Braille required.
2. Sign Type 2 - Toilet Room:
   a. 4" H x 7" L nominal rectangular shape.
      1) 3/4" high Tactile Text.
         a) "XXXXXX" and "RESTROOM".

2) Braille required.

b. 12" diameter nominal circular shape ("FEMALE").
   1) No Text or Braille required.

c. Equilateral triangle shape edges 12" L with vertex upward ("MALE").
   1) No Text or Braille required.

d. Equilateral triangle shape, superimposed within 12" diameter nominal circular shape ("UNISEX").
   1) No Text or Braille required.

3. Sign Type 3 - Occupancy Load:
   a. 7" h x 15" L nominal rectangular shape.
      1) 3/4" high non-Tactile Text required.
         a) "THE NUMBER OF PEOPLE PERMITTED IN THIS ROOM SHALL NOT EXCEED "XXX" BY ORDER OF THE STATE FIRE MARSHAL"
      2) No Braille required.
   b. 7" h x 15" L nominal rectangular shape.
      1) 3/4" high non-Tactile Text required.
         a) "THE NUMBER OF PEOPLE PERMITTED IN THIS ROOM SHALL NOT EXCEED "XXX" FOR DINING OR "XXX" FOR ASSEMBLY BY ORDER OF THE STATE FIRE MARSHAL"
      2) No Braille required.
4. Sign Type 4 - Assistive Listening:
   a. 7"H x 15"L nominal square shape.
      1) 6" high tactile International Symbol of Access for Hearing Loss required.
      2) 5/8" high Tactile Text required.
      3) No Braille required.
5. Sign Type 5 - Room Identification:
   a. 7" H x 7" L nominal square shape.
      1) 2" high Tactile Text required.
      2) Braille required.
   b. 3 1/2" H x 15" L nominal rectangular shape.
      1) 2" high Tactile Text required.
      2) Braille required.
   c. 11" H x 15"L nominal rectangular shape.
      1) 2" high Tactile Text required.
      2) Braille required.
6. Sign Type 6 - Tactile Identification:
   a. 3-1/2"H x 7"L nominal rectangular shape.
      1) 3/4" high Tactile Text required.
      2) Braille required.
   b. 3-1/2"H x 15"L nominal rectangular shape.
      1) 3/4" high Tactile Text required.
      2) Braille required.
   c. 7"H x 7"L nominal square shape.
      1) 3/4" high Tactile Text required.
      2) Braille required.
   d. 7"H x 15"L nominal rectangular shape.
      1) 3/4" high Tactile Text required.
      2) Braille required.
7. Sign Type 7 - Non-Tactile Identification:
   a. 3-1/2"H x 7"L nominal rectangular shape.
      1) 3/4" high Non-Tactile Text required.
      2) No Braille required.

b. 3-1/2"H x 15"L nominal rectangular shape.
   1) 3/4" high Non-Tactile Text required.
   2) No Braille required.
c. 7"H x 7"L nominal square shape.
   1) 3/4" high Non-Tactile Text required.
   2) No Braille required.
d. 7"H x 15"L nominal rectangular shape.
   1) 3/4" high Non-Tactile Text required.
   2) No Braille required.

8. Sign Type 8 - Directional:
   a. 3-1/2" H x 15" L nominal rectangular shape.
      1) Tactile Arrow symbol(s).
      2) 3/4" high Tactile Text.
      3) Braille required.
   b. 7" H x 15" L nominal rectangular shape.
      1) Tactile Arrow symbol(s).
      2) 3/4" high Tactile Text.
      3) Braille required.
   c. 11" H x 15" L nominal rectangular shape.
      1) Tactile Arrow symbol(s).
      2) 3/4" high Tactile Text.
      3) Braille required.
   d. 15" H x 15" L nominal square shape.
      1) Tactile Arrow symbol(s).
      2) 3/4" high Tactile Text.
      3) Braille required.
9. Sign Type 9 - Area of Refuge:
   a. 11" H x 7" L nominal rectangular shape.
      1) 5/8" high Tactile Text required.
      2) Braille required.
      3) 6" high Non-Tactile International Symbol of Accessibility.
10. Sign Type 10 - Stair Identification:
   a. 13" H x 18" L nominal rectangular shape.
      1) 1-1/2" H x 1/4" stroke Tactile Text Stair Identification.
      2) 5" High x 3/4" Stroke Tactile Text identifying Floor Level. Floor Level shall be preceded by "M" if Mezzanine Level or "B" if Basement Level.
      3) 1" High x 1/4" stroke Tactile Text identifying stairs upper terminus.
      4) 1" High x 1/4" stroke identifying stairs upper and lower terminus.
      5) 5" High Tactile five pointed star left of floor level shall be provided at level of discharge.
   b. 13" H x 18" L nominal rectangular shape.
      1) 1-1/2" H x 1/4" stroke Tactile Text Stair Identification.
      2) 5" High x 3/4" Stroke Tactile Text identifying Floor Level. Floor Level shall be preceded by "M" if Mezzanine Level or "B" if Basement Level.
      3) 1" High x 1/4" stroke Tactile Text identifying stairs upper terminus.
      4) 1" High x 1/4" stroke identifying stairs upper and lower terminus.
11. Sign Type 11 - Elevator Emergency:
   a. 7"H x 12"L nominal square shape.
      1) Standardized Tactile Pictogram
      2) 5/8" high Tactile Text required.
         a) "IN CASE OF FIRE, ELEVATORS ARE OUT OF SERVICE USE EXIT STAIRS"

END OF SECTION

SECTION 101453 – ROAD AND PARKING SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all walk, road and parking signage materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 32 12 00 PAVEMENT
   5. 32 31 13 CHAIN LINK
   6. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   7. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

C. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect and Civil Engineer.
   2. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, the loading, required clearances, method of field assembly, components, and location and size of each field connection.
      b. Closeout Submittals in accordance with Specification Sections in Division One.

1.3 QUALITY ASSURANCE

D. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

E. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. ADA Americans with Disabilities Act.

b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

c. CBC California Building Code, all accessible parking signage shall be as required by CBC 11B-502.

1.4 DELIVERY, STORAGE, AND HANDLING

F. Packing, shipping, handling, and unloading:

1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

G. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

H. Storage and protection:

1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.5 PROJECT CONDITIONS

I. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.6 WARRANTY

J. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

K. Manufacturer’s Warranty:

1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period One (1) Year.

L. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty Period [One (1) Year.][Five (5) Years.]

PART 2 - PRODUCTS

2.1 MATERIALS

M. Signage material:
1. Signs shall be permanent and reflectorized, constructed of porcelain coating on steel with beaded text or approved equivalent.
2. Sign materials shall be hot-dipped galvanized, embossed steel, with a heavy-duty baked enamel finish.
   a. 16 gage steel for all signs larger than 24" x 24".
   b. 18 gage steel for all signs smaller than 24" x 24".

N. Brackets:
1. Galvanized Pipe, attached with vandal resistant fasteners.
   a. Provide Owner with tool that is compatible with vandal resistant fasteners so that maintenance can be performed on the signs.

O. Posts:
1. Pipe, galvanized, Schedule 40, in accordance with ASTM A 53 “Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless”, with compatible galvanized Dome Caps.

P. Concrete:
1. See Specification Section – CAST-IN-PLACE CONCRETE.

Q. Other Materials:
1. Materials not specifically indicated but needed for proper installation shall be new and of first quality as selected by contractor subject to review by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

R. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 INSTALLATION

S. General:
1. In accordance with Regulatory Requirements.
2. Set plumb, level, and square.
   a. Set post plumb and at proper height.
   b. Place concrete and tamp to assure consolidation.

1) Footings shall be 8" in diameter, 24 inches deep minimum, unless otherwise noted.
2) Top of concrete shall be 3-1/2 inches below finished grade.

c. Install brackets so signs are plumb and level.

d. The accessible signage shall be centered at the interior end of the parking space at a minimum height of 80 inches from the bottom of the sign to the parking space finished grade, ground or sidewalk.

1) In lieu of posts, the accessible parking space signage may also be centered on the wall at the interior end of the parking space (if applicable) at a minimum of 60 inches from the parking space finished grade, ground or sidewalk. Verify with Architect before using this option.

3.3 SCHEDULE

T. Parking Entrance Accessible Sign:

1. A sign shall be posted in a conspicuous place at each entrance to off-street parking facilities.
   a. The sign shall be not less than 17 inches x 22 inches in size with lettering not less than one inch in height, which clearly and conspicuously states the following:
2. Sign Verbiage:

UNAUTHORIZED VEHICLES, PARKED IN DESIGNATED ACCESSIBLE SPACES, NOT DISPLAYING DISTINGUISHING PLACARDS OR SPECIAL LICENSE PLATES ISSUED FOR PERSONS WITH DISABILITIES, WILL BE TOWED AWAY AT OWNER'S EXPENSE. TOWED VEHICLES MAY BE RECLAIMED AT FRESNO P.D. OR BY TELEPHONING 559- 621-7000

U. Parking Stall Accessible Sign:

1. Each parking space reserved for the disabled shall be identified by a permanently affixed reflectorized sign and a minimum fine of $250.00.
   a. Sign shall display the International Symbol of accessibility shall be white reflectorized symbol and border on blue background. See drawings for overall size.
   b. Add van accessible sign to the parking space identified on the contract drawings. See drawings for overall size.
      1) Van accessible sign shall have 1" high white letters, 1/2" white border on blue background.

V. Directional Accessible Sign:

1. 12" x 18" with International Symbol of Accessibility, 1" high letters that say "PERSONS WITH DISABILITIES PARKING", and directional arrow.
   a. Arrow shall be square tip style.
   b. Symbols and lettering shall be white reflectorized characters on blue background.

W. Stop Sign:

1. Stop Sign in accordance with traffic standards in the area where the project is located:
2. 18" x 18" eight sided sign, 6" high letters that say "STOP".
   a. Lettering shall be white reflectorized characters on RED background.

X. Bus Entrance Sign:

1. A sign shall be posted in a conspicuous place at each side of the bus drop-off area.
   a. The sign shall be not less than 17 inches x 22 inches in size with lettering not less than one inch in height, which clearly and conspicuously states the following:
2. Sign Verbiage:

UNAUTHORIZED VEHICLES, PARKED IN DESIGNATED ACCESSIBLE SPACES, NOT DISPLAYING DISTINGUISHING PLACARDS OR SPECIAL LICENSE PLATES ISSUED FOR PERSONS WITH DISABILITIES, WILL BE TOWED AWAY AT OWNER'S EXPENSE. TOWED VEHICLES MAY BE RECLAIMED AT FRESNO P.D. OR BY TELEPHONING 559- 621-7000

Y. Bus Entrance Only Sign:
   1. 12" x18", 1-1/2" high letters that say "BUS ENTRANCE ONLY".
   2. Lettering shall be red on white background.

Z. Do Not Enter Sign:
   1. 12" x 18", 2" high letters that say "DO NOT ENTER".
   2. Lettering shall be white reflectorized characters on red background.

AA. Gate Sign:
   1. 12" x 18", 1" high letters that say:
      a. "OPERATED BY SECURITY PERSONNEL ONLY".

BB. No Parking Sign:
   1. 12" X 18", 1-1/2" high letters that say:
      a. "NO PARKING, BUS PARKING ONLY".
   2. Lettering shall be red on white background.

CC. Fire Riser Room Route Sign:
   1. 12" x 18", 1-1/2" high letters that say "FIRE RISER ROOM ROUTE".
      a. Lettering shall be white reflectorized characters on red background.

END OF SECTION

SECTION 102113 – TOILET PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Toilet Partition materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. High Density Polyethlyene (HDPE) Plastic Toilet Partition Systems.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 06 10 00 ROUGH CARPENTRY
   6. 08 11 00 METAL DOORS AND FRAMES
   7. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   8. 09 22 16 METAL FRAMING
   9. 09 24 00 CEMENT PLASTER
   10. 09 29 00 GYPSUM BOARD
   11. 09 30 13 TILE
   12. 09 91 00 PAINTING
   13. 10 28 13 TOILET ACCESSORIES
   14. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. In accordance with the following:
   1. AWS American Welding Society

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data:
      a. Submit manufacturer's full color range (including any standard and premium colors) for selection by the Architect.
      b. Submit manufacturer's technical data.
   2. Shop Drawings:
      a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachment to other units of work.
   3. Samples:
      a. Provide two (2) 4 inch square samples of each color selected.
      b. Provide hardware samples on request.
   4. Certificates:
      a. Provide third party certification that all products comply with NFPA 286.

5. Closeout Submittals in accordance with the following:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Project Documents in accordance with Specification Section - PROJECT DOCUMENTS.
   c. Warranty in accordance with Specification Section - WARRANTIES and the article in this section titled "Special Warranty".

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product in accordance with manufacturer's warranty requirements.
   2. Manufacturer Qualifications:
      a. Firm experienced in successfully producing products similar to that indicated for this Project, with sufficient production capacity to supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.
      b. CBC Chapter 11B Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing:
         1) Furnish Door Hardware for each accessible stall to comply with ANSI A 117.1 and the CBC Section 11B.
         2) Toe Clearance Requirements:
            a) Toe Clearance shall be in accordance with CBC Section 11B-604.8.1.4 - at least one side partition shall provide a toe clearance of 9 inches (229 mm) minimum above the finish floor and 6 inches (152 mm) deep minimum beyond the compartment-side face of the partition, exclusive of partition support members. Partition components at the clearances shall be smooth without sharp edges or abrasive surfaces.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be individually wrapped.
   2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name and model.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored in a locked, dry and protected area.

1.6 PROJECT CONDITIONS

A. Existing Conditions:
   1. Examine the project and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.7 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period for Solid Plastic Systems Fifteen (15) Years.
      b. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period Five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified Solid Plastic Toilet Partition product manufacturer:
      a. SCRANTON Products, includes:
         1) CAPITOL PARTITIONS
         2) COMTEC INDUSTRIES, INC.
         3) SANTANA PRODUCTS COMPANY
      b. Acceptable alternative manufacturer:
         1) ACCURATE PARTITIONS CORPORATION.
         2) LAMINATING TECHNOLOGIES.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Solid Plastic: Provide high density polyethylene (HDPE) solid polymer resin with homogeneous color throughout, 1 inch thick with seamless construction and all edges eased, tested in accordance with CBC 803.1.2, 803.13, NFPA 286 (Class A) and ASTM standards as follows:

1. PHYSICAL PROPERTIES:
   a. Smoke Density per ASTM D 2843 "Test Method for Density of Smoke from the Burning or Decomposition of Plastics":
      1) 75 maximum.
   b. Self Ignition per ASTM D 1929 "Test Method for Determining Ignition Temperature of Plastics":
      1) 650 degrees minimum.
   c. Rate of Burn per ASTM D 635 "Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position":
      1) 2.0 cm/min maximum.
   d. Density per ASTM D 1505 "Test Method for Density of Plastics by the Density-Gradient Technique":
      1) 0.96 g/cc.
   e. Tensile Yield per ASTM D 638 "Test method for Tensile Properties of Plastics":
      1) 4400 psi.
   f. Elongation per ASTM D 638 "Test method for Tensile Properties of Plastics":
      1) 600 percent minimum.
   g. Izod Impact per ASTM D 256 "Test methods for Determining the Izod Pendulum Impact Resistance of Plastics".
      1) 7.0 ft-lb/inch of notch.
   h. Tensile Impact per ASTM D 1822 "Test Method for Tensile-Impact Energy to Break Plastics and Electrical Insulating Materials":
      1) 120 ft-lb/in^2.
   i. Brittleness Temp. per ASTM D 746 "Test Method for Brittleness of Plastics and Elastomers by Impact":
      1) 76 degrees C maximum.
   j. Hardness per ASTM D 2240 "Standard Test Method for Rubber Property – Durometer Hardness":
      1) 68 Shore D.
   k. Flexural Modulus per ASTM D 256 "Test methods for Determining the Izod Pendulum Impact Resistance of Plastics":
      1) 220,000 psi.
2. Heat Sinc: Provide continuous aluminum edging strips fastened to the bottom edge at full width of doors, screens and panels.

2.3 COMPONENTS

A. Unless otherwise stated below, all materials shall be Stainless Steel.

B. Hardware:

1. General:
   a. Provide manufacturer’s standard stainless steel, ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar", Type 302 or 304, 18 gage minimum, #4 finish, unless otherwise noted.

b. Provide Extruded Aluminum, 6063 T-5 parts with a minimum 0.125 inch wall thickness, at Head Rails and Head Rail Endcaps.

2. Hinges: Integral type consisting of :
   a. Top Pin: 4 inch long, 1/2 inch diameter nylon.
   b. Lower Pin: "Cam Action" nylon assembly that provides "self-closing feature" for the door with 3/16 inch diameter stainless steel pin inserted in upper cam in accordance with CBC Section 11B-604.8.1.2.
3. Door Strike and Keeper:
   a. Provide surface-mounted door strike and latch keeper for appropriate edge condition and coordinate with latch. Install so that fingers can not be pinched between the door and the frame when using the handle
4. Latch:
   a. Provide surface-mounted, stainless steel slide latch conforming to accessibility requirements and pilaster and door conditions.
5. Door Bumper and Hook:
   a. At in-swinging stall doors provide surface-mounted combination hook and rubber-tipped door bumper sized to prevent door hitting mounted accessories.
   b. At out-swinging stall doors provide surface-mounted rubber-tipped door bumper sized to prevent door hitting mounted accessories.
   c. All hooks shall be mounted at +48" maximum AFF.
6. Door Pull in accordance with CBC Section 11B-404.2.7:
   a. At stalls that are not identified as accessible, provide manufacturer’s standard door pulls.
   b. At stalls that are identified as accessible, provide pull (or latch assembly) equipped with a loop or "U" Shaped door pull immediately below the latch on both sides of the door conforming to the Americans with Disabilities Act. The latch shall be the sliding, or other hardware not requiring the user to grasp, twist or pinch.
7. Wall Bumper:
   a. At out-swinging stall doors provide wall bumper with a rubber face.
8. Pilaster Shoes and Sleeves (Caps): 3-inches high, finished to match hardware.
   a. Furnish galvanized steel supports and leveling bolts at pilasters as recommended in writing by manufacturer to suit floor conditions. Make provisions for setting and securing continuous, extruded aluminum, antigrip, overhead bracing at top of each pilaster with a single crown to prevent the hiding of contraband. Provide shoe at each pilaster to conceal anchorage.
9. Wall Brackets - provide continuous length of panel, one-ear brackets and two-ear brackets as required.
10. Panel to Pilaster Brackets - provide continuous length of panel, "U" Shaped brackets.
11. Stirrup Brackets- provide one-ear brackets, two-ear brackets, and "U" Shaped brackets as required.
12. Head Rails - provide aluminum, anti-grip profile.
13. Head Rail Brackets - provide aluminum brackets compatible with Head Rail design.
14. Head Rail Endcaps - provide aluminum endcaps compatible with Head Rail design.

2.4 ACCESSORIES

A. Fasteners:
   1. Provide manufacturer’s standard stainless steel exposed fasteners finished to match hardware, with theft-resistant heads and nuts. For concealed anchors, use hot-dip galvanized, or other rust-resistant protective coated steel.

2.5 FABRICATION

A. General:
   1. Provide Gap-Free performance including rabbeted (shiplap) door panels and continuous brackets at panel connections.

B. Toilet Partition Design shall be as follows:
   1. Floor-Anchored and Overhead-Braced.

C. Furnish standard doors, panels, screens, and pilasters fabricated for toilet partition system. Units shall be furnished with cutouts, drilled holes, and reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated on the drawings. Coordinate with Specification Section - TOILET ACCESSORIES, and schedule reinforcements for products actually provided for this project.
   1. Doors, panels, and screens shall be 55 inches high and mounted 12 inches above finished floor.
   2. Pilasters shall be 82 inches high.
   3. Unless otherwise indicated, furnish 24 inch wide in-swinging doors for non-accessible stalls, and 34 inch wide out-swinging doors for front opening accessible stalls.
      a. 36 inch for side opening accessible stalls.
   4. Furnish galvanized steel supports and leveling bolts at pilasters as recommended in writing by manufacturer to suit floor conditions. Provide Pilaster Shoes to conceal anchorage.
   5. Secure floor-anchored-overhead braced pilasters by providing continuous Head Rails with Head Rail brackets, and Head Rail Endcaps.
   6. All floor anchoring requires a solid two inches thick of solid flooring for proper anchorage.

D. Urinal Screens: "Floor-Anchored and Overhead-Braced" of the same construction and finish as toilet partitions.

2.6 FINISHES

A. Color shall be selected from the manufacturer’s full color range including standard and premium colors.

B. One color will be selected per room.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
2. Coordinate the blocking required in all walls with approved shop drawings.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) that could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Structurally reinforce and anchor work as required.
6. Panels that contain patched holes not utilized for attachment to walls and pilasters will be rejected by the Architect.

B. Layout:
1. Lines shall be straight and true.
2. Stalls:
   a. Provide clearances of not less than 1/2 inch between pilasters and panels, and not more than 1 inch between pilasters/panels and walls.
   b. Secure panels to walls with continuous brackets.
   c. Secure panels to pilasters with continuous brackets. Brackets are to align with continuous brackets at walls.
   d. Locate wall brackets so that holes for wall anchorages occur in masonry or tile joints.
   e. Secure panels to pilasters with not less than two stirrup brackets located to align with stirrup brackets at wall.
   f. Secure panels in position with manufacturer's written recommended anchoring devices.
   g. Secure pilasters to floor and level and plumb, and tighten installation with devices furnished.
   h. Secure head rails to each pilaster with not less than two fasteners.
   i. Hang doors and adjust so that tops of doors are parallel with head rail when doors are in a closed position. Clearance at vertical edge of doors shall be uniform top and bottom and shall not exceed 1/4 inch.
   j. When wainscoting prevents the uninterrupted use of a continuous bracket, secure panels to walls with a continuous bracket to the top of the wainscoting and secure the top of the panels to the wall with a stirrup bracket.

3. Screens:
    a. Secure panels to walls with continuous brackets.
    b. Provide clearances of not more than 1 inch between panels and walls.
    c. Secure panels in position with manufacturer's written recommended anchoring devices to suit supporting structure.
    d. Set units to provide support and to resist lateral impact.

3.4 ADJUSTING

A. Adjust and lubricate for proper operation.

B. Doors:
1. Adjust and set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched.
2. Adjust and set hinges on out-swinging doors (and entrance swinging doors) to return fully closed positions.
3. Adjust and set hinges on doors at accessible stalls to return to fully closed positions.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean exposed surfaces using materials and methods recommended in writing by manufacturer.
2. Protect as necessary to prevent damage during the remainder of the construction period.

END OF SECTION

SECTION 102600 – WALL AND CORNER GUARDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Wall and Corner Guard materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 08 11 00 METAL DOORS AND FRAMES
   4. 08 14 16 WOOD DOORS
   5. 08 34 73 ACOUSTICAL DOORS AND FRAMES
   6. 09 24 00 CEMENT PLASTER
   7. 09 29 00 GYPSUM BOARD
   8. 09 72 00 WALL COVERINGS
   9. 09 91 00 PAINTING
   10. 10 05 00 MISCELLANEOUS SPECIALTIES
   11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   12. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ASTM American Society of Testing Materials
      b. NFPA National Fire Protection Association

1.3 SYSTEM DESCRIPTION

A. Design Requirements: In accordance with allowable values and properties assigned and approved by CBC.

B. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.
   1. Fire Performance Characteristics.
      a. Class A under ASTM E 84 “Test Method for Surface Burning Characteristics of Building Materials”:
         1) Flame Spread: 25 or less.
         2) Smoke Developed: 450 or less.
   2. Impact Strength:

a. Provide rigid sheet materials that have an Impact Strength of 30.4 ft-lbs/inch of thickness as tested in accordance with the procedures specified in ASTM D 256 “Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics”.

3. Chemical and Stain Resistance
   a. Provide wall protection system components with chemical and stain resistance in accordance with ASTM D 543 “Practices for Evaluating the Resistance of Plastics to Chemical Reagents”.
4. Fungal and Bacterial Resistance:
   a. Provide material that does not support fungal or bacterial growth as tested in accordance with ASTM G 21 "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi”.
5. Color Consistency:
   a. Provide components matched in accordance with SAE J-1545 – (Delta E) with a color difference no greater than 1.0 units using CIE Lab, CIE CMC, CIE LCh, Hunter Lab or similar color space scale systems.
6. Accessibility Compliance:
   a. Comply with ADA requirements and requirements of ANSI A117.1.

1.4 SUBMITTALS

A. Submit in accordance with Project Manual Specification Section - SUBMITTAL PROCEDURES:
   1. Coordination Drawings:
      a. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
   2. Product Data.
      a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
         1) Provide data for each type of rigid vinyl kickplates specified.
   3. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
   4. Samples.
      a. Provide 8" square sample of each color and pattern selected.
      b. Provide 6 inch lineal samples of each piece of trim material specified.
   5. Closeout Submittals in accordance with Project Manual Division 1 Sections:
      a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
      b. Project Record Documents in accordance with Specification Section - PROJECT RECORD Documents.
      c. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements:
1. In accordance with Project Manual Specification Section - REGULATORY REQUIREMENTS, and the following:
a. ADA Americans with Disabilities Act of 1990.
b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be individually wrapped.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored in a dry, protected area.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
1. Temperature: acclimate products in environment between sixty-five (65) degrees Fahrenheit and seventy (70) degrees Fahrenheit for one (1) day prior to installation.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.8 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer, or approved equivalent:
      a. INPRO CORPORATION
      b. KOROSEAL (Division of RJF INTERNATIONAL CORPORATION)
      c. Acceptable alternative manufacturers:
         1) ACROVYN as manufactured by The C/S GROUP
         2) KOROSEAL (Division of RJF INTERNATIONAL CORPORATION)

B. Products from other manufacturers not listed must submit in accordance with Project Manual Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. Corner Guards:
   1. Type 1: Vinyl/Acrylic Flush Corner Guards:
      a. INPRO Model # 160F (2 inch x 2 inch x 8 feet):
         1) When wall height exceeds maximum length available (12 feet), splice to be placed near the ceiling at the highest point practical for full height installation.
         2) Provide manufacturer's standard Vinyl/Acrylic extrusions in a nominal wall thickness of 0.080".
         3) Finish to be manufacturer's matte "Pebblette" finish in color as selected by Architect from manufacturer's full color range.
         4) Chemical and stain resistance shall be in accordance CSAV-280 standards, established by the manufacturer.
         5) Provide continuous aluminum retainer 0.070" nominal thickness including attachment of hardware for a complete assembly.
   2. Type 2: Vinyl/Acrylic Tape-On Corner Guards:
      a. Tape-on Corner Guards: (1-1/2" x 1-1/2" x 9'-0"):
         1) When wall height exceeds maximum length available (12 feet), splice to be placed near the ceiling at the highest point practical for full height installation.
         2) Provide manufacturer's standard Vinyl/Acrylic extrusions in a nominal wall thickness of 0.080".
         3) Finish to be manufacturer's matte "Pebblette" finish in color as selected by Architect from manufacturer's full color range.
         4) Chemical and stain resistance shall be in accordance CSAV-280 standards, established by the manufacturer.
         5) Adhesive Attachment: Field applied heavy duty adhesive per manufacturers written instructions.

B. High Impact Wall Covering:
   1. High Impact Wall Covering:
      a. INPRO "Rigid Vinyl Sheet" Item protective wall covering panels in sizes indicated on the drawings.
         1) Provide manufacturer's standard vinyl/ acrylic extrusions in a nominal wall thickness of 0.060".
         2) Provide manufacturer's recommended adhesive for the substrate material indicated on the drawings.
         3) Finish to be manufacturer's matte "Pebblette" finish in color as selected by Architect from manufacturer's full color range.
         4) Provide the manufacturer's recommended trim pieces and fabricated configurations as required by the drawings.

2.3 COMPONENTS

A. End caps, outside corners and inside corners shall be made of injection molded thermoplastics.
   1. Joints:
      a. Inside Corners: Color to match wall protection.
      b. Joint Sealants: Color to match wall protection.

2.4 ACCESSORIES

A. All mounting system accessories appropriate for substrates indicated on the drawings shall be provided.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
      a. Provide continuous blocking in walls of similar materials as the wall construction to properly anchor the continuous handrail system at the height indicated on the drawings. Fasteners shall be placed at 32" o.c. maximum.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.

B. Minimum temperature requirements for all products must be +70 deg. F. Relative humidity shall not exceed 80 percent.

C. Layout:
   1. Lines shall be straight and true.

3.3 CLEANING

A. Clean in accordance with Project Manual Specification Section - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. Clean any soiled surfaces at the end of each day, minimum.
   3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 102813 – TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Furnish all material, labor, equipment and services necessary to furnish Toilet Accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 06 10 00 ROUGH CARPENTRY
   5. 08 80 00 GLASS
   6. 09 24 00 CEMENT PLASTER
   7. 09 29 00 GYPSUM BOARD
   8. 09 30 13 TILE
   9. 09 72 00 WALL COVERINGS
   10. 10 21 13 TOILET PARTITIONS
   11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
   2. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location (including ADA Required dimensions for mounting locations), and size of each field connection.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. ADA American's with Disabilities Act 1990.
      b. ANSI American National Standards Institute Specifications ANSI A117.1 "Accessible and Usable Buildings and Facilities".
      c. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located
      d. CBC California Building Code (California State Building Standards Code - Title 24) and the latest edition of DSA's California Access Compliance Advisory Reference Manual.

1.4 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period One (1) Year.

PART 2 - PRODUCTS

A. See Schedule in PART 3.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All Toilet Room Accessories shall be furnished and installed by the Contractor, in accordance with manufacturer's written recommendations, and in accordance with accessibility mounting height.

B. Install in accordance with CBC and ADA Accessibility Chapters and Sections, and ANSI A 117.1.

3.2 SCHEDULES

A. All devices listed herein shall be installed where shown, complete, and ready for use in full compliance with all applicable codes and standards. The manufacturers listed are acceptable as approved suppliers to the suppliers to the Owner. Substitution of manufacturers other than those listed, must be approved by the Owner.
   1. TOILET TISSUE DISPENSER (All Boys and Girls Restrooms):
      a. Accessible Stalls: Recessed multi-roll toilet tissue dispenser shall be Type 304, 22 gage stainless steel with all-welded construction; exposed surfaces shall have satin finish.
         1) The front of toilet tissue dispenser shall be drawn, one-piece, seamless construction. Door shall be secured to cabinet with two rivets and equipped with a tumbler lock keyed like other manufacturer's washroom accessories.
         2) Flange shall be drawn, one-piece, seamless construction. Unit shall dispense two standard-core toilet tissue rolls up to 5-1/4" diameter.
         3) Extra roll shall automatically drop in place when bottom roll is depleted. Unit shall be equipped with two theft-resistant, heavy-duty, one-piece, molded ABS non-controlled delivery spindles.
         4) Manufacturer's service and parts manual shall be provided to the building owner / manager upon completion of the project.

5) Toilet Tissue Dispenser shall not protrude into accessible space no more than 3" from the face of the wall.
6) Acceptable manufacturers:
a) BOBRICK B-3888 -- 2-3/4" protrusion maximum.

b. Semi Ambulatory Stalls: Surface mounted multi-roll toilet tissue dispenser shall be heavy duty cast aluminum with a satin finish.
1) BOBRICK B-2740 at Semi Ambulatory Stalls.

c. Non-accessible Stalls: **OFCI:** Controlled delivery, single roll, heavy-duty cast aluminum, satin finish, with high-impact plastic spindle with concealed locking device, theft-resistant, 6-1/4" wide, projects 4-7/8" from wall, surface mounted.

2. TOILET TISSUE DISPENSER (All Men and Women's Restrooms):
a. Accessible Stalls: Recessed multi-roll toilet tissue dispenser shall be Type 304, 22 gage stainless steel with all-welded construction; exposed surfaces shall have satin finish.
1) The front of toilet tissue dispenser shall be drawn, one-piece, seamless construction. Door shall be secured to cabinet with two rivets and equipped with a tumbler lock keyed like other manufacturer's washroom accessories.
2) Flange shall be drawn, one-piece, seamless construction. Unit shall dispense two standard-core toilet tissue rolls up to 5-1/4" diameter.
3) Extra roll shall automatically drop in place when bottom roll is depleted. Unit shall be equipped with two theft-resistant, heavy-duty, one-piece, molded ABS non-controlled delivery spindles.
4) Manufacturer's service and parts manual shall be provided to the building owner / manager upon completion of the project.
5) Toilet Tissue Dispenser shall not protrude into accessible space no more than 3" from the face of the wall.
6) Acceptable manufacturers:
a) BOBRICK B-3888 -- 2-3/4" protrusion maximum.

b. Non-accessible stalls: **OFCI**: Controlled delivery, double roll, heavy-duty cast aluminum, satin finish, with high-impact plastic spindles with concealed locking device, theft-resistant, 12-1/2" wide, projects 4-7/8" from wall, surface mounted.

3. TOILET TISSUE DISPENSER for Toilet Partitions:
a. Bobrick B-386 Partition Mounted Multi-Roll Multi-Stall toilet tissue dispenser, for a pair of toilet partition stalls
b. Bobrick B-274 when there is a single odd toilet partition stall

4. SANITARY NAPKINS-TAMPON DISPENSER (All Girls and Women's Restrooms and Nurse's Stations):
a. Recess mounted, stainless steel, double coin - 25 cents each.
1) Acceptable manufacturers:
a) BOBRICK B-37063-25.

5. SANITARY NAPKIN DISPOSAL: (Same locations as dispensers, except where dispensers have disposal feature.)
a. Surface mounted stainless steel.
1) Acceptable manufacturers:
a) BOBRICK B-270.
b) BRADLEY 4781-15.

6. ACCESSIBLE SHOWER SEAT:
a. Folding "L" Shaped seat, 32" x 19" nominal, 16 gage stainless steel seat, 18 gage tubing and 11 gage brackets, with brackets for positive "catch" in the "up" position, mounted opposite the shower controls.
1) Acceptable manufacturers:
a) BOBRICK (No known equal).
b) BRADLEY 956-30 or 9561-30 as indicated on the drawings.

7. MOP HOLDER (All janitor's rooms):
   a. Stainless steel, 36" long - 4 holders.
      1) Acceptable manufacturers:
         a) BOBRICK B-223 x 36.
         b) BRADLEY 9954.
8. MOP HOLDER WITH SHELF:
   a. Shelf with Utility Hooks and Mop Strip shall have 8" depth shelf and mop strip fabricated of 18 gage, Type 304 stainless steel alloy. Utility Hooks shall be fabricated of 14 gage stainless steel. Shelf, back and mop strip shall be one piece construction. Mop holders shall be fabricated of cadmium plated steel and shall be ribbed for rigidity. Pivoting, spring-loaded, serrated rubber cam shall hold round handles of 7/8" to 1-1/4" diameter wedged against ribbed clamp plate. Mop holders and utility hooks shall be riveted to mop strip.
      a) Type 1 - 34" long shelf with 4 hooks. ASI 1308-3, Bobrick B-239 x34
      b) Type 2 - 44' long shelf with 5 hooks, ASI 1308-4
9. GRAB BARS:
   a. 1-1/2" diameter, 18 gage seamless, stainless safety-grip finish, exposed mounting, vandal resistant screws, in configuration as required.
      1) Acceptable manufacturers:
         a) BOBRICK B-6806-99.
         b) BRADLEY 812-2.
10. SHOWER CURTAIN ROD:
   a. Concealed mounting, 1" diameter, stainless steel.
      1) Acceptable manufacturers:
         a) BOBRICK B-207.
         b) BRADLEY 9538.
11. MIRRORS:
   a. One piece channel frame, galvanized steel back, wall mounted for accessibility as detailed on the drawings, 1/4" tempered glass, size as shown.
      1) Acceptable manufacturers:
         a) BOBRICK B-165 Series.
         b) BRADLEY 781.
12. SEAT COVER DISPENSER (All Men and Women's Restrooms):
   a. **OFCI**: Stainless steel, surface mounted.
13. TOWEL HOOK:
   a. Stainless Steel Surface Mounted Towel pin
      1) Acceptable manufacturers:
         a) BOBRICK B-6777
         b) BRADLEY 9114

END OF SECTION

AD6-SP02 **Refer to Specification Section 10 28 13 – TOILET ACCESSORIES.**

1. Add the following.

ELECTRIC HAND DRYER

Excel:	Xlerator Hand Dryer
Model:	XL-GR (Graphite)
Voltage:	208
Accessories:	ADA-Compliant Recess Kit

SECTION 104400 – FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to furnish and install Fire Protection Specialties, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 05 12 00 STEEL AND FABRICATIONS
   4. 06 10 00 ROUGH CARPENTRY
   5. 09 22 16 METAL FRAMING
   6. 09 24 00 CEMENT PLASTER
   7. 09 29 00 GYPSUM BOARD
   8. 09 72 00 WALL COVERINGS
   9. 09 91 00 PAINTING
   10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. NAAMM National Association of Architectural Metal Manufacturers

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.

B. Product Data: For each type of product.
   1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

C. Shop Drawings: For fire-protection cabinets.
   1. Include plans, elevations, sections, details, and attachments to other work.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.5 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
a. Engage an experienced Installer who has successfully completed three [3] projects of similar scope and size to that indicated for this Project.
2. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
b. NFPA National Fire Protection Association (NFPA 10)

1.7 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.
2. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.
a. Failures include, but are not limited to, the following:
1) Failure of hydrostatic test according to NFPA 10.
2) Faulty operation of valves or release levers.
a) Warranty Period: Six (6) years from date of Substantial Completion.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products specified are from companies listed below, or approved equivalent. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers listed as acceptable alternative manufacturers must still comply with the requirements of the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Specified product manufacturer, or approved equivalent:
   a. LARSEN'S MANUFACTURING CO.
      1) **FEC-1**
         a) Non-rated Model #AL 2409-R3.
         b) Rated Model #FS-AL-2409-R3.
         c) Fire Extinguisher Model #MP5-A.
      2) **FEC-2**
         a) Non-rated Model #AL 2409-6R.
         b) Rated Model #FS-AL 2409-6R.
         c) Fire Extinguisher Model #MP10.
      3) **FEC-3**
         a) Non-rated Model #2712-RL.
         b) Rated Model #FS-2712-RL.
         c) Fire Extinguisher Model #WC-6L.
   b. Acceptable alternative manufacturer:
      1) JL INDUSTRIES
2. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 FIRE EXTINGUISHER CABINET

A. Semi-Recessed "Architectural Series"

1. Non-rated: Box is to be fabricated from manufacturer's standard heavy gage steel, white baked enamel box. Provide at non-rated walls.
2. Fire-Rated: Box is to be fabricated from manufacturer's standard double wall heavy gauge steel, white baked enamel, fire rated box, with approved fire rated barrier material. Provide at one-hour or two-hour rated walls.
3. Provide 2-1/2 inch Rolled Edge Trim all around, fabricated from extruded aluminum with a clear satin anodized finish, with all corners mitered.
4. Typical Door (1/2" thick) to be "Vertical Duo" with tempered glass. Door to be fabricated from extruded aluminum with a clear satin anodized finish with "Black" Vertical Style Die Cut Lettering indicating "FIRE EXTINGUISHER" placed on the hinge side of the cabinet door.
5. Typical Door Hardware shall include a satin finish pull handle with a self-adjusting roller latch and a continuous piano hinge.

2.3 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.

B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 3-A:40-B:C, 5-lb, and 4-A:80-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

C. Wet-Chemical Type: UL-rated 2-A:K, 2.5-gal. nominal capacity, with potassium acetate-based chemical in stainless steel container; with pressure-indicating gage.

2.4 FABRICATION

A. Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
1. Weld joints and grind smooth.
2. Prepare doors and frames to receive locks.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
1. Fabricate door frames of one-piece construction, with edges flanged.
2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.6 STEEL FINISHES
1. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.

B. Baked-Enamel Finish: Immediately after cleaning and pre-treating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affect the execution of work under this specification section.
    a. Examine walls and partitions for suitable framing depth and blocking where recessed and semi-recessed cabinets will be installed.
    b. Examine walls and partitions for suitable blocking where surface applied brackets will be installed.
    c. Examine fire extinguishers for proper charging and tagging.
        1) Remove and replace damaged, defective, or undercharged units.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
    a. Comply with all applicable CBC and ADA requirements in regards to accessible mounting heights.
4. Set plumb, level, and square.
5. Identification:
    a. Apply decals, vinyl lettering, or other identification devices at locations indicated.

B. Layout:
1. Lines shall be straight and true.

3.4 PROTECTION

A. Protection from traffic:

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 105113 METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all materials, labor, equipment and services necessary to install Lockers, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 06 10 00 ROUGH CARPENTRY
   6. 09 22 16 METAL FRAMING
   7. 09 24 00 CEMENT PLASTER
   8. 09 29 00 GYPSUM BOARD
   9. 09 30 13 TILE
   10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   11. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.
   1. Product Data:
   2. Shop Drawings:
      a. Including fastening and any base information.
   3. Samples:
      a. Color samples on metal indicating two tone color options per locker location.
   4. Manufacturer and Supplier:
      a. Provide the Owner a warranty upon delivery of all Lockers that parts and accessories will be made available to the Owner in the future at no additional surcharge or re-tooling charge.
   5. Substitutions:
      a. See Specification Section - SUBSTITUTION PROCEDURES for time frames of acceptance or rejection of Substitution Requests. Sample locker tier and specification deviations shall be submitted for review. The Owner intends to thoroughly test for durability and compliance with the Owner's standards for Metal Lockers. Samples will not be returned. Those substitutions that are approved will be listed (with any modifications to design) in an addendum issued prior to the Bid Date.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Fabricator Qualifications:
   a. Firm experienced in successfully production Metal Lockers to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.
2. Installer Qualifications:
   a. Engage an experienced Installer who has successfully completed installation of Metal Lockers similar in material, design, and extent to that indicated for this Project.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS.
   a. ADA Americans with Disabilities Act of 1990.
   b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.4 SCHEDULING

A. Earliest Delivery/Installation (Tentative) Dates per Campus:
1. Coordinate with the Owner on the actual delivery/installation dates at least 30 days prior to the dates listed in Specification Section – SUMMARY OF WORK.

1.5 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty period One (1) Year.

1.6 MAINTENANCE

A. Extra Materials:
1. Deliver extra doors (complete door assemblies with handles, hinges, vents and locks or padlock options) to Owner as described below:
   a. Gym Lockers (Building "M"): 78.
   b. Dress Lockers (Building "M"): 14.
   c. Coaches Lockers (Building "M"): 2.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer:
      a. LIST INDUSTRIES, INC. "SUPERIOR"
   2. Acceptable alternative manufacturers:
      a. DEBOURGH MANUFACTURING COMPANY.
         1) All welded Products equivalent to those listed as approved by the Owner with equivalent gages or parts listed in parenthesis after the LIST INDUSTRIES, INC. part items. No listing after the LIST INDUSTRIES parts means that DEBOURGH will supply the parts listed.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. General Locker Design:
   1. Material: All locker components to be made of prime grade cold rolled steel free from imperfections and capable of taking a heavy coat of high gloss baked enamel, unless otherwise indicated.
      a. Doors: shall be fabricated from 14 gage outer door with 7/8" bend at top and bottom and 18 gage inner horizontal stiffener welded to outer door at the recessed latch assembly and inside face of the door, approximately six inches from the top and bottom of the door to allow for ventilation when called for, to form torque free double pan door.
      b. Vertical Dividers: shall be solid 18 gage cold rolled steel framed by 16 gage hollow "T" roll formed sections designed to conceal all edges of divider with entire assembly mig welded on 9" centers. Dividers to have 16 gage channel bracing welded at bottom to form rigid frame for each locker unit.
         1) DEBOURGH dividers to be 1" x 1" x 1/8" angle with 16 gage solid internal panels.
      c. Tops and Bottoms: shall be formed from solid 16 gage cold rolled steel. Bottoms to be made of electro-galvanized painted steel. Sloping hoods of 16 gage steel shall be secured in place at time of installation in addition to the 16 gage flat top which is already an integral part of each unit.
      d. Backs: Backs shall be solid 18 gage solid cold rolled steel securely mig welded.
      e. Sides: Sides (when not dividers) shall be solid 16 gage solid cold rolled steel securely mig welded.
      f. Closure: for door by manufacturer's standard nylon friction bumper fastened into the edge of the door.

g. Recessed Locker Handle: to be 22 gage stainless steel in a trapezoid shape to receive Owner supplied heavy duty padlocks. Handle shall be equipped with a full width stainless steel pull for easy opening. Rear of pan to be totally enclosed by door liner. Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.

h. Latch Assembly: shall be a single point rigid non-moving positive latch by means of a heavy gage latch (minimum 11 gage) securely welded to a full length 12 gage continuous door strike welded to the vertical frame divider which will attach inside the recessed pocket for flush clean appearance. The latch shall be reinforced for rigidity using an angle gusset welded to both the locker side and the frame. Provide a pry resistant lug as an integral part of the 11 gage latch. Rubber bumpers shall be securely attached to the strike.

i. Hinges: shall be minimum 13 gage, 3-1/2" long tight pin, seven knuckle type, securely riveted to frame and welded to door - all doors shall have a minimum of two fasteners, unless otherwise indicated.

1) Three hinges provided on doors of 42" and over.

2) Two hinges on doors less than 42".

3) DEBOURGH hinges shall be a minimum 3" long five knuckle pin type welded to frame and door for "a" and "b" above only.

j. Interior Equipment: Single tier lockers 12" or wider are provided with one double prong ceiling hook and three single prong wall hooks. Double and triple tier provided with two single prong wall hooks. Single tier lockers shall have one hat shelf located 12" below top of the locker on 72" models. Double and triple tier lockers have no shelf.

1) Shelves: shall be solid 16 gage with 1-1/8" x 3/8" bend at front edge.

k. Number Plates: to be polished aluminum not less than 3/8" high with etched numbers on black background attached by means of pop rivets. Accessible designated lockers to have the letter "A" etched in front of the numbers.

l. Continuous sloping tops: of solid 16 gage cold rolled steel, pitched per manufacturer's standard to prevent stacking of materials on top. All edges to have 1/2 inch return as indicated on the drawings, and joints shall line up with locker groupings below.

m. Boxed-end panels: of solid 16 gage cold rolled steel at all exposed "ends" of locker bays. This is to be in addition to the standard locker side panel. Panels to be attached with concealed fasteners. All ends to be one homogeneous piece for both bays with no seams in the middle.

n. All corner and front filler panels: are to be solid 16 gage cold rolled steel. See drawings and verify with Contractor the locations necessary for these filler panels.

B. Student Gym:

1. Same as the General Locker Design except for the following:

a. Doors: Doors shall be provided with manufacturer's stamped "Security-Plus Vents" for ventilation. Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.

1) "Secur-N-Vents" by DEBOURGH is an acceptable equivalent to the "Security-Plus Vents" by LIST as listed above.

b. Backs: Backs shall be 13 gage flattened expanded metal securely mig welded.

c. Recessed Locker Handle: to be 22 gage stainless steel in a trapezoid shape to receive Owner supplied heavy duty padlocks. Handle shall be equipped with a full width stainless steel pull for easy opening. Rear of pan to be totally enclosed by door liner for "LIST INDUSTRIES." Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.

d. Latch Assembly: shall be a single point rigid non-moving positive latch by means of a heavy gage latch (minimum 11 gage) securely welded to a full length 12 gage continuous door strike welded to the vertical frame divider which will attach inside the recessed pocket for flush clean appearance. The latch shall be reinforced for rigidity using an angle gusset welded to both the locker side and the frame. Provide a pry resistant lug as an integral part of the 11 gage latch. Rubber bumpers shall be securely attached to the strike.

C. Student Dress:

1. Same as the Student Book Design except for the following:

a. Doors: Doors shall be provided with manufacturer's stamped "Security-Plus Vents" for ventilation. Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.

1) "Secur-N-Vents" by DEBOURGH is an acceptable equivalent to the "Security-Plus Vents" by LIST as listed above.

b. Backs: Backs shall be 13 gage flattened expanded metal securely mig welded.

c. Recessed Locker Handle: to be 22 gage stainless steel in a trapezoid shape to receive Owner supplied heavy duty padlocks. Handle shall be equipped with a full width stainless steel pull for easy opening. Rear of pan to be totally enclosed by door liner for "LIST INDUSTRIES." Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.

d. Latch Assembly: shall be a single point rigid non-moving positive latch by means of a heavy gage latch (minimum 11 gage) securely welded to a full length 12 gage continuous door strike welded to the vertical frame divider which will attach inside the recessed pocket for flush clean appearance. The latch shall be reinforced for rigidity using an angle gusset welded to both the locker side and the frame. Provide a pry resistant lug as an integral part of the 11 gage latch. Rubber bumpers shall be securely attached to the strike.

D. Coaches:

1. Same as the General Locker Design except for the following:

a. Doors: Doors shall be provided with manufacturer's stamped "Security-Plus Vents" for ventilation. Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.

1) "Secur-N-Vents" by DEBOURGH is an acceptable equivalent to the "Security-Plus Vents" by LIST as listed above.

b. Vertical Dividers: shall be 3/4" 13 gage flattened expanded metal framed by 16 gage hollow "T" sections designed to conceal all sharp edges of divider with entire assembly being mig welded. Dividers to have channel bracing at the bottom forming a rigid frame for each locker unit.

1) Vertical Dividers for the Intermediate School (due to venting options provided in floor slab) shall be solid 16 gage cold rolled steel framed by 16 gage hollow "T" roll formed sections designed to conceal all edges of divider with entire assembly mig welded on 9" centers. Dividers to have 16 gage channel bracing welded at bottom to form rigid frame for each locker unit.

c. Backs: Backs shall be solid 18 gage solid cold rolled steel securely mig welded.

1) Backs for the Intermediate School (due to venting options provided in floor slab) shall be 13 gage flattened expanded metal securely mig welded.

d. Shelves-Bottoms: shall be solid 16 gage electro-galvanized for bottoms with 1-1/8" x 3/8" bend at front edge.

e. Recessed Locker Handle: to be 22 gage stainless steel in a trapezoid shape to receive Owner supplied heavy duty padlocks. Handle shall be equipped with a full width stainless steel pull for easy opening. Rear of pan to be totally enclosed by door liner for "LIST INDUSTRIES." Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.

f. Latch Assembly: shall be a single point rigid non-moving positive latch by means of a heavy gage latch (minimum 11 gage) securely welded to a full length 12 gage continuous door strike welded to the vertical frame divider which will attach inside the recessed pocket for flush clean appearance. The latch shall be reinforced for rigidity using an angle gusset welded to both the locker side and the frame. Provide a pry resistant lug as an integral part of the 11 gage latch. Rubber bumpers shall be securely attached to the strike.

g. Base: Provide manufacturer's standard solid 16 gage, 4" high, extended welded base frame (including back and intermediate supports) for locker installation.

1) DEBOURGH base shall be 14 gage, 4" high, welded steel base enclosed on all four sides and securely welded to locker bottom.

2) Exception: See drawings for details regarding existing concrete base and venting to the back for the Intermediate School - no Base required.

E. Staff:

1. Same as the Coaches Lockers, with padlock options, 18 gage solid backs, 13 gage expanded metal vented sides and solid 16 gage metal base.

2.3 FINISHES

A. Baked-on enamel finish (or approved equivalent), two tone color selected by Owner, to all surfaces exposed and concealed, except plates and non-ferrous metal.

1. Powder Coat finishes as provide by DEBOURGH are an approved equivalent to the specified finishes listed above.

PART 3 - EXECUTION

3.1 FABRICATION

A. Prior to fabrication, inspect the installed existing conditions which affect the installation of Metal Lockers. Verify all clear finish dimensions that may affect the installation of the Metal Lockers.

1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.

2. Installation of Metal Lockers shall constitute acceptance of existing conditions.

B. All lockers to be pre-assembled of all mig welded construction in multiple column units to meet job conditions as shown on the drawings. Assembly of locker bodies by means of bolts, screws, rivets or other fasteners is not permitted.

1. Doors can be riveted to the frames, but must have the hinges welded to the door.

C. Finishing: Prepare metal substrates per manufacturer's written requirements and apply baked-on enamel finish, color selected by Owner, to all surfaces exposed and concealed, except plates and non-ferrous metal.

1. Color samples on metal to be utilized in the lockers will be provided from the manufacturer's full color range (including custom colors) for color selection by the Owner. Owner wants the two tone color option - 1 color for the frame, body and trim, and the other color for the doors.

3.2 INSTALLATION

A. In accordance with Regulatory Requirements.

B. In accordance with approved Submittals.

C. Under supervision of manufacturer or his authorized agent with factory trained mechanics.
   1. Units shall be set in place fully pre-assembled by mig welding and securely attached to the wall (or bolted together if back to back). Units shall also be anchored to the floor or base as shown on the drawings.
   2. Maximum fastener spacing shall be 48" o.c. Provide two fasteners minimum per ganged locker units at wall and floor/base locations.
      a. Anchor welded locker groups to floor/base 6" in from each locker unit end.
      b. Lockers shall be anchored to wall 6" from each locker unit end 6" below unit top and into locker floor/base.

3.3 SCHEDULES

A. Locker Schedule: Refer to Drawings.

LOCATION	SIZE (INCHES) W x D x H	NUMBER OF TIERS
BUILDING M		
Boys and Girls Gym Lockers	12 x 15 x 10	6
Boys and Girls Dress Lockers	12 x 15 x 30	2
Athletic Lockers	18 x 18 x 30	2
Team Lockers	18 x 18 x 60	1
Coaches Lockers	12 x 18 x 36	2

END OF SECTION

SECTION 105116 - PLASTIC LAMINATE LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specifications Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Plastic Laminate Lockers materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   2. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   3. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.3 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. BHMA BHMA stands for Builders Hardware Manufacturers Associates, Inc.
      b. NAAWS "North American Architectural Woodwork Standards," Latest Edition, including latest amendments, by the Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada, and the Woodwork Institute.
      c. NEMA National Electrical Manufacturers' Associates, Publication Number LD3, latest-edition
      d. NIST National Institute of Standards and Technology
      e. NWMA "Industrial Standard" National Woodwork Manufacturer's Association.
      f. PS Product Standard of the U. S. Department of Commerce
      g. WI Woodwork Institute

1.4 SUBMITTALS

A. General: Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data:
   1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
   2. Include preparation, storage and handling requirements.
   3. Include installation guide.

4. Include product date specific to materials used in construction of locker.
5. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.

C. Shop Drawings.
1. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
2. Submit Elevation Drawings: Indicate locker component profiles and elevations, schedule of finishes, and accessories.
3. Submit Locker Room Layout: Show a plan view of each room receiving lockers, scaled locker location, trim pieces, and ADA compliance.

D. Samples.
1. Finishes:
   a. Provide 12 inch square sample of each color and pattern selected.
2. Accessories/Trim/Etc.
   a. Provide 6 inch lineal samples of each piece of trim material specified.

E. Closeout Submittals in accordance with the following:
1. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
2. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
3. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
   a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
2. Manufacturer/Supplier Qualifications:
   a. Firm experienced in successfully producing/supplying products, similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be individually wrapped.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored in a dry, protected area.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
1. Temperature: Maintain ambient temperature in space to receive products at sixty-eight (68) degrees Fahrenheit for two (2) days prior, during, and two (2) days minimum following installation.
   a. After this period, maintain a temperature of not less than 55 degrees Fahrenheit.
   b. After installation, at no such time shall the temperature exceed 85 degrees Fahrenheit.
   c. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.
2. Humidity: Maintain humidity in space to receive products between 6 percent to 9 percent for four (4) days minimum prior, during, and following installation in accordance with manufacturer's recommendations. Inform the Owner of humidity requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

1.8 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty.
   a. Warranty period Twenty-Five (25) Years.

Installer's Warranty:
2. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified product manufacturer:

a. RFS SPORTS, INC. "Athletic Team Lockers – Impact Phenolic"

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Locker Frame:
1. Material shall be Solid Phenolic with a High Pressure Melamine matte finish surface made as an integral part of the core material. Laminated surfaces are not acceptable. Surface and edges shall be non-porous and shall not support fungus or bacteria. Provide material which has been selected for uniform color, surface flatness and smoothness. Exposed surfaces which exhibit discolorations, pitting, seam marks, roller marks, stains, telegraphing of core material, or other imperfections on finished units are not acceptable. Defects such as chipping along edges and corners are unacceptable.

B. Edges: Exposed edges to be black Phenolic.

C. Venting: 12mm air flow opening.

D. Configuration: Athletic.
1. Athletic: LS Model Lockbox with flip lid seat, stay lift hinge and ventilated metal grill footlocker.
   a. Size: 20” x 18” x 84”, See Drawings.
2. Athletic ADA : Open adjustable Shelves with Lockbox, See Drawings.
   a. Size: 20” x 18” x 84”, See Drawings.

E. Hardware:
1. Hooks: Standard: 4 - Double Garment Hooks.
2. Pull: 6" Satin Nickel Pull Bar.
3. Hardware for connecting lockers and securing trim provided by RFS Sports.

F. Accessories:
1. Infinity number plate: 2-inch-tall inlaid stainless-steel number plate.
2. Lockbox Lock: DIGILOCK Axis
   a. Body Style: Pull Handle
   b. Brush Nickel
   c. ADA Compliant User Key
3. 2-inch Vinyl Seat Cushion with Logo.
   a. Vinyl Color: Blue, Refer to Interior Color Schedule.
4. Base Trim: 4 inches.
5. Filler, End, Double End Panels.
   a. Exposed faces to be high-pressure decorative laminate to match Locker Frame.
6. Valance: 2"
   a. Exposed faces to be high-pressure decorative laminate to match Locker Frame.
7. Logos: Acrylic Emblem, Decal.
   a. Refer to Drawings for location.

2.3 MATCHING BENCH

A. Benches:

1. Material:
   a. Phenolic, Match Locker.
2. Pedestals: Provide all necessary Stainless Steel fasteners to secure Bench Pedestal to the floor and Bench Top.
   a. Material: Stainless Steel.
   b. Bench Pedestal shall be constructed of 11 Gauge Type 304 Stainless Steel and shall be 16.5” High. Center post shall be load bearing and shall extend from the floor to the bottom of the Bench Top. Top and bottom flanges shall be welded to center post and shall be 8” in diameter. Bench Pedestals shall be secured to floor with Stainless Steel Torx Head with Pin, #14 X 2” Screws.

2.4 FABRICATION

A. Shop Assembly:
   1. General: Provide factory pre-assembled Locker units. Lockers shall be complete with all hardware and accessories listed above. Knock down units are unacceptable.
   2. Slope Tops and End Panels: Provide Slope Tops and End Panels as required to complete the installation of the Lockers.

B. Fabrication Tolerances:
   1. Fabricate lockers square, rigid and without warp, with the finish free of defects.
   2. Machine all parts and attachment holes accurately and without chips and defects.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
   2. Verify prepared bases are in correct position and configuration per shop drawings and locker layout.
   3. Verify space is 100% "conditioned" and will remain so throughout and after the installation.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's instructions and recommendations.
2. Clean substrates of substances (oil, grease, compounds, incompatible primers, etc.) which could impair bond of materials specified within this section.

3.3 ERECTION / INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.

3.4 CLEANING

A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS.
1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
2. Clean any soiled surfaces immediately.
3. Clean any soiled surfaces at the end of each day, minimum.
4. Finish shall be clean and ready for the application of any additional finishes.
5. In accordance with manufacturer's instructions and recommendations.

3.5 PROTECTION

A. Protection from weather:
1. Protect newly installed work from freezing for twenty-four (24) hours after erection, installation or application.

B. Protection from traffic:
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.
2. Immediately after cleaning, neatly apply four (4) mil thick, minimum, polyethylene film over finished surfaces at traffic areas. Fasten film firmly to surface.

3.6 SCHEDULES

A. Locker Schedule Per Room:
1. Room M113 Boys Team Room (Refer to Drawings).

a.	**TYPE**	**SIZE (INCHES) W x D x H**	**QUANTITY**
b.	Athletic	20 x 18 x 84	26
c.	Athletic ADA	20 x 18 x 84	2
d.	Bench	54 x 20 x 18	1

2. Room M120 Girls Team Room (Refer to Drawings).

a.	**TYPE**	**SIZE (INCHES) W x D x H**	**QUANTITY**

b.	Athletic	20 x 18 x 84	26
c.	Athletic ADA	20 x 18 x 84	2
d.	Bench	54 x 20 x 18	1

END OF SECTION

SECTION 105626 – MOBILE STORAGE UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Mobile Storage Unit materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
      a. Mechanical Assist Operation.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 09 65 16 RESILIENT SHEET
   5. 09 65 19 RESILIENT TILE
   6. 09 68 40 CARPET
   7. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   8. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. AISI American Iron and Steel Institute
      b. ALA American Library Association

1.3 SYSTEM DESCRIPTION

A. Design Requirements: In accordance with allowable values and properties assigned and approved by CBC.
   1. Seismic Performance: Provide mobile storage units capable of withstanding the effects of earthquake motions determined according to the building code in effect for this Project or ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 9, "Earthquake Loads," whichever is more stringent.
   2. Ease Of Movement:
      a. Provide mechanically assisted units capable of being moved by exerting a maximum horizontal force of 5 lbs. on the operating wheel.

B. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.

1. General: The system consists of storage units mounted on manufacturer's track-guided carriages to form a compact storage system. System design permits access to any single aisle by manually moving units until the desired aisle is opened. The carriage/rail system provides uniform carriage movement along the total length of travel, even with unbalanced loads.
2. Carriage System Design and Features:
   a. The carriage system consists of a formed structural steel frame with hardened steel wheel riding on steel rails mounted to the floor.
   b. Rails shall be types selected in writing by the manufacturer to ensure smooth operation and self-centering of mobile storage units during travel without end play or binding.
   c. All bearings used in the drive mechanism shall be permanently shielded and lubricated.
   d. Rail types, quantities and spacing shall be selected in writing by the manufacturer to suit installation conditions and requirements.
3. Movement Controls:
   a. Triple arm operating wheels with rotating hand knobs shall be provided on the accessible (drive) ends of shelf units, centered on the end panel, located 39" from the base of each unit to permit units to be moved to create a single aisle opening.
   b. Turning the handle transmits power through a chain drive-to-drive wheels on each carriage.
4. Drive System: The system shall be designed with a positive type mechanically assisted drive, which minimizes endplay, ensures there is no play in the drive handle, and that carriages will stop without drifting.
   a. System shall include a chain sprocket drive system for each movable carriage to ensure that carriages move uniformly along the total length of travel, even with unbalanced loads. All system components shall be selected to ensure a smooth, even movement along the entire carriage length.
   b. Drive system gearing shall be designed to permit 1 lb. of force applied to the drive handle to move a minimum of 4,000 lbs. of load. Optional gear ratio to be provided which offer 1:6,000, 1:8,000 or 1:10,000.
   c. A tensioning device shall be provided on each chain drive with provision for adjusting tension without removing end panels. Adjustments that require removal of end panels are not acceptable.
   d. All bearings used in the drive mechanism shall be permanently shielded and lubricated
5. Safety Features:
   a. Color-coded visual indicators shall provide verification that carriages are in a locked or unlocked mode.
   b. A single safety lock button, mounted on each operating wheel hub, will permit moving a carriage in either direction to create a new access aisle when pulled out (unlocked), or locking the carriage when pushed in.
6. Finishes:
   a. Fabricated Metal Components and Assemblies: Manufacturer's standard powder coat paint finish.
   b. End Panels, Accessible Ends: High Pressure Plastic laminate, manufacturer's standard textures and patterns.

1.4 DEFERRED APPROVAL

A. The plans and specifications shall be prepared and stamped by a structural engineer licensed in the State of California.

B. The drawings shall clearly establish the loading and performance criteria; Title 24, Part 1, 4-317 (g).

C. Anticipate the DSA review and approval process to take 6 months in duration.

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data:
   a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
   b. Submit manufacturer's product literature and installation instructions for each type of shelving, track and installation accessory required. Include data substantiating that products to be furnished comply with requirements of the contract documents.
2. Shop Drawings:
   a. Submit shop drawings prepared by, or under the supervision of a registered Civil or Structural Engineer in the State of California, detailing fabrication and assembly of the work under this section, as well as procedures and diagrams. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as unit of work of other related sections.
   b. Show fabrication, assembly, and installation details including descriptions of procedures and diagrams. Show complete extent of installation layout including clearances, spacing, and relation to adjacent construction in plan, elevation, and sections. Indicate clear exit and access aisle widths; access to concealed components; assemblies, connections, attachments, reinforcement, and anchorage; and deck details, edge conditions, and extent of finish flooring within area where units are to be installed.
      1) Show installation details at non-standard conditions. Furnish floor layouts, technical and installation manuals for every unit shipment with necessary dimensions for rail layout and system configuration at the project site. Include installed weight, load criteria, furnished specialties, and accessories.
      2) Provide layout, dimensions, and identification of each unit corresponding to sequence of installation and erection procedures. Specifically include the following:
         a) Location, position and configuration of tracks on all floors.
         b) Plan layouts of positions of carriages, including all required clearances.
         c) Details of shelving, indicating method and configuration of installation in carriages.
      3) Provide location and details of anchorage devices to be embedded in or fastened to other construction.
      4) Provide installation schedule and complete erection procedures to ensure proper installation.
3. Quality Assurance/Control Submittals:
   a. Manufacturer's Written Instructions:
      1) Submit three (3) copies of manufacturer's written instructions.
   b. Engineering Calculations:
      1) Submit four (4) copies of engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.
4. Closeout Submittals in accordance with the following:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.

c. Project Documents in accordance with Specification Section - PROJECT DOCUMENTS.
d. Warranty in accordance with Specification Section - WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
1) Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
a. Coordinate the work with all other related work.
b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.
3. Contractor: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted at final inspection.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Environmental requirements:

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.9 SEQUENCING AND SCHEDULING

A. Sequencing: Coordinate storage shelving system installation with other work to minimize possibility of damage and soiling during remainder of construction period.
1. Scheduling: Plan installation to commence after finishing operations, including painting have been completed.
2. Built-In Items: Provide components which must be built in at a time which causes no delays general progress of the Work.
3. Review and verify structural loading limitations.

1.10 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Provide a written warranty, executed by Contractor, Installer, and Manufacturer, agreeing to repair or replace units which fail in materials or workmanship within the established warranty period. This warranty shall be in addition to, and not a limitation of , other rights the Owner may have under General Conditions provisions of the Contract Documents.
1) Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.
2) Warrant the entire movable compact shelving installation against defects in materials and workmanship.
b. Warranty period Five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer, or approved equivalent:
      a. SPACESAVER CORPORATION
         1) As provided by SYSTEMS & SPACE.
      b. Acceptable alternative manufacturers:
         1) KARDEX.
         2) TAB PRODUCTS CO.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General: Provide materials and quality of workmanship which meet or exceed established industry standards for products specified. Material thickness/gages are manufacturer's option unless indicated otherwise.

B. Plastic Laminates: NEMA LD-3, GP-28, Vertical Grade.

2.3 MANUFACTURED UNITS

A. Rails:
   1. Material: AISI Type 1035 or 1045 steel, manufacturer's written selection.
   2. Capacity: 1,000 pounds per lineal foot of carriage.
   3. Minimum Contact Surface: 5/8 inch wide.
   4. Rail configuration shall permit attachment to top of structural floor system with provision for leveling rails to compensate for variations in floor surface level.
   5. Provide rail connections designed to provide horizontal and vertical continuity between rail sections, to gradually transfer the concentrated wheel point load to and from adjoining rail sections. Butt joints are not permitted.

B. Raised Floor and Ramp:
   1. Raised floor and ramp sheathing: Minimum 3/4 inch, 5-ply underlayment grade plywood. Particle board sheathing materials are not permitted. Provide fire retardant treated floor/ramp materials when required by code.
   2. Finished flooring materials shall be provided by others.

C. Carriages:
   1. Carriage to be capable of supporting 1,000 lbs. minimum per carriage foot length. Carriages rated at 750 lbs. per carriage foot length are not acceptable.

2. Provide manufacturer's design movable carriages fabricated of welded or bolted steel construction. Galvanized structural components and/or riveted carriages are unacceptable.
3. Provide fixed carriages of same construction and height as the movable carriages, anchored to rails. Setting fixed shelving directly on floors is not permitted.
4. Design carriages to allow the shelving uprights to recess and interlock into the carriages a minimum of 3/4 inch. Top mount carriages are unacceptable.
5. Provide each carriage with two wheels per rail.

D. Drive System:
1. Design: Provide drive system which prevents carriage whipping, binding and excessive wheel/rail wear under normal operation.
   a. If synchronized drives are used, a minimum of one wheel assembly driving both sides of carriage at center location required. Drive shaft shall exhibit no play or looseness over the entire length of that assembly.
2. Shafts: Solid steel rod or tube.
3. Shaft Connections: Secured couplings.
4. Bearing Surfaces: Provide rotating load bearing members with ball or roller bearings. Provide shafts with pillow block or flanged self-aligning type bearings.

E. Wheels:
1. Materials: AISI Type 1045 solid steel. Minimum load capacity per wheel: 3200 lbs.
2. Size: Minimum 5 inches, outside diameter drive wheels.
3. Guides: Determined in writing by manufacturer; minimum 2 locations.

F. Face Panels:
1. Materials: Plastic laminate clad particle board with plastic edging on vertical edges.
2. Finishes: Selected from manufacturer's standard available colors and patterns.

G. 4-Post shelving:
1. Finishes: Powder coated finish, selected from manufacturer's standard available colors and patterns.
2. Design: Wedge-lock type consisting of uprights, shelves, and shelf supports, designed to be assembled without fasteners or clips. Shelves shall not have any holes on exposed surfaces. Front and back flanges shall be flush with outside faces of posts. Design shall permit individual shelf adjustment and/or removal anywhere along the entire height of uprights.
3. Materials and Workmanship: Fabricate units from Class 1, cold-rolled steel sheet with all bends sharp and true and no exposed "knife" edges.
4. All units shall be free of burrs, sharp edges and projecting hardware with smooth, non-abrasive surfaces and edges.
5. After fabrication, shelving shall exhibit no dents, "oil canning," buckling or other surface irregularities.
6. Uprights: Formed from steel sheet to a "tee" shape for intermediate supports and formed angles for end supports. Uprights shall have keyhole slots on inner wall only. Provide with closed sheet steel panels full height and depth for all uprights. Open uprights are not acceptable.
7. Shelves: Form from sheet steel with flanges on all sides and return hem on front and back flanges. Ends shall be formed to clear inside of upright offset panels. Shelves shall be independently adjustable. Provide all shelves with slots for file dividers. Provide "Back to Back" Panels with full height Back Panels.
8. Canopy Tops: Same construction as shelf units.
9. Shelf Supports: Form from heavy gage steel sheet with four solid steel shoulder rivets, two per ear that interlock with inner wall of uprights.
10. Nominal Shelf Dimensions:

a. Standard Width: 36 inches, with 30, 42, or 48 inch sections used to meet project requirements.
b. Shelf Depth: 12 inches.
c. Shelf edge vertical profile to be 3/4 inch maximum.

11. Vertical adjustment increment to be 1-1/2 inches. Width of intermediate uprights to be 2 inches.
12. Number of vertical shelf openings to be 7.
13. Vertical shelf-to-shelf spacing to be 11-1/4".
14. Provide 2-Dividers.
15. The painting process is an electrostatically applied powder coating system using an epoxy-polyester hybrid powder paint. All over spray is collected and reused within the self-contained application booths with no venting or emissions to the environment. The film is applied to an average thickness of 1 to 1.5 mils. The coated parts are then oven cured for 20 minutes at up to 450 degrees to provide a furniture quality finish. The hot parts are cooled to ambient temperature prior to packaging. After curing, the paint finish is inert and no volatile emissions are present. There are no fugitive (stray) emissions in the finished product.
16. Color to be selected from manufacturers standard color card.

2.4 ACCESSORIES

A. Grout:
1. General: Provide non-shrink, non-staining hydraulic cement compound conforming to the following requirements, based on the performance of the test specimens at room temperature and in laboratory air.
   a. Linear Movement: No shrinkage while setting; maximum expansion limited to 0.002 inches per linear inch.
   b. Compressive Strength: Based on two inch cubes made following ASTM standards, tested on a Balding-Southward machine of 60,000 lbs. capacity, meet or exceed the following:
      1) Age:
         a) 1 hour 4,500 p.s.i.
         b) 7 days 8,000 p.s.i.

B. Rail Form Covers:
1. Provide manufacturer's protective rail covers to prevent damage to rails.

2.5 FABRICATION

A. General: Coordinate fabrication and delivery to ensure no delay in progress of the Work
1. Wheels: Provide precision ground, balanced and hardened units with permanently shielded and lubricated bearings.
2. Carriages: Fabricate to ensure no more than 1/4 inch maximum deviation from a true straight line. Splice and weld to ensure no permanent set or slippage in any spliced or welded joint when exposed to forces encountered in normal operating circumstances.
3. Shelving, Supports And Accessories: See individual descriptions in "Shelving" paragraphs.

2.6 FINISHES

A. Colors: Selected from manufacturer's standard available colors.

1. Paint Finish: Provide factory applied electrostatic powder coat paint. Meet or exceed specifications of the American Library Association.
2. High Pressure Plastic Laminate Finish: Provide factory applied laminate panels at locations indicated on approved shop drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.

C. Rails:
1. Lay out rails using full length units to the maximum extent possible. Use cut lengths only at ends to attain total length required. Locate and position properly, following dimensions indicated on approved shop drawings. Verify thickness of finished floor materials to be installed (by others) and install level 1/16 inch above finished floor surfaces.

2. Verify level, allowing for a minimum 1/4 inch of grout under high points. Position and support rails so that no movement occurs during grouting.
3. Set rails in full grout bed, completely filling any voids entire length of all rails including rail connectors. Trim up sides flush with rails to ensure proper load transfer from rail to supporting floor. Using shims in lieu of full grouting is not permitted.
4. Installation Tolerances: Do not exceed levelness of installed rails listed below:
   a. Maximum Variation From True Level Within Any Module: 3/32 inch.
   b. Maximum Variation Between Adjacent (Parallel) Rails: 1/16 inch, perpendicular to rail direction.
   c. Maximum Variation In Height: 1/32 inch, measured along any 10 foot rail length.
5. Verify rail position and level; anchor to structural floor system with anchor type and spacing indicated on approved shop drawings.

D. Floors / Ramps:
1. General: Finished elevation shall be 1/16 inch below top of rails.
2. Place floors and ramps to the extent indicated on approved shop drawings. Extend ramps under all movable ranges. Provide ramp at both ends of mobile system. Do not extend ramps beyond the ends of carriages.
3. Construct floors and ramps to prevent warping or deformation of floor panels in a normal operating environment. Support panels on levelers at maximum 16 inches on center.
4. Ramp Slope: Do not exceed the following: ADA Accessible Ramps: Maximum 1:12 slope (4.76 degrees).

E. Carriages:
1. Place movable carriages on rails. Ensure that all wheels track properly and centering wheels are properly seated on centering rails. Fasten multiple carriage units together to form single movable base where required. Position fixed carriage units to align with movable units.

F. Shelving Units Installation:
1. Shelving Units:
   a. Permanently fasten shelving units to fixed and movable carriages with vibration-proof fasteners.
   b. Stabilize shelving units following manufacturer's written instructions. Reinforce shelving units to withstand the stress of movement where required and specified.

3.4 FIELD QUALITY CONTROL

A. Verification of Installation prior to Inspection:
1. Verify shelving unit alignment and plumb after installation. Correct if required following manufacturer's written instructions. Remove components which are chipped, scratched, or otherwise damaged and which do not match adjoining work. Replace with new matching units, installed as specified.

B. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 ADJUSTING

A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

3.6 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. Finish shall be clean and ready for the application of any additional finishes.
   3. In accordance with manufacturer's written instructions and recommendations.

3.7 PROTECTION

A. Protect system against damage during remainder of construction period. Advise Owner of additional protection needed to ensure that system will be without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 11 40 00 - FOOD SERVICE EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. The work referred to in this section consists of furnishing all labor and material required to provide and deliver all food service equipment hereinafter specified into the building, uncrate, assemble, hang, set in place, level, and completely install, exclusive of final utility connections. Final utility connections to all equipment, shall be part of the work under additional appropriate sections of the work and not part of the food service work.

1. The equipment and its component parts shall be new and unused. All items of standard manufactured equipment shall be current models at the time of delivery. Parts subject to wear, breakage, or distortion shall be accessible for adjustment, replacement and repair.

2. The materials or products specified herein by trade names, manufacturer's name or catalog number shall be provided as specified. Substitutions will not be permitted unless approved by owner's representative in writing no later than 10 days prior to bidding. This stipulation applies to all equipment and materials.

a. Any request for substitution or alternate must include documentation supporting that the requested substitution/alternate will perform in all aspects as well as the original specification. Alternative exhaust hood manufacturers are required to provide heat load based design exhaust volume calculations prior to alternate being considered. Request must include the following:

1) Grease filtration performance data and manufacturer's own airflow calculations based on convective heat load of cooking equipment beneath the hood.

2) Efficiency comparison data performed in accordance with ASTM Standard F1704-96 for a standard 24" high exhaust hood.

3) A written guarantee of compliance with Title 24 Part 6 with Kitchen Ventilation acceptance tests NA7.11.1.2 and NA7.11.1.3.

b. Should no request for substitution be received and approved as stated above, the project is to be provided as specified.

3. The food service equipment contractor shall be responsible for all costs associated with the acceptable alternate or approved alternate items, if the item requires additional space or specific utilities that differ from specifications or drawings. The FSEC is responsible for all coordination, documentation and costs

associated with any alternate item that was not submitted for approval and accepted by the consultant prior to bid. The FSEC shall be responsible for any costs associated with building changes, utility changes and drawings changes. All substitution requests must be approved by Webb Foodservice Design during the bid process. Substitutions after the project award will not be accepted.

B. Coordinate Owner and Vendor-supplied equipment noted on the drawings or in the specifications as NIFSEC, "not in food service equipment contract". Show on roughing in Plans and sizes, utilities, and other requirements as furnished in the specifications, by owner or appropriate supplier in submittals as if the equipment is contractor furnished.

C. Bidders shall carefully examine the specifications and the project site including location and condition of existing equipment to determine cost for each “Existing-Reset” and “Existing-Modify” item to cover removal, modification (including materials), cleaning, inspection for damage, repair and resetting.

D. Field measurements shall be made prior to fabrication or installation of any equipment item.

E. The cutting of holes in equipment for pipe, drains, electrical outlets, etc., required for this installation, shall be part of this work. Work shall conform to the highest standards of workman-ship and shall include welded sleeves, collars, ferrules and escutcheons.

F. Repair of all damage to the premises as a result of the equipment installation as well as the removal of all debris left by the work of this section.

G. Food service equipment and fixtures shall be cleaned and ready for operation at the time the facility is turned over to the Owner for final inspection by the Owner’s Representative.

H. Food Service Equipment Contractor shall be responsible for coordinating with the Architect and Contractor in submitting all applicable documents.

I. All bidders shall submit with their itemized costing a list of the subcontractors that are included in their bids and a complete "schedule of values" for all equipment and labor.

J. The food service equipment contractor shall submit an itemized Schedule of Values to Webb Foodservice Design for acceptance no later than 30 days after bid date using a “Schedule of Values” format.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Related Work In Other Sections by appropriate trades include the following:

1. Division 5 Section "Metal Fabrications" for equipment supports.

2. Division 6 Section “Interior Architectural Woodwork” for wood casework and plastic laminate substrates.

3. Refer to Division 23 Sections for supply and exhaust fans; exhaust ductwork; demand control ventilation requirements; service roughing-ins; drain traps; atmospheric vents; valves, pipes, and fittings; fire extinguishing systems; and other materials required to complete food service equipment installation.

4. Refer to Division 26 & 28 Sections for connections to fire alarm systems, wiring, disconnects, and other electrical materials required to complete food service equipment installation.

C. All electric services including wiring to, and final connections to, the fixtures except, as specified differently in the specifications, drawings, or herein.

D. All water, waste and gas services to the fixtures including shut-off valves, trim, traps, etc., and final connections to the fixtures, except as specified differently in the specifications, drawings, or herein.

E. All hood or ventilator duct work above the connection position on such exhaust hoods or exhaust ventilators, except as specified differently in the specifications, drawings, or herein. Final welded connections at the junction point of exhaust hoods or exhausts ventilators, shall be part of the food service work.

F. Floors, quarry tile, concrete bases, walls, ceilings, finishes and related building work, except as specified differently in the specifications, drawings or herein.

1.3 DEFINITIONS

A. Terminology Standard: Refer to NSF 2, "Food Equipment", NSF 4, Heated Cabinets, NSF 7, Refrigerated Equipment, or other applicable NSF standards for definitions of food service equipment and installation terms not otherwise defined in this Section or in other referenced standards.

B. FSEC: Food Service Equipment Contractor

C. Owner-Furnished Equipment: Where indicated, Owner will furnish equipment items.

D. Vendor-Furnished Equipment: Where indicated the Owner's or operator's vendor will furnish equipment items.

E. NIFSEC: Not Included in Food Service Equipment Contract.

1.4 SUBMITTALS

A. Submittal Process: All submittals will be reviewed within 10 days upon receipt by Webb Foodservice Design. All submittals shall be separated as a stand-alone digital file and submittal by discipline with identifying tracking number (i.e. 11400.1, 11400.2 etc..) as listed below. Any other disciplines for particular project will be submitted and given the

next available tracking number. Do not submit all files into one document, submittals must be received and reviewed as separate packages as outlines below:

1. 11400.1 Product Data Submittal Book
2. 11400.2 FSEC Utility Rough-in Construction Documents Drawings
3. 11400.3 Walk In Box Submittal
4. 11400.4 Refrigeration Rack Submittal
5. 11400.5 Exhaust Hood Submittal
6. 11400.6 Fire Suppression Submittal
7. 11400.7 Custom Stainless Steel Submittal
8. 11400.8 Custom Millwork Submittal
9. 11400.9 Custom Sneeze Guards Submittal

B. Regardless of drawing formats provided it will remain the responsibility of equipment supplier to develop submittals in accordance with the Specific Conditions and assume all required responsibilities there to. The consultant is not to be liable for errors or omissions by the FSEC's use of electronic data provided by the Consultant or the development of data used in the submittal approval process. Checking product data, rough-in drawings, wall backing drawings, shop drawings, and refrigeration drawings by Designer is for design concept only, and does not relieve the Food Service Equipment Contractor of responsibility for compliance with Contract Documents, verification of utilities with equipment requirements for conformity and location, verification of all dimensions of equipment and building conditions or reasonable adjustments due to deviations.

C. The Food Service Equipment Contractor shall review and provide an affidavit through the proper channels and chain of command with each submittal stating that such review has been completed by an authorized agent of the food service equipment contractor.

D. Product Data: For each type of food service equipment indicated. Include manufacturer's model number and accessories and requirements for access and maintenance clearances, water and drainage, power or fuel, and service-connections including roughing-in dimensions.

E. Shop Fabrication Drawings: For food service equipment not manufactured as standard production and/or catalog items by manufacturers the fabricator of the equipment shall prepare and submit through the Food Service Equipment Contractor one electronic file of all shop drawings showing all information necessary for the fabrication and installation of the work of this section. Include plans, elevations sections, material schedule, roughing-in dimensions, fabrication details, service requirements and attachments to

other work. All drawings to be fully detailed and dimensioned to a minimum scale of ¾ inch to the foot for plan and elevation views and 1-½ inch to the foot for section views. Reduced or enlarged drawings are not acceptable. Drawings not submitted in the proper format will be returned as unreviewed.

1. Wiring Diagrams: Details of wiring for power, signal, and control systems and differentiating between manufacturer-installed and field-installed wiring.

2. Piping Diagrams: Details of piping systems and differentiating between manufacturer-installed and field-installed piping.

3. All custom fixtures shop drawings must show proper sneeze guard and built-in equipment relationships as well as all switch locations.

F. Coordination Drawings: For locations of food service equipment and service utilities. Key equipment with item numbers and descriptions indicated in Contract Documents. Include plans and elevations of equipment, access- and maintenance-clearance requirements, details of concrete, masonry or metal bases and floor depressions, and service-utility characteristics. Ventilation requirements for refrigerated equipment shall be identified in these drawings.

G. Contract Document Drawings:

1. Drawings furnished, constitute a part of these specifications and show locations of equipment and general arrangement of mechanical and electrical services. Necessary deviation from the illustrated arrangements to meet structural conditions, shall be considered a part of the work of this section. Such deviations shall be made without expense to the owner. Equipment drawings are definitive only and should not be used as construction documents or shop details.

2. The drawings are for the assistance and guidance of the Food Service Equipment Contractor. Exact locations shall be governed by the building configuration. The Food Service Equipment Contractor shall accept his contract with this understanding.

3. Should there be a conflict between the drawings and the specifications, the FSEC shall submit a “Request for Information” (RFI) for clarification.

H. Utility Rough-in Drawings:

1. The Food Service Equipment Contractor shall prepare and submit one electronic file each (separately), of all roughing-in drawings, showing information necessary for the roughing-in of refrigerant lines, syrup/beer lines, plumbing, steam, mechanical and electrical utility requirements. Drawings shall also include construction requirements necessary for all equipment including floor depressions, raised bases, wall blocking, wall recesses and any critical dimensions for specific equipment requirements. Acceptance will be made upon the electronic file or one

print which will be returned to the Food Service Equipment Contractor for reproduction purposes. Drawings not properly submitted in this format, will not be reviewed. Drawings without an “Accepted” or “Accepted as noted” stamp, will not be considered an authorized shop drawing and will not be allowed on the job site.

a. Furnish four (4) sets “Accepted” and/or “Accepted as Noted” shop drawings, for distribution to the field, as directed.

I. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for exposed products with color finishes.

J. Samples for Verification: Of each type of exposed finish required, minimum 4-inch- (100-mm-) square or 6-inch- (150-mm-) long sections of linear shapes and of same thickness and material indicated for work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

K. Product Certificates: Signed by manufacturers of refrigeration systems, refrigerated equipment or their authorized agents certifying that systems furnished comply with NSF 7 requirements and will maintain operating temperatures indicated in the areas or equipment that they will serve.

L. Maintenance Data: Operation, maintenance, and parts data for food service equipment to include in the maintenance manuals specified in Division 1. Include a product schedule as follows:

1. Product Schedule: For each food service equipment item, include item number and description indicated in Contract Documents, manufacturer's name and model number, and authorized service agencies' addresses and telephone numbers.

2. See itemized specifications for closeout and owner’s maintenance manual requirements.

1.5 QUALITY ASSURANCE AND LAWS AND ORDINANCES

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing food service equipment, who has completed installations similar in design and extent to that indicated for this Project, and who has a record of successful in-service performance. See specifications section 3.5 for installation requirements pertaining to refrigeration, fire suppression, and walk in box installation as well as food service drawings.

B. Manufacturer Qualifications: Engage a firm experienced in manufacturing food service equipment similar to that indicated for this Project and with a record of successful in-service performance. See itemized specifications section 3.5 for custom fabricated stainless steel and/or millwork. Food Service Equipment Contractor to submit and procure specified custom manufacturer as listed in the itemized specifications as this

company has demonstrated quality control and proper coordination from design development through closeout requirements.

C. Source Limitations: Obtain each type of food service equipment through one source from a single manufacturer.

D. Product Options: Drawings indicate food service equipment based on the specific products indicated. Other manufacturers' equipment with equal size and performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

E. Regulatory Requirements: Comply with the following National Fire Protection Association (NFPA) and California Electrical Codes (CBC) codes:

1. NFPA 17, "Dry Chemical Extinguishing Systems."

2. NFPA 17A, "Wet Chemical Extinguishing Systems."

3. NFPA 54, "National Fuel Gas Code."

4. NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations."

5. CEC, California Electrical Code, 2019

6. The FSEC shall certify that all work and materials comply with Federal, State and Local laws, ordinances, and regulations and is confirmed by the local inspector having jurisdiction.

   a. US PUBLIC HEALTH SERVICE

   b. LOCAL HEALTH DEPARTMENT

   c. OSHA

   d. UL

   e. HACCP

   f. NFPA 96 – Current

   g. ADA

   h. OSHPD

   i. DSA

F. Listing and Labeling: Provide electrically operated equipment or components specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

G. AGA Certification: Provide gas-burning appliances certified by the American Gas Association (AGA).

H. ASME Compliance: Fabricate and label steam-generating and closed steam-heating equipment to comply with ASME Boiler and Pressure Vessel Code.

I. ASHRAE Compliance: Provide mechanical refrigeration systems complying with the American Society of Heating, Refrigerating and Air-Conditioning Engineers' ASHRAE 15, "Safety Code for Mechanical Refrigeration."

J. Food Service Equipment: Where provided, check-out aisles, sales counters, service counters, food service lines, queues, and waiting lines shall comply with CBC Sections11B-227 and 11B-904. The top of tray slides shall be 28” minimum and 34” maximum above finish floor. Space and elements within food service employee work areas shall meet the requirements of CBC Section 11B-203.9. Food service equipment required to be accessible shall conform to all reach requirements in CBC Figures 2019, 11B-403.5.1, 11B-227.4, 11B-904.5, 11B-904.5.1, and 11B-904.5.2.

K. NSF Standards: Comply with applicable NSF International (NSF) standards and criteria and provide NSF, UL Sanitation or ETL Sanitation Certification Mark on each equipment item, unless otherwise indicated.

L. ANSI Standards: Comply with applicable ANSI standards for electric-powered and gas-burning appliances; for piping to compressed-gas cylinders; and for plumbing fittings, including vacuum breakers and air gaps, to prevent siphonage in water piping.

M. SMACNA Standard: Where applicable, fabricate food service equipment to comply with the Sheet Metal and Air Conditioning Contractors National Association's (SMACNA) "Food Service Equipment Fabrication Guidelines," unless otherwise indicated.

N. Seismic Restraints: Provide seismic restraints for food service equipment according to the Sheet Metal and Air Conditioning Contractors National Association's (SMACNA) "Food Service Equipment Fabrication Guidelines," appendix 1, "Guidelines for Seismic Restraints of Kitchen Equipment," unless otherwise indicated.

O. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

P. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Review methods and procedures related to food service equipment including, but not limited to, the following:

1. Review access requirements for equipment delivery.

2. Review equipment storage and security requirements.

3. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

4. Review structural loading limitations.

5. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

Q. Walk-in cooler and/or freezer shall comply with CBC Figures 2019, 11B-404.2.4, 11B-404.2.4.4. 11B-404.2.7 and 11B-309.4.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver food service equipment as factory-assembled units with protective crating and covering.

B. Store food service equipment in original protective crating and covering and in a dry location.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of food service equipment installation areas by field measurements before equipment fabrication and indicate measurements on Shop Drawings and Coordination Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish required dimensions and proceed with fabricating equipment without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

2. Food service aisles shall be a minimum 36” wide and tray slides shall be mounted at 34” maximum above the floor. Ensure compliance with paragraphs 1.5.J and 1.5.Q.

3. Pass-thru windows for food service shall conform to the reach and access requirements of paragraphs 1.5.J and 1.5.Q. Accessible pass-thru shelves shall not exceed 34-inch height above interior finished floor surface or exterior pavement.

1.8 COORDINATION

A. Coordinate equipment layout and installation with other work, including light fixtures, HVAC equipment, and fire-suppression system components.

B. Coordinate location and requirements of service-utility connections.

C. Coordinate size, location, and requirements of concrete bases, positive slopes to drains, floor depressions, and insulated floors. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

D. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."

1.9 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents. Warranty period: 1 year from date of substantial completion.

B. Refrigeration Compressor Warranty: 5 years from date of substantial completion. Submit a written warranty signed by manufacturer agreeing to repair or replace compressors that fail in materials or workmanship within the specified warranty period.

PART 2 - PRODUCTS

2.1 MATERIALS - METAL

A. Submit a certified copy of the mill analysis of materials if requested by the Architect.

B. Finish shall be 304 #4 brushed finished except edges where it shall be #8 polished finish.

C. Protective covering shall be provided on all polished surfaces of stainless steel sheet work, and retained and maintained until time of final testing, cleaning, start-up and substantial completion.

D. Stainless-Steel Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304, stretcher leveled, and in finish specified in "Stainless-Steel Finishes" Article.

1. Stainless steel finishes

a. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

1) Remove or blend tool and die marks and stretch lines into finish.

2) Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

b. Concealed surfaces: No. 2B finish (bright, cold-rolled, unpolished finish).

c. Exposed surfaces: No. 4 finish (bright, directional polish).

d. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

e. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

E. Stainless-Steel Tube: ASTM A 554, Grade MT-304, and in finish specified in "Stainless-Steel Finishes" Article.

F. Zinc-Coated Steel Sheet: ASTM A 653, G115 (ASTM A 653M, Z350) coating designation; commercial quality; cold rolled; stretcher leveled; and chemically treated.

G. Zinc-Coated Steel Shapes: ASTM A 36 (ASTM A 36M), zinc-coated according to ASTM A 123 requirements.

H. Sealant: ASTM C 920; Type S, Grade NS, Class 25, Use NT. Provide elastomeric sealant NSF certified for end-use application indicated. Provide sealant that, when cured and washed, meets requirements of Food and Drug Administration's 21 CFR, Section 177.2600 for use in areas that come in contact with food.

1. Color: As selected by Architect from manufacturer's full range of colors.

2. Backer Rod: Closed-cell polyethylene, in diameter larger than joint width.

I. Sound Dampening: NSF-certified, nonabsorbent, hard-drying, sound-deadening coating. Provide coating compounded for permanent adhesion to metal in 1/8-inch (3-mm) thickness that does not chip, flake, or blister.

J. Gaskets: NSF certified for end-use application indicated; of resilient rubber, neoprene, or PVC that is nontoxic, stable, odorless, nonabsorbent, and unaffected by exposure to foods and cleaning compounds.

K. Casters: NSF-certified, heavy duty, stainless-steel, swivel stem casters with 5-inch-(125-mm-) diameter wheels, polyurethane tires with 1-inch (25-mm) tread width, and 200-lb (90-kg) load capacity per caster. Provide brakes on 2 casters per unit.

L. Approved manufacturers for custom fabricated equipment are: Stainless Fixtures Inc. (909) 622-1615, B&W Custom Restaurant Equipment (714) 578-0332 or Kemco (909) 923-3153.

2.2 MATERIALS – CASEWORK/MILLWORK

A. Cabinet Hardware: Provide NSF-certified, stainless-steel hardware for equipment items as indicated. Pulls, Handles and Catches to be included.

B. All wood to be thoroughly seasoned and kiln dried prior to being used for fabrication of custom casework. All wood to be free from knots, pitchy seams, or other imperfections. All exposed wood to be grade A pine.

C. All plywood to be thoroughly seasoned and kiln dried prior to being used. All plywood to be free from knots, pitchy seams, and other imperfections. All plywood to be glued with water resistant resin. Particle board may not be substituted for plywood panels. "W.I. - Custom Grade" marine grade plywood is required on all fixtures to be installed in high humidity environments.

D. All wood to have less than 12% moisture content and be a species listed by the national hardwood association.

E. Plastic laminates shall be 1/16th thick, general purpose grade GP-50 as manufactured by Wilson Art or equal. Patterns, textures, and colors as specified under individual items. Semi ex-posed and cabinet liners shall be CL-20. Countertops, backsplashes and edges shall be grade GP-50 on exposed and grade BK-20 on underside of tops. Exposed vertical surfaces and cabinet liners shall be grade CL-20. Sides and edges of shelving shall be grade 50. Adhesive shall be waterproof and low VOC.

F. Hardware that is furnished and installed shall be of solid material unless specified otherwise. The hardware shall be provided with the necessary mechanisms for locking. All locks shall be furnished with two (2) keys.

G. Solid Surface Material (SSM) shall be Caesarstone, Silestone or approved equal and installed over 3/4" plywood per manufacturer's instructions. Provide air space, trim and /or insulation around any heat or cold producing equipment to guard against discoloration and cracking.

H. Approved manufacturers for custom fabricated equipment are: Stainless Fixtures Inc. (909) 622-1615, B&W Custom Restaurant Equipment (714) 578-0332 or Kemco (909) 923-3153.

2.3 FABRICATION, GENERAL, METAL,

A. Fabricate food service equipment according to NSF (standards 2, 4 & 7) requirements. Factory assemble equipment to the greatest extent possible.

B. STAINLESS-STEEL EQUIPMENT: for all parts of custom tables, tops, benches, sinks, cabinets, etc., as drawn or as specified, shall be AICI type 304 (18-8 Austenitic). All gauges called for shall be U.S. Standard Gauges, “S/S” or “S.S.” as shown in the drawings or specifications, shall indicate stainless steel.

1. Edges and Backsplashes: Provide equipment edges and backsplashes indicated complying with referenced SMACNA standard, unless otherwise indicated.

2. Apply sound dampening to underside of metal work surfaces, including sinks and similar units. Provide coating with smooth surface and hold coating 1 inch (25 mm) back from open edges for cleaning.

3. Tables: Fabricate with reinforced tops, legs, and reinforced undershelves or cross bracing to comply with referenced SMACNA standard, unless otherwise indicated, and as follows:

    a. Tops: Minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel, unless otherwise indicated.

    b. Legs: 1-5/8 inch (41.3 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stain-less steel with stainless-steel gusset and adjustable insert bullet-type feet with minimum adjustment of 1 inch (25 mm) up or down without exposing threads, unless otherwise indicated.

    c. Undershelves: Minimum #16 gauge / 0.625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

    d. Top and Undershelf Reinforcement: Provide minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick, stainless-steel reinforcing, unless otherwise indicated.

    e. Cross Bracing: 1-1/4 inch (31.75 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

4. Counters: Fabricate with reinforced tops and undershelves to comply with referenced SMACNA standard, unless otherwise indicated, and as follows:

    a. Tops: Minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel, unless otherwise indicated.

    b. Undershelves: Minimum #16 gauge / 0.625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

    c. Top and Undershelf Reinforcement: Provide minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick, stainless-steel reinforcing, unless otherwise indicated.

    d. Doors: Minimum #18 gauge / 0.0478-inch- (1.214-mm-) thick stainless steel, unless otherwise indicated. To be constructed with a integral door pull and to have a pivot hinge. Door to be finished as stainless steel or with a laminate panel insert as noted on drawings.

    e. Body: Minimum #18 gauge / 0.0478-inch- (1.214-mm-) thick stainless steel, unless otherwise indicated.

f. Curb: Minimum #16 gauge / 0.625-inch- (1.588-mm-) thick galvanized steel, unless otherwise indicated.

5. Sinks: Fabricate of minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel with fully welded, 1-piece construction. Construct 2 sides and bottom of sink compartment from 1 stainless-steel sheet with ends welded integral and without overlapping joints or open spaces between compartments. Provide double-wall partitions between compartments with 1/2-inch- (13-mm-) radius rounded tops that are welded integral with sink body. Cove horizontal, vertical, and interior corners with 3/4-inch (19-mm) radius. Pitch and crease sinks to waste for drainage without pooling. Seat wastes in die-stamped depressions without solder, rivets, or welding.

   a. Wastes: 2-inch (50-mm), stainless steel ball valve, rotary-handle waste assembly with stainless-steel strainer plate, rough chrome plated body.

   b. Drainboards: Minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel, pitched to sink at 1/8 inch/12 inches (3 mm/300 mm) of length. Reinforce drainboards with minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel, unless otherwise indicated.

   c. Legs: 1-5/8 inch (41.3 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stain-less steel with stainless-steel gusset welded to #12 gauge / 0.1094-inch- (2.779-mm-) thick, stainless-steel support plate. Provide adjustable insert bullet-type feet with minimum adjustment of 1 inch (25 mm) up or down without exposing threads, unless otherwise indicated.

   d. Drainboard Braces: 1 inch (25 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588- mm-) thick stainless steel, unless otherwise indicated.

   e. Cross Bracing: 1-1/4 inch (31.75 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

6. Wall Shelves and Overshelves: Fabricate to comply with referenced SMACNA standard, unless otherwise indicated, and with minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick, stainless-steel shelf tops.

7. Drawers: Provide lift-out type, 1-piece, die-stamped drawer pan fabricated from #18 gauge / 0.050-inch- (1.27-mm-) thick stainless steel with inside corners radiused. Support drawer pan with #16 gauge / 0.0625-inch- (1.588-mm-) thick, stainless-steel channel frame welded to drawer front. Provide 1-inch- (25-mm) thick, double-wall front fabricated from #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel and with integral recessed pull. Fill void in drawer front with semi rigid fiberglass sound dampening. Mount drawers on NSF-certified, full-extension, stainless-steel drawer slides that have minimum 100-lb (45-kg) load capacity per pair, ball-bearing rollers, and positive stop. Mount drawer slides for self-closing on drawer housing as indicated.

8. Refrigerated Bases: Unit to be all welded construction and fabricated in accordance with NSF Standard 7.

   a. Top: 18 gauge galvanized sub-top or 14 gauge stainless steel top.

   b. Exterior: Front and Sides to be 18 gauge number 4 finish type 304 stainless steel; bottom and back to be 18 gauge galvanized (unless otherwise noted).

   c. Interior liner: 20 gauge number 4 finish type 304 stainless steel with 3/8" radius corners.

   d. Insulation: Minimum 2" thick polyurethane foam in place insulation (CFC free).

   e. Doors: 18 gauge front and 20 gauge door pan number 4 finish type 304 stainless steel with 2" polyurethane foam in place insulation, long-life press in place gasket.

   f. Drawers: 300 lb. capacity with 14 gauge stainless steel track system, tandem 2" all stainless steel skate wheels, each drawer accommodates two 6" deep, 12" x 20" pans side by side.

   g. Shelving: Each door section shall have stainless steel wire racks.

   h. Provide remote fixture mounted on/off switches.

9. Refrigerated Pan Rails: Unit to be all welded construction and fabricated in accordance with NSF Standard 7.

   a. Top: 16 gauge number 4 finish type 304 stainless steel top and inner liner.

   b. Outer liner: To be 18 gauge type 304 stainless steel; bottom and back to be 18 gauge galvanized (unless otherwise noted).

   c. Insulation: Minimum 2" thick polyurethane foam in place insulation (CFC free).

   d. Drain: Provide with 1" stainless steel drain

   e. Control: Provide with on/off control to be filed installed.

C. Welding: Use welding rod of same composition as metal being welded. Use methods that minimize distortion and develop strength and corrosion resistance of base metal. Provide ductile welds free of mechanical imperfections such as gas holes, pits, or cracks.

   1. Welded Butt Joints: Provide full-penetration welds for full-joint length. Make joints flat, continuous, and homogenous with sheet metal without relying on straps under seams, filling in with solder, or spot welding.

2. Grind exposed welded joints flush with adjoining material and polish to match adjoining surfaces.

3. Where fasteners are welded to underside of equipment, finish reverse side of weld smooth and underpressed.

4. Coat unexposed stainless-steel welded joints with suitable metallic-based paint to prevent corrosion.

5. After zinc-coated steel is welded, clean welds and abraded areas and apply SSPCPaint 20, high-zinc-dust-content, galvanizing repair paint to comply with ASTM A 780.

D. Fabricate field-assembled equipment prepared for field-joining methods indicated. For metal butt joints, comply with referenced SMACNA standard, unless otherwise indicated.

E. Where stainless steel is joined to a dissimilar metal, use stainless-steel welding material or fastening devices.

F. Form metal with break bends that are not flaky, scaly, or cracked in appearance; where breaks mar uniform surface appearance of material, remove marks by grinding, polishing, and finishing.

G. Sheared Metal Edges: Finish free of burrs, fins, and irregular projections.

H. Provide surfaces in food zone, as defined in NSF 2, free from exposed fasteners.

I. Cap exposed fastener threads, including those inside cabinets, with stainless-steel lock washers and stainless-steel cap (acorn) nuts.

J. Provide pipe slots on equipment with turned-up edges and sized to accommodate service and utility lines and mechanical connections.

K. Provide enclosures, including panels, housings, and skirts, to conceal service lines, operating components, and mechanical and electrical devices including those inside cabinets, unless otherwise indicated.

L. Seismic Restraints:

1. Fabricate to comply with referenced “SMACNA Guidelines for Seismic Restraint of Kitchen Equipment” in any State, province, or jurisdiction that has legislated this requirement as necessary for acceptance. This shall include:

a. Identifying these items on the submittal drawings, Plans, Elevations, and Sections.

b. Showing required SMACNA methods of restraint on the submittal drawings.

c. Referencing the appropriate detail(s).

d. Obtain regulatory approval for all seismic engineering details

2.4 FABRICATION, MILLWORK/CASEWORK

A. Fabricate food service equipment according to the "Manual of Millwork, current edition" of the Woodwork Institute, including all amended printed revisions, and NSF Standards. All composite wood products shall meet the latest California Air Resources Board (CARB) Composite Wood Products Regulations. Factory assemble equipment to greatest extent possible. All specially fabricated equipment must be by one manufacturer/fabricator per specialty acceptable to Consultant and the Owner.

B. Stone Material shall be Caesarstone, Cambria, Silestone or approved equal and installed and fabricated per manufacturer instructions, observing standards set forth by said manufacturer(s) regarding use of certified fabricators and installers. Provide air space, trim and /or insulation around any heat or cold producing equipment to guard against discoloration and cracking, always per manufacturer's instructions.

2.5 EXHAUST HOOD FABRICATION

A. Definitions:

1. Listed Hood: A hood, factory fabricated and tested for compliance with UL-710 by a testing agency acceptable to authorities having jurisdiction.

2. Type I Hood: A hood designated for grease exhaust applications.

3. Type II Hood: A hood designed for heat and steam removal and for other non-grease applications.

4. Non-listed Hoods are not acceptable for this project.

B. General: Provide listed hoods with dual wall construction and manufactured from minimum #18 gauge / 0.050-inch- (1.27-mm-) thick type 304 stainless steel, unless otherwise indicated. FSEC shall verify size and location of all connections required before fabrication.

1. Exhaust hood performance tests shall be in accordance with ASTM F1704-05. Manufacturer, upon request, shall be required to submit validation that full capture and containment of appliance thermal plume and smoke can be accomplished at specified/design air volumes without modifications to duct size, filter velocity or hood/system static pressure.

2. Hoods shall comply with current NFPA 96, NSF, ASHRAE 90.1, ASHRAE 154, CA-Title 24 (CA Based Projects Only), Local Applicable Codes and Manufactures Recommendations.

3. Product/system must meet the design, construction, performance and operational intent of the project. It is the responsibility of the FSEC to verify interface of the

system with all associated trades including, but not limited to; electrical, mechanical, sheet metal, plumbing and controls per Division 23.

4. Design exhaust volume shall be based on hood manufacturers heat load based design calculations and not estimated CFM/linear foot or minimum UL-710 listed volume.

C. Grease Removal: Provide removable, stainless-steel, single stage, baffle-type grease filter. Provide minimum #18 gauge / 0.0781-inch- (1.984-mm-) thick, stainless steel filter frame and removable collection basins or troughs. Filters/baffles shall be UL 1046 Classified and tested according to ASTM Standard F 2519-05 “Standard Test Method for Grease Particle Capture Efficiency of Commercial Kitchen Filters and Extractors” by a nationally recognized testing laboratory acceptable to authorities having jurisdiction. The filters/baffles must be single stage and have a minimum extraction rate of 93% at 5 microns and 98% at 15 microns.

D. Sound Level Criteria: Isolated grease filter sound levels shall not exceed an NC rating of 55 at full design exhaust volume.

E. Light Fixtures: Provide NSF, UL, CSA AND CE-certified LED fixtures, vapor-tight sealed lenses, to provide 3500K with 50 foot candles at the cooking surface. Any exposed wiring shall be concealed in stainless-steel.

F. Appliance Interlock: Hoods to be provided with Appliance Interlock Temperature Sensor to comply with IMC 2006 requirement, section 507.2.1.1.

G. Exhaust-Duct Collars: Minimum #18 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel, FSEC shall provide all stainless steel duct collars and make final connections to hood, welded 100% grooved smooth and painted.

H. Fires suppression system: Hoods to be provided with factory pre-piping for connection to wet chemical fire suppression system, model R102 as manufactured by “Ansul” or equal in accordance with UL300 standards.

1. Surface drop exposed piping shall be stainless steel.

2.6 FIRE SUPPRESSION SYSTEM

A. Provide complete fire suppression system conforming to NFPA and UL300. System to be connected to factory pre-piping provided as part of the exhaust hood.

B. Automatic actuation shall be by means of fusible link with no visible conduit. Manual activation shall be made possible with remote pull stations.

C. System shall be furnished and installed by the manufacturer. Failure to do so will void warranty.

D. Microswitches shall be furnished as part of the system for “tie in” of building alarm and for make-up air/fire/fuel/shutdown.

E. Gas valves shall be electric solenoid type and support simultaneous activation.

F. Approved manufacturer for fire suppression system is Edison Fire Protection Company Inc. (800) 222-9338 or Christopherson Fire Protection (909) 591-0438.

2.7 WALK-IN COOLERS/FREEZERS

A. Panel Construction:

1. Panels shall be pre-fabricated, sectional construction (minimum 5-inches thick for Coolers and Freezers), of tongue and groove design with foamed-in-place “double bubble” PVC gaskets (not glued, stapled, or nailed) on the male side of all interior and exterior panels and rigid urethane frame. Every panel shall be NSF and UL factory approved and bear the certifying labels. Walk-in box height to be 108”; Interior Height, except freezers with pre-fab floor in combination with cooler without floor to be 104” or unless otherwise specified.

2. Gaskets shall be impervious to stains, greases, oils, and mildew and be resistant to chemical corrosion and ultraviolet radiation. Gasket operating temperature shall be -30 degrees F to 160 degrees F (-34 degrees C to +71 degrees C).

3. Corner panels shall be 90-degree angles with coved corners; interior partition walls shall utilize `T' panels with coved corners. All panels shall be manufactured in accordance NSF approved standards.

4. Panels shall be completely filled with rigid 100% foamed-in-place non-CFC urethane between interior and exterior metal `skins' which have been die-formed and gauged for uniformity in size. Rigid polyurethane blowing agents shall comply with current US EPA SNAP program listings. Slab urethane or polystyrene are not acceptable. In addition, wood shall not be acceptable in any panel including doors, walls, floor, and ceiling.

5. Insulation shall have a 95% closed cell structure with an average in-place density of 2.2 lbs. per cubic foot, and compression strength at yield point of 19 lbs. per square inch. The R-Values of the floor, ceiling and wall panels meet the requirements under the Energy Independence and Security Act of 2009 (EISA).

6. Floor panels: Floor panels shall be die stamped with 3/8-inch radius NSF coved corners. All plane intersections shall be drawn, not cut and welded. Panels shall be fabricated similar to other panels and designed to readily withstand uniformly distributed loads, point loads for stationary shelving, rolling loads from hand truck and mobile food racks. Where noted, pre-fabricated floors shall withstand rolling loads from either manual pallet jacks or electric pallet jacks.

B. Door Construction: Walk-in coolers and freezers shall have entry and exit door hardware that complies with all of the requirements of CBC Section 11B-404.2.8.1 and maneuvering clearances at the exterior side per CBC Section 11B-404.2.7 & 11B-309.4. Doors shall be flush (in-fitting) type, self-closing, 36-inches by minimum 80-inches high, 20-guage stainless steel interior and exterior.

1. Doors shall be mounted with three adjustable cam-lift hinges (Kason 1245) and hydraulic adjustable automatic hold-open (rack and pinion) door closers. Door hardware shall be chrome plated Kason model 27C. Mounting height of latching hard-ware shall be 34 to 44 inches above finish floor. All hardware shall meet the requirements of CBC 11B-404.2.7 & 11B-309.4.

2. Door latches shall lock and have a safety release to prevent entrapment (one quarter turn of the release handle unlocks the door from the inside).

3. All freezer door will be provided with a Department of Energy approved heater strip, heated sweep gaskets, and a heated pressure relief port.

4. All door sections to have raised casings. Light fixtures to be wired through digital controllers, refer to para. 2.7.E.5 for controller requirements. Provide additional switches as required for light activation from multiple locations.

5. The doorjambs, frames, and thresholds shall be made of durable Fiberglass Reinforced Plastic (FRP) or polyvinyl chloride (PVC).

C. Assembly: Panels shall be assembled by Posi-Locs or equal which shall be foamed-in-place and activated by a hex wrench. Floor panels shall utilize post tension construction within the floor panels. Access ports to locking devices shall be covered by snap caps and shall be located in interior of walk-in.

D. Finishes: Refer to the finishes shown and the Foodservice Equipment Schedule paragraph 3.5.

1. Surfaces (walls, ceiling and closure panels):

a. Exposed exterior 20-gauge Type 304 stainless steel, #4 finish, pattern per manufacturer drawings.

b. Unexposed exterior surfaces to be 20 gauge smooth galvanized steel.

c. Interior finishes: minimum 20 gauge type 304 stainless steel on walls and white stucco aluminum on ceiling.

d. Interior floor: verify on finish schedule and item specification, paragraph 3.5.

E. Accessories:

1. Provide interior and exterior doors with 14 gauge (stainless steel) kickplates to 36-inches high.

2. Provide (s/s) closure panels to interior ceiling and all adjacent walls, finished with 90- degree angles at the box and the ceiling/wall; no raw edges will be accepted.

3. Provide vinyl strip curtains.

4. Include LED light fixtures to provide 20 ft. candles of light throughout compartment.

5. Refrigerated compartments fabricated and standard, shall be fitted with flush mounted digital temperature controllers. Thermometers on such controllers shall be adjustable and calibrated after installation. All thermometers shall have an accuracy of 2 degrees. Controller shall be Modularm 75 LC, or equal, and include frame mounted door magnets for door ajar alarm, interior panic alarm button and motion detector activated automatic panic alarm. All controllers are to be programmable and have the capability of being connected to remote monitoring systems or building management systems.

6. Per document drawings, provide 14-inches by 24-inches view port - unheated for cooler door, heated for freezer door.

7. Freezer Door Fan Switches (at ambient facing freezer door only)

8. When Anthony doors are specified: include Optimax Pro LED Lighting.

F. Insulated Floor Depressions: The FSEC shall provide styrofoam insulation for cooler and freezer floors. Insulation shall be a minimum of 3 layers Dow high load 60 extruded polystyrene, 2-inch thick. Overall R-value to meet DOE requirements for freezer floors with vertical compressive strength of 60 psi and maximum water absorption of 0.1% by volume.

G. Approvals: Fire hazard classification according to ASTME-84 (UL723) shall be a flame spread rating of 25 or less with a certifying UL label attached to every panel showing the meeting of the fire code. Smoke development rating to be 450 or less; NSF-listed with an approved toxicity rating.

H. Walk-in coolers and freezers shall have level maneuvering clearances at the exterior side (CBC 118-404.2.4.1) and accessible entry and exit door hardware (CBC 11B-404.2.7, 11B-309.4 & 11B-404.2.8.1).

I. Furnish and installation to be provided by the manufacturer. Failure to do so will void warranty.

J. Food service equipment provider shall contract all aspects of installation for walk-in boxes directly with specified factory to not void warranty.

2.8 REMOTE REFRIGERATION SYSTEMS

A. Furnish and install mechanical refrigeration work as indicated and specified, complete and ready for use. All systems shall comply with the latest edition of Title 24, 2019 Building Efficiency Standards. Principal items of work include:

1. Mechanical refrigeration systems, including compressor units, condensers, refrigerant piping, evaporator coils, control valves, compressor racks, weather covers, KE2 rack controller, and required miscellaneous items. Refrigeration equipment shall consist of two major assemblies. One is the condensing unit assembly with all necessary components, factory installed and wired including single point electrical control panel, circuit breakers and contactors, OSHA approved fan guards, aluminum flexible conduit for internal wiring, suction filter, sight glass, drier, adjustable dual pressure control, flexible pressure hoses, Rotolock compressor adaptors and necessary tubing. The other is the refrigeration coil assembly/heat exchanger with expansion valve, electronic thermostat temperature control with electronic defrost time clock and on/off power switch, completely factory mounted and factory pressure tested with dry nitrogen.

   a. Utilize refrigerant with an ozone depleting potential of 0

   b. R-448A Low to Medium Temperatures

   c. Other refrigerant approved by the Department of Energy for use in remote systems after December 31, 2017.

   d. Glycol – Food Grade

2. Furnishing of motor starters and walk-in refrigerator/freezer thermostats for installation under Electrical Section.

3. Sleeves, inserts, hangers, supports and other incidental items necessary to complete the work.

4. Cutting and patching of non-structural and other incidental items necessary to complete the work on this section.

5. Testing, charging, adjusting, operational testing and cleaning of equipment. Conduct all tests as required by local inspecting agencies concerned with this project. Each refrigeration items specification is written to provide minimum specifications and scope of work.

6. Refrigeration equipment shall be designed and installed to maintain the following general temperature unless otherwise specified.

a.	Walk-In Refrigerators	1.7°C / 35°F
b.	Walk-In Freezers	-23.2°C / -10°F
c.	Reach-In Refrigerators	1.7°C / 35°F
d.	Reach-In Freezers	-23.2°C / -10°F
e.	Undercounter Refrigerators	1.7°C / 35°F

f.	Undercounter Freezers	-23.2°C / -10°F
g.	Cold Pan	4°C / 39°F

B. Compressors and Condensing Unit: Factory assembled, scroll compressors with air cooled condensers operating at such speed within recommended range of section and discharge pressures for economical operation and with required BTU rating per hour, sizes and capacities in accordance with specifications. Provide units of same manufacturer and type throughout, new standard cataloged, to operate with refrigerant R-407A. 100 degrees ambient air, capacities selected on 16 hour running time basis for medium temperature fixtures and 18 hour running time basis for low temperature fixtures. For locations where the ambient exceeds 100 degrees Fahrenheit, the system is to be engineered for the maximum recorded ambient temperature. Additionally, all parallel systems shall include a minimum of one digital scroll compressor and be designed with 75% redundancy minimum.

C. Condensing units shall be scroll air cooled condensing unit with rigid structural bases, 20 gauge weather covers, OSHA-approved fan guards and shrouds and waterproof electrical systems. Include internal inherent motor protection, suction line, shut off valves, liquid line shut off valves, oil pressure safety switches when required, adjustable dual pressure control, crank case heaters and oil separators on systems with longer than 100 lin. ft. run from condensing unit to the evaporator coil. Any outdoor installation within 20 miles of the salt air environment shall be provided with coated condenser coils.

D. Medium temperature evaporators shall be equipped with Electronically Commutated Motors (ECM). Coils shall be low profile UL/NSF approved units with inline fans and cross fins staggered. Provide copper tubing, aluminum cased, permanently lubricated motors with thermal overload protection. Unit shall be provided with evaporator controller system capable of providing evaporator fan control, remote monitoring and diagnostics. Control system shall be interconnected to the local area network and be capable of sending alarm alerts via mobile telephone or e-mail. Water proof electrical system pre-wired to a single connection. Coils are designed to operate above 34 degrees Fahrenheit.

E. Low Temperature evaporators shall be equipped with Electronically Commutated Motors (ECM). Coils shall be low profile UL/NSF approved units with inline fans and cross fins staggered. Provide cooper tubing, aluminum cased, permanently lubricated motors with thermal overload protection. Unit shall be equipped with electric demand defrost controller system. Controller system shall provide on-demand defrost, remote monitoring and diagnostics and be interconnected to the local area network with the capability of sending alarm alerts via mobile telephone or e-mail. Water proof electrical system pre-wired to a single connection. Coils are designed to operate in a range from 30 degrees above Fahrenheit to -20 degrees Fahrenheit.

F. Refrigerant lines shall be type “L” ACR copper tubing with wrought copper fittings assembled by silver soldering joints.

G. Coil drains shall be 1” IPS copper. Route and pitch ½” per foot to drain. Provide electrical heaters on freezer drains. Drain lines to floor sinks by Plumber.

H. Refrigeration lines insulation shall have a minimum ¾” Armstrong Armaflex AP Pipe insulation sealed with adhesive foam insulation. For glycol systems the minimum insulation shall be ¾”. Tape fittings to be sufficient thickness to prevent condensation. Lines ran externally shall include a hard white PVC cover.

I. Furnish and installation to be provided by the manufacturer. Failure to do so will void warranty.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Unless expressly stipulated, and in a timely manner, no additional allowances will be made for Contractors or Manufacturers for errors, omissions or ambiguities not reported at time of bidding. Carefully review and compare the Contract Documents and at once report to Owner and/or Designer any errors, ambiguities, inconsistencies or omissions. Unless expressly stipulated, and in a timely manner, Kitchen Equipment Contractor shall be liable to Owner or Designer for any damage resulting from such errors, inconsistencies or omissions in the Contract Documents. Work shall not be done without approved Drawings, Specifications and/or Modifications and without receiving prior written receiving authorizations from Owner or Designer. Drawings and equipment specifications are intended to complement each other. Therefore, neither should be considered complete without the others.

B. Examine areas and conditions, with Installer present, for compliance with requirements or installation tolerances, service-utility connections, and other conditions affecting installation and performance of food service equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

C. Examine roughing-in for piping, mechanical, and electrical systems to verify actual locations of connections before installation.

D. Verify all conditions at the building, particularly door openings and passageways for large equipment. Coordinate with General Contractor access to insure delivery of equipment to the required areas. Coordination shall include, but not be limited to, early delivery, hoisting, window removal and/or delay of wall construction. All special equipment, handling charges, window removal, etc. shall be paid for by the Food Service Equipment Contractor.

E. Any and all food service equipment and equipment systems noted as “by owner/operator”, “by purveyor”, or “existing” in the food service construction documents

are presented for reference only. These representations must be verified in writing by the food service equipment contractor, owner, operator, and/or general contractor prior to the release of “for construction” documentation. It will be the general contractor’s responsibility to further verify and coordinate all necessary information pertaining to this equipment or systems making up, or relating to, this equipment including, but not limited to, local health department regulations, local sanitation code requirements, mechanical, structural, plumbing and electrical requirements prior to commencement of construction. Consultant or Architect take no responsibility for design, intent, function, performance, utility requirements, or code compliance of non-specified equipment.

3.2 INSTALLATION, GENERAL

A. Install food service equipment level and plumb, according to manufacturer's written instructions, original design, and referenced standards.

B. Complete equipment field assembly, where required, using methods indicated.

1. Provide closed butt and contact joints that do not require a filler.

2. Grind field welds on stainless-steel equipment smooth, and polish to match adjacent finish. Comply with welding requirements in "Fabrication, General" Article.

C. Install equipment with access and maintenance clearances according to manufacturer's written instructions and requirements of authorities having jurisdiction.

D. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections. Cut holes and provide sleeves for pipes on equipment, for drains, electrical, plumbing, etc., as required for proper installation. Verify sizes with Owner on the following items before ordering or fabrication: steam pans, sheet pans, trays, glass and cup racks.

E. Except for mobile and adjustable-leg equipment, securely anchor and attach items and accessories to walls, floors, or bases with stainless-steel fasteners, unless otherwise indicated.

F. Install hoods to comply with NFPA 96 requirements and to remain free from vibration when operating.

G. Install seismic restraints according to referenced SMACNA standard.

H. Install trim strips and similar items requiring fasteners in a bed of sealant. Fasten with stainless-steel fasteners at 48 inches (1200 mm) O.C. maximum.

I. Install sealant in joints between equipment and abutting surfaces with continuous joint backing, unless otherwise indicated. Provide airtight, watertight, vermin-proof, sanitary joints.

J. Prohibit cold storage rooms from being used by any other trade for storage or work areas. Repair or cause replacement to any damaged areas on the interior of the cold storage rooms, if the damage was caused due to the cold storage rooms being used for storage or work areas.

3.3 PROTECTING

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure food service equipment is without damage or deterioration at the time of Substantial Completion.

3.4 START-UP, TESTING AND COMMISSIONING

A. Startup Services: Engage factory-authorized service representatives to perform startup services for all equipment.

1. Coordinate food service equipment startup with service-utility testing, balancing, and adjustments. Do not operate steam lines before they have been cleaned and sanitized. Provide demonstrations for both operations and maintenance personnel.

2. Remove protective coverings and clean and sanitize equipment, both inside and out, and re-lamp equipment with integral lighting. Where applicable, comply with manufacturer's written cleaning instructions.

3. Test each equipment item for proper operation. Repair or replace equipment that is defective in operation, including units that operate below required capacity or that operate with excessive noise or vibration.

a. Start up and testing for ice making equipment to be performed by the Original Equipment Manufacturer’s authorized representative after substantial completion by the FSEC prior to final testing. All issues of installation hook-up and operational conditions are to be addressed. Any conditions not meeting operational needs will be identified and reviewed with the FSEC and/or GC.

b. Type I grease hoods and fire protection systems are to be reviewed by the Original Equipment Manufacturer’s authorized representative after substantial completion and prior to final testing. This review shall also take place prior to the start-up and demonstration of any cooking equipment under the hood. All issues of installation hook-up and operational conditions will be addressed. Any conditions not meeting operational needs will be identified and reviewed with the FSEC and/or GC. A field inspection report will be provided as part of the Owner’s equipment manual and submitted to the GC and local fire marshal when required by code.

4. Provide maintenance and proper operations training to both the client maintenance and operations staff.

5. Provide maintenance manuals, service parts manuals and product schedule in accordance with paragraphs 1.4.K and 1.4.K.1

B. Demonstration and Commissioning: Representatives of authorized service agencies, manufacturer or original equipment supplier shall provide these services with FSEC in attendance.

1. Demonstrate in the presence of the owner, owner's designated representative and owner's maintenance and operations personnel the proper initial start-up, operation clean-up, preventative maintenance safety procedures of each item of equipment.

2. FSEC is to provide a signed log or record of all demonstrations, training and start-ups conducted to the owner with equipment operations manuals.

3.5 FOOD SERVICE EQUIPMENT SCHEDULE

SIS# W010

ITEM # 1-01 DRY STORAGE SHELVING UNITS

Quantity: Twenty-Five (25)
Manufacturer: Cambro
Model: CAMSHELVING
SIS No.:W010

1. Twenty-Five (25) Model CAMSHELVING (LOT) 4 tier, 21" deep shelving units, posts to be 72" high. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall be removable to be washed manually or fit into a standard 20 x20" rack for use in a commercial dishwasher. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Shelves to be vented with the exception of the bottom shelf, which should be solid shelf plates. Posts shall have dovetails that allow shelves to be adjusted in 4" increments. Provide dunnage stands for the bottom shelf for all traverses 54" or longer and at corners where corner connectors are used. Shelving should have a "Life Time Warranty" against rust and corrosion and be NSF approved. Provide in the configuration shown on plans, verify final sizes of shelves and posts by field measuring prior to ordering.

ITEM # 1-02 BUMPER RAILS

Quantity: Thirteen (13)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. Thirteen (13) Model STAINLESS STEEL (LOT) Provide 14 ga. stainless steel bumper rails guards mounted at 34" above the finished floor. Stainless steel shall have a #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-03 CORNER GUARDS

Quantity: Twelve (12)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. Twelve (12) Model STAINLESS STEEL Provide 16 ga. stainless steel corner guards at 6'-6" in height. Stainless steel shall have a #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-04 EMPLOYEE LOCKERS <NIC>

Quantity: Eight (8)
Manufacturer: NIFSEC
SIS No.:W010

1. Eight (8) Employee Lockers - NIFSEC

ITEM # 1-05 REMOTE REFRIGERATION RACK AND SYSTEM

Quantity: One (1)
Manufacturer: Coldzone
Model: ET-2
SIS No.:W010

1. One (1) Model ET-2 Refer to Section 114000, paragraph 2.8 and FS drawings.

ITEM # 1-06 AIR CURTAIN

Quantity: One (1)
Manufacturer: Berner
Model: CLC08-1048A
SIS No.:W010

1. One (1) Model CLC08-1048A Commercial Series Low Profile Air Curtain, 48"L, unheated, (1) 1/5 hp 2-speed motor, for doors up to 8' high, specify exterior, interior mounting only, cULus, Made in USA
2. One (1) Five year parts warranty (unheated units)
3. One (1) If special freight fees are requested, (See below) all applicable fees will be added to the invoice; fees subject to change; contact factory for addition information.

4. One (1) Model A 120v/60/1-ph
5. One (1) White powder coat exterior finish, standard

ITEM # 1-07 WALK-IN FREEZER

Quantity: One (1)
Manufacturer: Thermalrite
Model: CUSTOM
SIS No.:W010

1. One (1) Model CUSTOM Dimensions:
External (O.D.): 18' 3" x 23' 10" x 10' 2 1/2" - w x d x h
Internal (I.D.): 17' 5" x 23' 0" x 9' 9 1/2" - w x d x h
Volume: 3922 ft^3 / E065578-02

Finishes
Walls: St. Stl. Type 304 #4 finish - 20 Ga. - interior
Galvanized/Smooth - 20 Ga. & St. Stl. Type 304 #4 finish - 20 Ga. - exterior
Ceilings: Aluminum/Embossed White - .040 - interior
Galvanized/Smooth - 20 Ga. - exterior

Panel Thickness
Walls: 5" UL Listed Class 1 Foam
Ceilings: 5" UL Listed Class 1 Foam

ITEM # 1-08 SPARE NO.

ITEM # 1-09 SPARE NO.

ITEM # 1-10 SPARE NO.

ITEM # 1-11 MOBILE FREEZER SHELVING UNITS

Quantity: Eighteen (18)
Manufacturer: Cambro
Model: CAMSHELVING
SIS No.:W010

1. Eighteen (18) Model CAMSHELVING (LOT) 4 tier, 21” deep shelving units, posts to be 72” high. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall be removable to be washed manually or fit into a standard 20 x20” rack for use in a commercial dishwasher. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Shelves to be vented with the exception of the bottom shelf, which should be solid shelf plates. Posts shall have dovetails that allow shelves to be adjusted in

4” increments. Verify evaporator coil location, shelving units below coil to have 3 shelves. Provide with CSRDB donut bumper and CSCTL casters with brake. Shelving should have a “Life Time Warranty” against rust and corrosion and be NSF approved. Verify sizes for shelves and posts by field measuring prior to ordering.

ITEM # 1-12 EVAPORATOR COIL (FREEZER) <Included>

Quantity: Two (2)
Manufacturer: Coldzone
Model: CL6A094ADA
SIS No.:W010

1. Two (2) Model CL6A094ADA Evaporator coil provided as an integral part of the remote refrigeration system.

ITEM # 1-13 WALK-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Thermalrite
Model: CUSTOM
SIS No.:W010

1. One (1) Model CUSTOM Dimensions:
External (O.D.): 18' 3" x 23' 10" x 9' 5" - w x d x h
Internal (I.D.): 17' 5" x 23' 0" x 9' 0" - w x d x h
Volume: 3605 ft^3 / E065578-01

Finishes
Walls: St. Stl. Type 304 #4 finish - 20 Ga. - interior
Galvanized/Smooth - 20 Ga. & St. Stl. Type 304 #4 finish - 20 Ga. - exterior
Ceilings: Aluminum/Embossed White - .040 - interior
Galvanized/Smooth - 20 Ga. - exterior

Panel Thickness
Walls: 5" UL Listed Class 1 Foam
Ceilings: 5" UL Listed Class 1 Foam

ITEM # 1-14 MOBILE REFRIGERATOR SHELVING UNITS

Quantity: Eighteen (18)
Manufacturer: Cambro
Model: CAMSHELVING
SIS No.:W010

1. Eighteen (18) Model CAMSHELVING (LOT) 4 tier, 21” deep shelving units, posts to be 72” high. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf

plates shall be removable to be washed manually or fit into a standard 20 x20” rack for use in a commercial dishwasher. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Shelves to be vented with the exception of the bottom shelf, which should be solid shelf plates. Posts shall have dovetails that allow shelves to be adjusted in 4” increments. Verify evaporator coil location, shelving units below coil to have 3 shelves. Provide with CSRDB donut bumper and CSCTL casters with brake. Shelving should have a “Life Time Warranty” against rust and corrosion and be NSF approved. Verify sizes for shelves and posts by field measuring prior to ordering.

ITEM # 1-15 EVAPORATOR COIL (COOLER) <Included>

Quantity: Two (2)
Manufacturer: Coldzone
Model: CL6E105DDA
SIS No.:W010

1. Two (2) Model CL6E105DDA Evaporator coil provided as an integral part of the remote refrigeration system.

ITEM # 1-16 HAND SINK

Quantity: One (1)
Manufacturer: Eagle Group
Model: HSAP-14-ADA-FW
SIS No.:W010

1. One (1) Model HSAP-14-ADA-FW Hand Sink, wall mount, 14" wide x 16" front-to-back x 5" deep bowl, 16/304 stainless steel construction, splash mount gooseneck faucet with wrist handles & mixer valve, marine edge on front & sides, 1/2" NPS water inlet, chrome-plated P-trap, wrist handles, soap dispenser, basket drain, skirt assembly & paper towel dispenser, PHYSICALLY CHALLENGED, NSF
2. One (1) Model -LRS Left & right side splashes

ITEM # 1-17 WALL / SPLASH MOUNT FAUCET

Quantity: One (1)
Manufacturer: Fisher
Model: 62669
SIS No.:W010

1. One (1) Model 62669 Faucet, backsplash mount, 4" centers, 6" swivel/rigid gooseneck spout (use included star washer to make rigid), lever handles with color coded indexes, 1/2" NPT male inlets, stainless steel, ADA Compliant
2. One (1) Model 75626 Handle Kit Wrist 2 each, 3"W x 6.5"D x 1.5"H
3. One (1) Model 71447 Close Elbows, (2) 1/2", stainless steel
4. One (1) 5 year warranty against defects in materials or workmanship, standard

ITEM # 1-18 SPARE NO.

ITEM # 1-19 SPARE NO.

ITEM # 1-20 SPARE NO.

ITEM # 1-21 MOBILE POT STORAGE SHELVING UNITS

Quantity: Six (6)
Manufacturer: Cambro
Model: CAMSHELVING
SIS No.:W010

1. Six (6) Model CAMSHELVING (LOT) 4 tier, 21” deep shelving units, posts to be 72” high. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall be removable to be washed manually or fit into a standard 20 x20” rack for use in a commercial dishwasher. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Shelves to be vented with the exception of the bottom shelf, which should be solid shelf plates. Posts shall have dovetails that allow shelves to be adjusted in 4” increments. Provide with CSRDB donut bumper and CSCTL casters with brake. Shelving should have a “Life Time Warranty” against rust and corrosion and be NSF approved. Verify sizes for shelves and posts by field measuring prior to ordering.

ITEM # 1-22 SOILED DISH TABLE W/QUICK DRAIN

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 11'-3" l x 2'-6" w. Provide stainless steel landing table with 1-5/8" legs with adjustable bullet feet, under and/or mid shelves, quick drain assembly, 10" high back and end splash (where required). Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-23 SLANTED RACK SHELF

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 5'-8" l x 1'-9" w Provide 18 ga. stainless wall mounted slant rack shelf with 14 ga. stainless steel wall brackets at 36" on center, 1/2" stainless steel drain tubing at each end. All stainless steel shall have a #4 finish. Verify rack sizes prior to fabrication. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-24 SCRAP COLLECTOR

Quantity: One (1)
Manufacturer: Salvajor
Model: P914
SIS No.:W010

1. One (1) Model P914 Pot/Pan Scrap Collector™, scrapping, pre-flushing & collecting system (widely accepted in areas where disposers are restricted), NEMA 4 HYDROLOGIC® control panel with patented operator sensor, two water saving modes (timed run & auto start/stop), safety line disconnect, LCD readout, salvage basin & silverware trap, scrap basket, 3/4 HP corrosion-resistant pump, pump intake screen, stainless steel construction, UL, CSA, CE, NSF
2. One (1) Collector top is available to ship to the fabricator in advance of unit (additional shipping charges will apply). Please provide instructions on order
3. One (1) 2nd-year warranty (P/N 999184)
4. One (1) 208v/60/1-ph, 5.5 amps
5. One (1) Model RSS Remote start/stop switch for all controls (HydroLogic control with operator sensor comes standard mounted to S914/P914 models. ONLY add if additional on/off control is required)
6. One (1) Model 980104 Mounting bracket for RSS, MSS, MSS-LD, MRSS, MRSS-LD
7. One (1) Model LSP3 Stainless steel bolt-down flanges for S914, P914 & S419

ITEM # 1-25 PRE-RINSE FAUCET ASSEMBLY

Quantity: One (1)
Manufacturer: Fisher
Model: 53430
SIS No.:W010

1. One (1) Model 53430 Pre-Rinse Unit, spring style, 8" adjustable wall control valve, 21" riser, 36" hose, stainless steel
2. One (1) Model 10197 Ultra-Spray™/PLUS Valve, with long squeeze lever 0.65 gpm, stainless steel

ITEM # 1-26 VENT COWL RISERS <NIC>

Quantity: One (1)
Manufacturer: NIFSEC
Model: IN MECHANICAL SECTION
SIS No.:W010

1. One (1) Model IN MECHANICAL SECTION Vent Cowl Risers - NIFSEC, In Mechanical Section.

ITEM # 1-27 VENT COWL RISERS <NIC>

Quantity: One (1)
Manufacturer: NIFSEC
Model: IN MECHANICAL SECTION
SIS No.:W010

1. One (1) Model IN MECHANICAL SECTION Vent Cowl Risers - NIFSEC, In Mechanical Section.

ITEM # 1-28 SPARE NO.

ITEM # 1-29 SPARE NO.

ITEM # 1-30 SPARE NO.

ITEM # 1-31 DISHWASHER, CONVEYOR TYPE

Quantity: One (1)
Manufacturer: Champion
Model: 66 PRO
SIS No.:W010

1. One (1) Model 66 PRO Pro Series Conveyor Dishwasher, 66"W, (44" single tank + 22" prewash), Proportional Rinse, Progressive anti-jam drive system, top mounted Prodigy series HMI user interface, Proactive maintenance software,100 gallons per hour with energy sentinel (idle pump shut-off), (209) racks per hour, single-piece hood design, single-piece stainless steel upper & lower wash arms manifolds, internal removable scrap basket, dual-piece scrap screens, 20” standard vertical clearance which accommodate 18” x 26” sheet pans, full 180° opening leak proof insulated hinged access doors, automatic tank fill, door safety switches, leak-proof ball valve drains, lower front & side enclosure panels, stainless steel heavy gauge construction including base & legs, electric tank heat, 2 HP prewash and wash pumps, single point machine & booster connection, vent fan control, stainless steel rear manifolds, NSF, cULus, Made in USA
2. One (1) 1 year parts & labor warranty, standard
3. One (1) Oversized units with crated dimension of equal to or greater than 96" for shipping will require an oversize charge. Shipping to a facility without a standard receiving dock could incur additional shipping charges related to service requested.
4. One (1) Complimentary factory authorized performance test included, upon equipment start-up. Consult local Champion sales representative for coordination of the start-up. If customer is beyond 60 miles from Champion authorized service agent, consult factory.
5. One (1) Right-to-left operation
6. One (1) 480v/60/3-ph
7. One (1) Electric tank heat, standard

8. One (1) Electric booster, 70° rise, 21kW, built-in
9. One (1) Drain water tempering kit (un-mounted)
10. One (1) 20" High hood vertical clearance for sheet pans (standard)
11. One (1) Table limit switch, whisker style (unmounted) (traditional)

ITEM # 1-32 CLEAN DISH TABLE

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 8'-0" l x 2'-6" w. Provide stainless steel landing table with 1-5/8" legs with adjustable bullet feet, under and/or mid shelves, 10" high back and end splash (where required). Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-33 WALL SHELF (KNIFE BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 6'-7" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-34 CUSTOM

Quantity: One (1)
Manufacturer: Power Soak
~~**Model:**~~ ~~**CUSTOM**~~
Model: **POWER SOAKM-**
SIS No.:W010

1. One (1) Model POWER SOAKM- (1-34) POWER SOAK M-
2. UNIT O.D. 235" LEFT TO RIGHT X 34" FRONT TO BACK AS FOLLOWS:
3. 1.5" LEFT CHANNEL RIM
4. 95" SOILED DRAINBOARD (WITH CUT-OUT FOR CUSTOMER PROVIDED SCRAP COLLECTOR)
5. 48" WASH TANK X 21" DEEP (WITH SHEET PAN RACKS)
6. 24" RINSE SINK X 14"
7. 24" SANITIZE SINK X 14"
8. 41" CLEAN DRAINBOARD

9. 1.5" RIGHT CHANNEL RIM
10. UNIT TO SHIP IN (2) SECTIONS WITH NON-WELDED JBZ FIELD JOINT
11. FAUCETS TO BE PROVIDED BY OTHERS
12. Model POWERSOAK-PSK POWERSOAK
13. Model UB-S34-JBZ-PSK GEN 3 UTENSIL BASKET JBZ
14. Model WS-48-21-28.75-G3-L-PSK 48" GEN-3 WASH SINK, 21" DEEP
15. Model WIDTH-34-PSK STANDARD 34 INCHES FRONT TO BACK SYSTEM
16. Model DECK-HEIGHT-PSK Deck Height
17. Model LENGTH-PSK System Length
18. Model SS-24-14-28.75-L-PSK 24" WIDE SANITIZER SINK, 14" DEEP
19. Model DC-PSK PROVIDE CUTOUT IN TOP - WELD IN DISPOSER CONE SUPPLIED BY OTHERS
20. Model SDB-48-34-PSK 43-48" SOILED DRAIN BOARD
21. Model CRES-X-L-SLD-34-PSK 1.5" CHANNEL RIM, SOILED LEFT END
22. Model RS-24-14-28.75-N-PSK 24" WIDE RINSE SINK, 14" DEEP
23. Model CHEM-NO-PSK NO CHEMICAL DISPENSING SYSTEM
24. Model CDB-42-34-PSK 37-42" CLEAN DRAIN BOARD
25. Model CRES-X-R-CLN-34-PSK 1.5" CHANNEL RIM, CLEAN RIGHT END
26. Model TYPE-JBZ-PSK NSF-LISTED NON-WELDED FIELD JOINT
27. Model PS-200-H-3PH-208V-2HP-L-PSK PS-200 208V/3PH CONTROL WITH AUTOMATIC WASH TANK HEAT
28. Model DREBV-PSK DRAIN BALL VALVE REAR OUTLET
29. Model CDB-XX-PSK CUSTOM DRAINBOARD (OVER 48", PER INCH)
30. Model FLANGE-FOOT-PSK FLANGED FOOT
31. Model US-XX-PSK UNDERSHELF/STATIONARY PER INCH, 30 INCH MINIMUM
32. Model SPRS-48-L-PSK GEN 3 SHEET PAN RACK SYSTEM FOR A 48" WASH TANK

ITEM # 1-35 UTENSIL RACK

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 8'-0" l x 1/4" w x 2" d. Provide stainless steel flatbar utensil rack with integral 1/4" x 2" mounting bracket. Include sliding hooks 8" on center. Stainless steel shall be type 304 with #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-36 FAUCET CONTROL VALVE

~~**Quantity: One (1)**~~
Quantity: Two (2)
Manufacturer: Fisher
Model: 61565
SIS No.:W010

1. One (1) Model 61565 Control Valve, wall mount, 8" adjustable centers, swivel outlet & swivel stems (without spout), lever handles with color coded indexes, 1/2" NPT female inlets, stainless steel, ADA Compliant
2. One (1) 5 year warranty against defects in materials or workmanship, standard
3. One (1) Model 54445 Swing Spout, 16" long, stainless steel

ITEM # 1-37 SCRAP COLLECTOR

Quantity: One (1)
Manufacturer: Salvajor
Model: P914
SIS No.:W010

1. One (1) Model P914 Pot/Pan Scrap Collector™, scrapping, pre-flushing & collecting system (widely accepted in areas where disposers are restricted), NEMA 4 HYDROLOGIC® control panel with patented operator sensor, two water saving modes (timed run & auto start/stop), safety line disconnect, LCD readout, salvage basin & silverware trap, scrap basket, 3/4 HP corrosion-resistant pump, pump intake screen, stainless steel construction, UL, CSA, CE, NSF
2. One (1) Collector top is available to ship to the fabricator in advance of unit (additional shipping charges will apply). Please provide instructions on order
3. One (1) 2nd-year warranty (P/N 999184)
4. One (1) 208v/60/1-ph, 5.5 amps
5. One (1) Model RSS Remote start/stop switch for all controls (HydroLogic control with operator sensor comes standard mounted to S914/P914 models. ONLY add if additional on/off control is required)
6. One (1) Model 980104 Mounting bracket for RSS, MSS, MSS-LD, MRSS, MRSS-LD
7. One (1) Model LSP3 Stainless steel bolt-down flanges for S914, P914 & S419

ITEM # 1-38 WALL SHELF (KNIFE BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 3'-7" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-39 SPARE NO.

ITEM # 1-40 SPARE NO.

ITEM # 1-41 PRE-RINSE FAUCET ASSEMBLY

Quantity: One (1)
Manufacturer: Fisher
Model: 53430
SIS No.:W010

1. One (1) Model 53430 Pre-Rinse Unit, spring style, 8" adjustable wall control valve, 21" riser, 36" hose, stainless steel
2. One (1) Model 10197 Ultra-Spray™/PLUS Valve, with long squeeze lever 0.65 gpm, stainless steel
3. One (1) Model 38660 Pre-Rinse Sub-Assembly, includes: 21" riser, spring, 36" hose, hose to pipe adapter, handle & Ultra-Spray™/PLUS spray valve, stainless steel
4. One (1) Model 70459 Control Valve, wall mount, single hole, swivel outlet & swivel stem (without spout), lever handle, 1/2" female inlet, stainless steel, ADA compliant
5. One (1) 5 year warranty against defects in materials or workmanship, standard
6.

ITEM # 1-42 TRASH RECEPTACLE W/DOLLY

Quantity: (10)
Manufacturer: Rubbermaid Commercial Products
Model: FG262000GRAY
SIS No.:W010

1. (10) Model FG262000GRAY ProSave® BRUTE® Container, without lid, 20 gallon, 19-1/2"D x 22-7/8"H, round, reinforced rims, built in handles, double rimmed base, high-impact plastic construction, gray, NSF, Made in USA
2. (10) Model FG264043BLA BRUTE® Quiet Dolly, 18-1/4"D x 6-5/8"H, non-marking casters, black, NSF, Made in USA

ITEM # 1-43 WALL SHELF (KNIFE BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 3'-4" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-44 WORK TABLE W/PREP SINK ASSEMBLY

Quantity: One (1)

Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 13'-1" l x 2'-6" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 6" high back and end splash (where required). Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. One (1) Model DRAWER Provide 16 ga. type 304 stainless steel enclosed NSF utensil drawer assembly with metal roller track hardware, removable pan, hemmed safety pull and lock, measuring approximately 20"l x 20"w x 5"d.
3. Two (2) Model PREP SINK Provide 16 ga stainless steel sink tub measuring approximately 18" w x 24" d x 12" h. Welded in place with polished seams.
4. Two (2) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish

ITEM # 1-45 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-42
SIS No.:W010

1. One (1) Model 7-PS-42 Recessed Hand Sink, 14"W x 10"D x 5" deep sink bowl, includes: 4" OC deck mounted gooseneck faucet with aerator, soap & paper towel dispensers, 4"H side splashes, 304 stainless steel, NSF (countertop opening not to exceed 17-1/4" (front to back) x 17-3/8" (left to right))
2. One (1) Model K-08 Low-flow aerator 0.5gpm, fits 55/64-27 male or 15/16-27 female thread on spout, conforms to California AB 1953
3. One (1) Model 7-PS-14 P-trap, 1-1/2", 22 gauge

ITEM # 1-46 WALL SHELF (KNIFE BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 13'-1" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-47 WALL / SPLASH MOUNT FAUCET

Quantity: One (1)
Manufacturer: Fisher

Model: 53139
SIS No.:W010

1. One (1) Model 53139 Faucet, wall mount, 8" adjustable centers, 12" swing spout, lever handles with color coded indexes, 1/2" NPT female inlets, stainless steel, ADA Compliant
2. One (1) 5 year warranty against defects in materials or workmanship, standard
3.
4. NOTE: FISHER TAKES EXCEPTION TO THE CERAMAS CARTRIDGE

ITEM # 1-48 SPARE NO.

ITEM # 1-49 SPARE NO.

ITEM # 1-50 SPARE NO.

ITEM # 1-51 REACH-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Traulsen
Model: AHT232WUT-FHS
SIS No.:W010

1. One (1) Model AHT232WUT-FHS Spec-Line Refrigerator, Reach-in, two-section, 51.6 cu. ft., self-contained refrigeration, StayClear™ Condenser, stainless steel exterior, aluminum interior, standard depth, wide full-height door or doors with Santoprene® EZ-Clean Gaskets, (3) adjustable wire shelves per section, microprocessor controls, 6" adjustable stainless steel legs, 5/8 HP, cULus, NSF
2. One (1) 115v/60/1-ph, 8.2 amps, with cord & NEMA 5-15P, standard
3. One (1) 3 year service/labor, 5 year compressor warranty, standard
4. One (1) Standard refrigerant, standard
5. One (1) Full height solid door, standard
6. One (1) Full height solid door, standard
7. One (1) Left door hinged left/right hinged right, standard

ITEM # 1-52 WORK TABLE

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 21'-3" l x 2'-6" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 6" high back and end

splash (where required). Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-53 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-42
SIS No.:W010

1. One (1) Model 7-PS-42 Recessed Hand Sink, 14"W x 10"D x 5" deep sink bowl, includes: 4" OC deck mounted gooseneck faucet with aerator, soap & paper towel dispensers, 4"H side splashes, 304 stainless steel, NSF (countertop opening not to exceed 17-1/4" (front to back) x 17-3/8" (left to right))

ITEM # 1-54 WALL SHELF (KNIFE BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 21'-3" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-55 REACH-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Traulsen
Model: AHT232WUT-FHS
SIS No.:W010

1. One (1) Model AHT232WUT-FHS Spec-Line Refrigerator, Reach-in, two-section, 51.6 cu. ft., self-contained refrigeration, StayClear™ Condenser, stainless steel exterior, aluminum interior, standard depth, wide full-height door or doors with Santoprene® EZ-Clean Gaskets, (3) adjustable wire shelves per section, microprocessor controls, 6" adjustable stainless steel legs, 5/8 HP, cULus, NSF
2. One (1) 115v/60/1-ph, 8.2 amps, with cord & NEMA 5-15P, standard
3. One (1) 3 year service/labor, 5 year compressor warranty, standard
4. One (1) Standard refrigerant, standard
5. One (1) Full height solid door, standard
6. One (1) Full height solid door, standard
7. One (1) Left door hinged left/right hinged right, standard

ITEM # 1-56 WORK TABLE W/ 2 COMPARTMENT PREP SINK ASSEMBLY

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 15'-6" l x 2'-6" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 6" high back and end splash (where required). Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. Two (2) Model PREP SINK Provide 16 ga stainless steel sink tub measuring approximately 18" w x 24" d x 12" h. Welded in place with polished seams.
3. Two (2) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish
4. One (1) Model DRAWER Provide 16 ga type 304 stainless steel enclosed NSF utensil drawer assembly with metal roller track hardware, removable drawer pan, hemmed safety pull handle and lock measuring approximately 20" l x 20" w x 5" d.

ITEM # 1-57 FOOD PROCESSOR

Quantity: One (1)
Manufacturer: Robot Coupe
Model: R602N
SIS No.:W010

1. One (1) Model R602N Combination Food Processor, 7 liter stainless steel bowl with handle, continuous feed kit with kidney shaped & cylindrical shaped hoppers, includes: (1)"S" blade, (1) 3mm grating disc (28058), (1) 3mm slicing disc (28064), two speeds, 850 & 1750 RPM, 208-240v/60/3-ph, 2.6/2.8 amps, 3 HP, NEMA L15-20P, cETLus, ETL-Sanitation
2. One (1) 1 year parts & labor warranty
3. One (1) Model LP16DISC LP16 Disc Package, (16) disc package includes: (3) slicing discs (3/64", 5/64", 5/32"), (2) grating discs (1/16", 1/8"), (1) French fry kit (3/8" x 3/8"), (3) dicing kits (3/16", 3/8", 25/32"), (3) julienne discs (5/64" x 3/8", 1/10", 5/32"), dice cleaning kit & disc holder

ITEM # 1-58 SPARE NO.

ITEM # 1-59 SPARE NO.

ITEM # 1-60 SPARE NO.

ITEM # 1-61 WALL SHELF (KNIFE BRACKETS)

Quantity: One (1)

Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 14'-6" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-62 WALL / SPLASH MOUNT FAUCET

Quantity: One (1)
Manufacturer: Fisher
Model: 53139
SIS No.:W010

1. One (1) Model 53139 Faucet, wall mount, 8" adjustable centers, 12" swing spout, lever handles with color coded indexes, 1/2" NPT female inlets, stainless steel, ADA Compliant
2. One (1) 5 year warranty against defects in materials or workmanship, standard

ITEM # 1-63 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-42
SIS No.:W010

1. One (1) Model 7-PS-42 Recessed Hand Sink, 14"W x 10"D x 5" deep sink bowl, includes: 4" OC deck mounted gooseneck faucet with aerator, soap & paper towel dispensers, 4"H side splashes, 304 stainless steel, NSF (countertop opening not to exceed 17-1/4" (front to back) x 17-3/8" (left to right))

ITEM # 1-64 ISLAND WORK TABLE

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 13'-10" l x 5'-0" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, and under and/or mid shelves. Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-65 OVERSHELF

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 12'-4" l x 2'-0" w. Provide table mounted 16 ga stainless steel overshelf with tubular supports and 14 ga concealed brackets. Stainless steel shall have a #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-66 WORK TABLE

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 5'-9" l x 3'-0" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 6" high back and end splash (where required). Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-67 WALL SHELF (KNIFE BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 5'-9" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-68 SPARE NO.

ITEM # 1-69 SPARE NO.

ITEM # 1-70 SPARE NO.

ITEM # 1-71 EXHAUST HOOD (TYPE I)

Quantity: One (1)
Manufacturer: Caddy
Model: CUSTOM
SIS No.:W010

1. One (1) Model CUSTOM GENERAL:
Exhaust Ventilator shall be constructed of 18 gauge type 300 series stainless steel. All exposed surfaces to have a #4 finish. Construction to meet all requirements of NFPA 96 and NSF Standard No. 2. To include necessary hanger brackets at front and rear for suspending from building overhead structure.

CONSTRUCTION:
Ventilator and exhaust duct collar shall be of all stainless steel, minimum 18 gauge, type 304. All exposed surfaces shall be number 4 finish. Caddy's optional front low air volume deflector plate we achieve low air volume design with no wiring, motorizations, or jets with giving an aesthetically polished fit and finish.

DESCRIPTION:
The Caddy AirSystems Model "PB" Series ventilator is a dry filter type and is UL listed under the standards set forth in UL 710 "Exhaust Hoods for Commercial Cooking Equipment". This ventilator is 90% grease extraction efficient when operated and maintained in accordance with design specifications. Filters to be UL Classified stainless steel baffle type. This high efficiency is accomplished by utilizing removable stainless steel baffle filters containing a series of horizontal, self-draining baffles. As the air is drawn around the baffles, the grease, dust and lint particles are removed from the airstream by centrifugal force. As the liquefied grease is extracted, it is drained off via a trough into grease collection containers at the end of the ventilator. At the end of the cooking day or at scheduled intervals, the filters are removed for cleaning without having to climb up or onto the cooking equipment. Once removed, the filters can be washed either in a dishwasher or soaked and rinsed off in a pot sink. Each filter is a maximum of 19-1/2" long. Ventilator can also be equipped with an optional manual or automatic air balancing damper.

APPLICATION:
Wall mounted exhaust only canopy style for use over all types of cooking equipment.

MAKE-UP AIR:
Ventilator shall have ceiling supply plenum with 40% open stainless steel perforated panels for downward discharge of tempered or untempered make-up air. Ceiling supply plenums to be constructed of 100% 18 gauge type 300 series stainless steel. No galvanized metal shall be used. Plenums shall include additional perforated baffles below each supply duct inlet to equally disburse air along full length of ceiling supply plenum.

LIGHT FIXTURES:
Ventilator shall be equipped with (4) FOUR 36" recessed double tube LED light fixtures. All light fixtures shall be pre-wired to a single connection point. Ventilators built in multiple sections to be furnished with junction boxes for ease of field connection by the electrical trades. Light bulbs furnished and installed by the Kitchen Equipment Contractor. (or Caddy if LED)

HOOD MOUNTED FAN & LIGHT SWITCH:
Fan control panel to be mounted on top of the ventilator in a NEMA 4 painted enclosure.

Enclosure to house a terminal block for field interlocks for the exhaust fan, supply fan, fire suppression system and factory interlocks for the ventilator surface lights, auto-start thermostats, and ventilator front panel mounted fan and light switches. The fan control panel shall include a 5-minute time delay for the auto-start activation of the exhaust and supply fan to eliminate fan cycling. Fan control panel to comply with the IMC Fan Interlock Code 507.2.1.1 to automatically activate the fans via thermostatic interlock during cooking operations in lieu of manual activation.

EXHAUST FANS:
Exhaust fans are to be provided and installed by others in compliance with local codes. Fans should be induced draft, squirrel cage design, equipped with backward inclined blades.

FIRE PROTECTION:
NFPA 96 and local codes require a fire extinguishing system for protection of the duct collar and plenum of all ventilators, as well as for the protection of various cooking appliances such as deep fat fryers, griddles, ranges, and broilers, which may be a source of ignition of grease. Consult factory and local fire officials for exact requirements. UL Listed fire protection systems may be pre-piped by Caddy at the time of manufacture, assuring concealment of piping and detectors

ITEM # 1-72 EXHAUST HOOD TRIM AND CLOSURE PANEL

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 9'-7" l x 5'-0" w. Provide 18 ga stainless steel exhaust hood trim and closure panels with #4 finish. Provide all necessary closure, louvers and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-73 FIRE PROTECTION SYSTEM

Quantity: One (1)
Manufacturer: Edison Fire
Model: R102
SIS No.:W010

1. One (1) Model R102 Provide One (1) each Fire Protection System complete with nozzles, fusible links, piping, pull box, and actuators, utilizing a wet chemical extinguishing agent fabricated and installed by an approved Ansul system installer. Provide in accordance with complete drawings, details, and specifications section 114000. System to be an R-102 automatic type and be manufactured and installed per the current NFPA guidelines and be U.L. approved. Cylinders shall be mounted on wall in a stainless steel enclosure, or mounted in a stainless steel cabinet attached to the exhaust hood. All piping to be concealed with the exception of drops which shall be chrome sleeved and of as minimal exposure as possible. Size, number, and location of nozzles or fusible links to be in accordance with U.L. limits for this particular system. Fire system contractor shall provide engineered drawings, acquire permit, coordinate start-up and testing with

the appropriate Fire Officials, and obtain final certification. Provide as-built drawings at completion of install. Fire System installer to provide adequate job site visits to coordinate installation of un-exposed pipe and installation of system. Include the appropriately sized and approved electronic gas shut-off valve(s).

ITEM # 1-74 FIRE PULL BOX <NIC>

Quantity: One (1)
Manufacturer: Custom
Model: PART OF ITEM #1-73
SIS No.:W010

1. One (1) Model PART OF ITEM #1-73 Fire Pull Box - Box by electrician, Mechanism part of item #1-73 Fire Protection System.

ITEM # 1-75 FLOOR TROUGH

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 2'-0" l x 2'-6" d. Provide 14 gauge type 304 stainless steel floor trough with coved corners and integrally pitched toward waste outlet with a stainless steel beehive strainer. Provide IMC Teddy ASFT-ADA stainless steel accessible grating. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-76 TILTING SKILLET BRAISING PAN, ELECTRIC

Quantity: One (1)
Manufacturer: Groen
Model: BPP-40EA
SIS No.:W010

1. One (1) Model BPP-40EA Braising Pan, electric, 40-gallon capacity, 10" deep pan, 38" pan height, IPX6 water rated electronic Advanced controls with digital display, 1 minute to 10 hour timer, 175° - 400°F preset temperatures along with manual setting capability, power tilt, standard etch marks, faucet bracket, vent cover, round tubular open leg base, stainless steel construction, bullet feet, 15.3kW, cUL, UL, NSF, Made in USA
2. One (1) (1) year parts & labor, (10) year pan warranty, standard
3. One (1) 208v/60/3-ph, 43.0 amps, std.
4. One (1) 2" Tangent draw-off with perforated strainer
5. One (1) Model 146222 Faucet, double pantry, with swing spout & riser, left or right-sided mounting
6. One (1) Model FL FOOTKIT 4 Flanged Feet, for all BPM & BPP models (set of 4)

ITEM # 1-77 WALL FLASHING

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL (LOT) Approximately 9'-7" l. Provide 18 ga. stainless steel wall flashing from cove base to 6" beyond exhaust hood with a #4 finish. Provide all necessary closure and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-78 SPARE NO.

ITEM # 1-79 SPARE NO.

ITEM # 1-80 FLOOR TROUGH

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 2'-0" l x 1'-10" d. Provide 14 gauge type 304 stainless steel floor trough with coved corners and integrally pitched toward waste outlet with a stainless steel beehive strainer. Provide IMC Teddy ASFT-ADA stainless steel accessible grating. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-81 KETTLE, ELECTRIC, TILTING

Quantity: One (1)
Manufacturer: Groen
Model: DEE/4-60A
SIS No.:W010

1. One (1) Model DEE/4-60A Tilting Kettle, electric, 60-gallon capacity, 2/3 jacket, IPX6 water rated electronic Advanced controls with digital display, 1 minute to 10 hour timer, low (2) and high (7) preset intensities with manual capability, 316 stainless steel liner, crank tilt, floor mounted control console, stainless steel construction, bullet feet, 50 PSI, cULus, NSF, Made in USA
2. One (1) (1) year parts & labor, (10) year hemisphere warranty, standard
3. One (1) 208v/60/3-ph, 21.0kW, 59.0 amps, std.
4. One (1) 2" Tangent draw-off (TDO)
5. One (1) Model 159147 Hinged Cover Kit (no. 41), for 60 gallon floor model kettles (factory installed)

6. One (1) Model Z091879 Faucet, double pantry, with swing spout
7. One (1) Model 153193 Flanged feet, set of 4

ITEM # 1-82 WORK TABLE W/PREP SINK ASSEMBLY

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 6'-11" l x 3'-0" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 6" high back and end splash (where required). Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. One (1) Model PREP SINK Provide 16 ga stainless steel sink tub measuring approximately 18" w x 24" d x 12" h. Welded in place with polished seams.
3. One (1) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish

ITEM # 1-83 DECK MOUNT FAUCET

Quantity: One (1)
Manufacturer: Fisher
Model: 57665
SIS No.:W010

1. One (1) Model 57665 Faucet, deck mount, 8" centers, 12" swing spout, lever handles with color coded indexes, 1/2" male inlets, stainless steel, ADA Compliant
2. One (1) 5 year warranty against defects in materials or workmanship, standard

ITEM # 1-84 WALL SHELF (KNIFE BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 18'-8" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-85 BAKER'S TABLE W/ PREP SINK

Quantity: One (1)
Manufacturer: Custom

Model: STAINLESS STEEL/WOOD
SIS No.:W010

1. One (1) Model STAINLESS STEEL/WOOD Approximately 11'-6" l x 3'-0" w. Provide stainless steel bakers table with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 6" high back and end splash. Top shall be NSF approved solid maple, and legs shall be 16 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.
2. One (1) Model PREP SINK Provide 16 ga stainless steel sink tub measuring approximately 18" w x 24" d x 12" h. Welded in place with polished seams.
3. One (1) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish

ITEM # 1-86 INGREDIENT BIN

~~**Quantity: One (1)**~~
Quantity: Five (5)
Manufacturer: Cambro
Model: IBS27148
SIS No.:W010

1. One (1) Model IBS27148 Ingredient Bin, mobile, 27 gallon capacity, 1-pc seamless polyethylene bin, 2-pc sliding polycarbonate lid, S-hook on front (scoop NOT included), (4) 3" heavy duty casters (2 front swivel, 2 fixed), white with clear cover, NSF

ITEM # 1-87 DECK MOUNT FAUCET

Quantity: One (1)
Manufacturer: Fisher
Model: 57665
SIS No.:W010

1. One (1) Model 57665 Faucet, deck mount, 8" centers, 12" swing spout, lever handles with color coded indexes, 1/2" male inlets, stainless steel, ADA Compliant
2. One (1) 5 year warranty against defects in materials or workmanship, standard

ITEM # 1-88 SPARE NO.

ITEM # 1-89 SPARE NO.

ITEM # 1-90 SPARE NO.

ITEM # 1-91 HOSE BIB

Quantity: One (1)

Manufacturer: NIFSEC
Model: IN PLUMBING SECTION
SIS No.:W010

1. One (1) Model IN PLUMBING SECTION IN PLUMBING SECTION

ITEM # 1-92 PLANETARY MIXER

Quantity: One (1)
Manufacturer: Hobart
Model: HL600-1STD
SIS No.:W010

1. One (1) Model HL600-1STD 200-240/50/60/3/1 Mixer; with bowl, beater, “D” whip, & spiral dough arm; US/EXP configuration - Legacy Planetary Mixer, 2.7 HP, 60 quart, (4) fixed speeds, gear-driven transmission, 20-Minute SmartTimer™, #12 attach hub, power bowl lift, stainless steel bowl, stainless steel bowl guard, "B" beater, "D" wire whip, "ED" dough hook
2. One (1) Standard warranty: 1-Year parts, labor & travel time during normal working hours within the USA
3. One (1) Model PPASTRY-HL60 60 qt. "P" Pastry Knife
4. One (1) Model SPLASH-LEX060 Mixer Bowl Splash Cover, for 60 quart, Lexan
5. One (1) Model CHUTE-HL HL600/HL662 Ingredient Chute

ITEM # 1-93 FLOOR TROUGH

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 0'-0" l x 1'-6" d. Provide 14 gauge type 304 stainless steel floor trough with coved corners and integrally pitched toward waste outlet with a stainless steel beehive strainer. Provide IMC Teddy ASFT-ADA stainless steel accessible grating. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-94 WALL CAPS

Quantity: Two (2)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. Two (2) Model STAINLESS STEEL Provide 16 ga. stainless steel wall caps at 6'-6" in height. Stainless steel shall have a #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-95 EXHAUST HOOD (TYPE I)

Quantity: One (1)
Manufacturer: Caddy
Model: CUSTOM
SIS No.:W010

1. One (1) Model CUSTOM GENERAL:
Exhaust Ventilator shall be constructed of 18 gauge type 300 series stainless steel. All exposed surfaces to have a #4 finish. Construction to meet all requirements of NFPA 96 and NSF Standard No. 2. To include necessary hanger brackets at front and rear for suspending from building overhead structure.

CONSTRUCTION:
Ventilator and exhaust duct collar shall be of all stainless steel, minimum 18 gauge, type 304. All exposed surfaces shall be number 4 finish. Caddy's optional front low air volume deflector plate we achieve low air volume design with no wiring, motorizations, or jets with giving an aesthetically polished fit and finish.

DESCRIPTION:
The Caddy AirSystems Model "PB" Series ventilator is a dry filter type and is UL listed under the standards set forth in UL 710 "Exhaust Hoods for Commercial Cooking Equipment". This ventilator is 90% grease extraction efficient when operated and maintained in accordance with design specifications. Filters to be UL Classified stainless steel baffle type. This high efficiency is accomplished by utilizing removable stainless steel baffle filters containing a series of horizontal, self-draining baffles. As the air is drawn around the baffles, the grease, dust and lint particles are removed from the airstream by centrifugal force. As the liquefied grease is extracted, it is drained off via a trough into grease collection containers at the end of the ventilator. At the end of the cooking day or at scheduled intervals, the filters are removed for cleaning without having to climb up or onto the cooking equipment. Once removed, the filters can be washed either in a dishwasher or soaked and rinsed off in a pot sink. Each filter is a maximum of 19-1/2" long. Ventilator can also be equipped with an optional manual or automatic air balancing damper.

APPLICATION:
Wall mounted exhaust only canopy style for use over all types of cooking equipment.

MAKE-UP AIR:
Ventilator shall have ceiling supply plenum with 40% open stainless steel perforated panels for downward discharge of tempered or untempered make-up air. Ceiling supply plenums to be constructed of 100% 18 gauge type 300 series stainless steel. No galvanized metal shall be used. Plenums shall include additional perforated baffles below each supply duct inlet to equally disburse air along full length of ceiling supply plenum.

LIGHT FIXTURES:
Ventilator shall be equipped with (4) FOUR 36" recessed double tube LED light fixtures. All light fixtures shall be pre-wired to a single connection point. Ventilators built in multiple sections to be furnished with junction boxes for ease of field connection by the electrical trades. Light bulbs furnished and installed by the Kitchen Equipment Contractor. (or Caddy if LED)

HOOD MOUNTED FAN & LIGHT SWITCH:
Fan control panel to be mounted on top of the ventilator in a NEMA 4 painted enclosure. Enclosure to house a terminal block for field interlocks for the exhaust fan, supply fan, fire suppression system and factory interlocks for the ventilator surface lights, auto-start thermostats, and ventilator front panel mounted fan and light switches. The fan control panel shall include a 5-minute time delay for the auto-start activation of the exhaust and supply fan to eliminate fan cycling. Fan control panel to comply with the IMC Fan Interlock Code 507.2.1.1 to automatically activate the fans via thermostatic interlock during cooking operations in lieu of manual activation.

EXHAUST FANS:
Exhaust fans are to be provided and installed by others in compliance with local codes. Fans should be induced draft, squirrel cage design, equipped with backward inclined blades.

FIRE PROTECTION:
NFPA 96 and local codes require a fire extinguishing system for protection of the duct collar and plenum of all ventilators, as well as for the protection of various cooking appliances such as deep fat fryers, griddles, ranges, and broilers, which may be a source of ignition of grease. Consult factory and local fire officials for exact requirements. UL Listed fire protection systems may be pre-piped by Caddy at the time of manufacture, assuring concealment of piping and detectors

ITEM # 1-96 EXHAUST HOOD TRIM AND CLOSURE PANEL

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 29'-10" l x 5'-6" w. Provide 18 ga stainless steel exhaust hood trim and closure panels with #4 finish. Provide all necessary closure, louvers and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-97 FIRE PROTECTION SYSTEM

Quantity: One (1)
Manufacturer: Edison Fire
Model: R102
SIS No.:W010

1. One (1) Model R102 Provide One (1) each Fire Protection System complete with nozzles, fusible links, piping, pull box, and actuators, utilizing a wet chemical extinguishing agent fabricated and installed by an approved Ansul system installer. Provide in accordance with complete drawings, details, and specifications section 114000. System to be an R-102 automatic type and be manufactured and installed per the current NFPA guidelines and be U.L. approved. Cylinders shall be mounted on wall in a stainless steel enclosure, or mounted in a stainless steel cabinet attached to the exhaust hood. All piping to be concealed with the exception of drops which shall

be chrome sleeved and of as minimal exposure as possible. Size, number, and location of nozzles or fusible links to be in accordance with U.L. limits for this particular system. Fire system contractor shall provide engineered drawings, acquire permit, coordinate start-up and testing with the appropriate Fire Officials, and obtain final certification. Provide as-built drawings at completion of install. Fire System installer to provide adequate job site visits to coordinate installation of un-exposed pipe and installation of system. Include the appropriately sized and approved electronic gas shut-off valve(s).

ITEM # 1-98 SPARE NO.

ITEM # 1-99 SPARE NO.

ITEM # 1-100 SPARE NO.

ITEM # 1-101 FIRE PULL BOX <NIC>

Quantity: One (1)
Manufacturer: Custom
Model: PART OF ITEM # 1-97
SIS No.:W010

1. One (1) Model PART OF ITEM # 1-97 Fire Pull Box - Box by electrician, Mechanism part of item #1-97 Fire Protection System.

ITEM # 1-102 COMBI OVEN, GAS

Quantity: One (1)
Manufacturer: RATIONAL
Model: ICP 20-FULL NG 208/240V 1 PH (LM100GG)
SIS No.:W010

1. One (1) Model ICP 20-FULL NG 208/240V 1 PH (LM100GG) (CG1GRRA.0000245) iCombi Pro® 20-Full Size Combi Oven, natural gas, (20) 18" x 26" sheet pan or (40) 12" x 20" steam pan or (20) 2/1 GN pan capacity, mobile oven rack & (10) stainless steel grids included, intelligent cooking system with (4) assistants; iDensityControl, iCookingSuite, iProductionManager, & iCareSystem, (6) operating modes, (5) cooking methods, (3) manual operating modes, 85° to 572°F temperature range, quick clean, care control, eco mode, 6-point core temperature probe, retractable hand shower, Ethernet interface, Wi-Fi enabled, 303,500 BTU, 208/240v/60/1-ph, 6 ft. cord, 2.2 kW, CE, IPX5, cCSAus, NSF, ENERGY STAR-®
2. One (1) NOTE: All discounts subject to approval by manufacturer
3. One (1) 2 years parts and labor, 5 years steam generator warranty
4. One (1) Model CAP Chef Assistance Program, a RATIONAL certified Chef conducts 4 hours/location specialized application training with personnel, no charge

5. One (1) Model 1900.1150US Water Filtration Double Cartridge System, for full-size Combi-Duos or if used for more than (2) units, includes: (1) double head with pressure gauge, (2) R95H filter & (1) filter installation kit (for each additional unit add (1) additional head & additional cartridge. Maximum (4) cartridges)
6. One (1) NOTE: The RATIONAL Water Filtration Systems helps provide consistent high quality water to your RATIONAL cooking systems. The patented carbon block technology reduces the effects of sediment, chloramines and chlorine while providing the required flow rates

ITEM # 1-103 WATER FILTRATION SYSTEM

Quantity: One (1)
Manufacturer: RATIONAL
Model: PART OF ITEM #1-102
SIS No.:W010

1. One (1) Model PART OF ITEM #1-102

ITEM # 1-104 COMBI OVEN, GAS

Quantity: One (1)
Manufacturer: RATIONAL
Model: ICP 20-FULL NG 208/240V 1 PH (LM100GG)
SIS No.:W010

1. One (1) Model ICP 20-FULL NG 208/240V 1 PH (LM100GG) (CG1GRRA.0000245) iCombi Pro® 20-Full Size Combi Oven, natural gas, (20) 18" x 26" sheet pan or (40) 12" x 20" steam pan or (20) 2/1 GN pan capacity, mobile oven rack & (10) stainless steel grids included, intelligent cooking system with (4) assistants; iDensityControl, iCookingSuite, iProductionManager, & iCareSystem, (6) operating modes, (5) cooking methods, (3) manual operating modes, 85° to 572°F temperature range, quick clean, care control, eco mode, 6-point core temperature probe, retractable hand shower, Ethernet interface, Wi-Fi enabled, 303,500 BTU, 208/240v/60/1-ph, 6 ft. cord, 2.2 kW, CE, IPX5, cCSAus, NSF, ENERGY STAR-®
2. One (1) NOTE: All discounts subject to approval by manufacturer
3. One (1) 2 years parts and labor, 5 years steam generator warranty
4. One (1) Model CAP Chef Assistance Program, a RATIONAL certified Chef conducts 4 hours/location specialized application training with personnel, no charge
5. One (1) Model 1900.1150US Water Filtration Double Cartridge System, for full-size Combi-Duos or if used for more than (2) units, includes: (1) double head with pressure gauge, (2) R95H filter & (1) filter installation kit (for each additional unit add (1) additional head & additional cartridge. Maximum (4) cartridges)
6. One (1) NOTE: The RATIONAL Water Filtration Systems helps provide consistent high quality water to your RATIONAL cooking systems. The patented carbon block technology reduces the effects of sediment, chloramines and chlorine while providing the required flow rates

ITEM # 1-105 WATER FILTRATION SYSTEM

Quantity: One (1)
Manufacturer: RATIONAL
Model: PART OF ITEM #1-104
SIS No.:W010

1. One (1) Model PART OF ITEM #1-104

ITEM # 1-106 COMBI OVEN, GAS

Quantity: One (1)
Manufacturer: RATIONAL
Model: ICP 20-FULL NG 208/240V 1 PH (LM100GG)
SIS No.:W010

1. One (1) Model ICP 20-FULL NG 208/240V 1 PH (LM100GG) (CG1GRRA.0000245) iCombi Pro® 20-Full Size Combi Oven, natural gas, (20) 18" x 26" sheet pan or (40) 12" x 20" steam pan or (20) 2/1 GN pan capacity, mobile oven rack & (10) stainless steel grids included, intelligent cooking system with (4) assistants; iDensityControl, iCookingSuite, iProductionManager, & iCareSystem, (6) operating modes, (5) cooking methods, (3) manual operating modes, 85° to 572°F temperature range, quick clean, care control, eco mode, 6-point core temperature probe, retractable hand shower, Ethernet interface, Wi-Fi enabled, 303,500 BTU, 208/240v/60/1-ph, 6 ft. cord, 2.2 kW, CE, IPX5, cCSAus, NSF, ENERGY STAR-®
2. One (1) NOTE: All discounts subject to approval by manufacturer
3. One (1) 2 years parts and labor, 5 years steam generator warranty
4. One (1) Model CAP Chef Assistance Program, a RATIONAL certified Chef conducts 4 hours/location specialized application training with personnel, no charge
5. One (1) Model 1900.1150US Water Filtration Double Cartridge System, for full-size Combi-Duos or if used for more than (2) units, includes: (1) double head with pressure gauge, (2) R95H filter & (1) filter installation kit (for each additional unit add (1) additional head & additional cartridge. Maximum (4) cartridges)
6. One (1) NOTE: The RATIONAL Water Filtration Systems helps provide consistent high quality water to your RATIONAL cooking systems. The patented carbon block technology reduces the effects of sediment, chloramines and chlorine while providing the required flow rates

ITEM # 1-107 WATER FILTRATION SYSTEM

Quantity: One (1)
Manufacturer: RATIONAL
Model: PART OF ITEM #1-106
SIS No.:W010

1. One (1) Model PART OF ITEM #1-106

ITEM # 1-108 SPARE NO.

ITEM # 1-109 SPARE NO.

ITEM # 1-110 SPARE NO.

ITEM # 1-111 WALL FLASHING

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL (LOT) Approximately 29'-9" l. Provide 18 ga. stainless steel wall flashing from cove base to 6" beyond exhaust hood with a #4 finish. Provide all necessary closure and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-112 COMBI OVEN, GAS

Quantity: One (1)
Manufacturer: RATIONAL
Model: ICP 20-FULL NG 208/240V 1 PH (LM100GG)
SIS No.:W010

1. One (1) Model ICP 20-FULL NG 208/240V 1 PH (LM100GG) (CG1GRRA.0000245) iCombi Pro® 20-Full Size Combi Oven, natural gas, (20) 18" x 26" sheet pan or (40) 12" x 20" steam pan or (20) 2/1 GN pan capacity, mobile oven rack & (10) stainless steel grids included, intelligent cooking system with (4) assistants; iDensityControl, iCookingSuite, iProductionManager, & iCareSystem, (6) operating modes, (5) cooking methods, (3) manual operating modes, 85° to 572°F temperature range, quick clean, care control, eco mode, 6-point core temperature probe, retractable hand shower, Ethernet interface, Wi-Fi enabled, 303,500 BTU, 208/240v/60/1-ph, 6 ft. cord, 2.2 kW, CE, IPX5, cCSAus, NSF, ENERGY STAR-®
2. One (1) NOTE: All discounts subject to approval by manufacturer
3. One (1) 2 years parts and labor, 5 years steam generator warranty
4. One (1) Model CAP Chef Assistance Program, a RATIONAL certified Chef conducts 4 hours/location specialized application training with personnel, no charge
5. One (1) Model 1900.1150US Water Filtration Double Cartridge System, for full-size Combi-Duos or if used for more than (2) units, includes: (1) double head with pressure gauge, (2) R95H filter & (1) filter installation kit (for each additional unit add (1) additional head & additional cartridge. Maximum (4) cartridges)
6. One (1) NOTE: The RATIONAL Water Filtration Systems helps provide consistent high quality water to your RATIONAL cooking systems. The patented carbon block technology reduces the effects of sediment, chloramines and chlorine while providing the required flow rates

ITEM # 1-113 WATER FILTRATION SYSTEM

Quantity: One (1)
Manufacturer: RATIONAL
Model: PART OF ITEM #1-112
SIS No.:W010

1. One (1) Model PART OF ITEM #1-112

ITEM # 1-114 COMBI OVEN, GAS

Quantity: One (1)
Manufacturer: RATIONAL
Model: ICP 20-FULL NG 208/240V 1 PH (LM100GG)
SIS No.:W010

1. One (1) Model ICP 20-FULL NG 208/240V 1 PH (LM100GG) (CG1GRRA.0000245) iCombi Pro® 20-Full Size Combi Oven, natural gas, (20) 18" x 26" sheet pan or (40) 12" x 20" steam pan or (20) 2/1 GN pan capacity, mobile oven rack & (10) stainless steel grids included, intelligent cooking system with (4) assistants; iDensityControl, iCookingSuite, iProductionManager, & iCareSystem, (6) operating modes, (5) cooking methods, (3) manual operating modes, 85° to 572°F temperature range, quick clean, care control, eco mode, 6-point core temperature probe, retractable hand shower, Ethernet interface, Wi-Fi enabled, 303,500 BTU, 208/240v/60/1-ph, 6 ft. cord, 2.2 kW, CE, IPX5, cCSAus, NSF, ENERGY STAR-®
2. One (1) NOTE: All discounts subject to approval by manufacturer
3. One (1) 2 years parts and labor, 5 years steam generator warranty
4. One (1) Model CAP Chef Assistance Program, a RATIONAL certified Chef conducts 4 hours/location specialized application training with personnel, no charge
5. One (1) Model 1900.1150US Water Filtration Double Cartridge System, for full-size Combi-Duos or if used for more than (2) units, includes: (1) double head with pressure gauge, (2) R95H filter & (1) filter installation kit (for each additional unit add (1) additional head & additional cartridge. Maximum (4) cartridges)
6. One (1) NOTE: The RATIONAL Water Filtration Systems helps provide consistent high quality water to your RATIONAL cooking systems. The patented carbon block technology reduces the effects of sediment, chloramines and chlorine while providing the required flow rates

ITEM # 1-115 WATER FILTRATION SYSTEM

Quantity: One (1)
Manufacturer: RATIONAL
Model: PART OF ITEM #1-114
SIS No.:W010

1. One (1) Model PART OF ITEM #1-114

ITEM # 1-116 COMBI OVEN, GAS

Quantity: One (1)

Manufacturer: RATIONAL
Model: ICP 20-FULL NG 208/240V 1 PH (LM100GG)
SIS No.:W010

1. One (1) Model ICP 20-FULL NG 208/240V 1 PH (LM100GG) (CG1GRRA.0000245) iCombi Pro® 20-Full Size Combi Oven, natural gas, (20) 18" x 26" sheet pan or (40) 12" x 20" steam pan or (20) 2/1 GN pan capacity, mobile oven rack & (10) stainless steel grids included, intelligent cooking system with (4) assistants; iDensityControl, iCookingSuite, iProductionManager, & iCareSystem, (6) operating modes, (5) cooking methods, (3) manual operating modes, 85° to 572°F temperature range, quick clean, care control, eco mode, 6-point core temperature probe, retractable hand shower, Ethernet interface, Wi-Fi enabled, 303,500 BTU, 208/240v/60/1-ph, 6 ft. cord, 2.2 kW, CE, IPX5, cCSAus, NSF, ENERGY STAR-®
2. One (1) NOTE: All discounts subject to approval by manufacturer
3. One (1) 2 years parts and labor, 5 years steam generator warranty
4. One (1) Model CAP Chef Assistance Program, a RATIONAL certified Chef conducts 4 hours/location specialized application training with personnel, no charge
5. One (1) Model 1900.1150US Water Filtration Double Cartridge System, for full-size Combi-Duos or if used for more than (2) units, includes: (1) double head with pressure gauge, (2) R95H filter & (1) filter installation kit (for each additional unit add (1) additional head & additional cartridge. Maximum (4) cartridges)
6. One (1) NOTE: The RATIONAL Water Filtration Systems helps provide consistent high quality water to your RATIONAL cooking systems. The patented carbon block technology reduces the effects of sediment, chloramines and chlorine while providing the required flow rates

ITEM # 1-117 WATER FILTRATION SYSTEM

Quantity: One (1)
Manufacturer: RATIONAL
Model: PART OF ITEM #1-116
SIS No.:W010

1. One (1) Model PART OF ITEM #1-116

ITEM # 1-118 SPARE NO.

ITEM # 1-119 SPARE NO.

ITEM # 1-120 SPARE NO.

ITEM # 1-121 WORK TABLE

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL

SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 7'-6" l x 3'-0" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 6" high back and end splash (where required). Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-122 WALL SHELF (KNIFE BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 7'-6" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-123 ISLAND WORK TABLE W/2 COMPARTMENT PREP SINKS

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 11'-0" l x 4'-0" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, and under and/or mid shelves. Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. One (1) Model 2 COMP SINK Provide 16 ga stainless steel with 2 compartment sink tub measuring approximately 18" w x 24" d x 12" h each. Welded in place with polished seams.
3. Two (2) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish

ITEM # 1-124 OVERSHELF

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 7'-3" l x 2'-0" w. Provide table mounted 16 ga stainless steel overshelf with tubular supports and 14 ga concealed brackets. Stainless steel shall have a #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-125 DECK MOUNT FAUCET

Quantity: One (1)
Manufacturer: Fisher
Model: 57665
SIS No.:W010

1. One (1) Model 57665 Faucet, deck mount, 8" centers, 12" swing spout, lever handles with color coded indexes, 1/2" male inlets, stainless steel, ADA Compliant
2. One (1) 5 year warranty against defects in materials or workmanship, standard
3.
4. NOTE: FISHER TAKES EXCEPTION TO THE CERAMAS CARTRIDGE

ITEM # 1-126 ISLAND WORK TABLE

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 10'-0" l x 4'-0" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, and under and/or mid shelves. Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-127 OVERSHELF

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 8'-6" l x 2'-0" w. Provide table mounted 16 ga stainless steel overshelf with tubular supports and 14 ga concealed brackets. Stainless steel shall have a #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-128 SPARE NO.

ITEM # 1-129 SPARE NO.

ITEM # 1-130 SPARE NO.

ITEM # 1-131 HEATED MOBILE CABINET

Quantity: Eight (8)
Manufacturer: Cres Cor
Model: 1301836D

SIS No.:W010

1. Eight (8) Model 1301836D Cabinet, Mobile Heated, non-insulated with bottom-mounted heater assembly, corrugated sides taking 18" x 26" pans, slides on 1-1/2" centers, capacity (34) 18" x 26" pans, (4) 5" casters (2) braked, aluminum exterior & interior, CSA, cCSAus
2. Eight (8) Standard Warranty: 90 day labor with 1 year parts warranty
3. Eight (8) 120v/60/1-ph, 2.0 kW, 16.7 amp, 6 ft 12/3 ga. power cord, standard
4. Eight (8) Right-hand door swing, standard

ITEM # 1-132 WALL MOUNT HAND SINK W/SOAP & TOWEL DISPENSER

Quantity: One (1)
Manufacturer: Eagle Group
Model: HSAP-14-ADA-FW (NO FAUCET)
SIS No.:W010

1. One (1) Model HSAP-14-ADA-FW (NO FAUCET) Hand Sink, wall mount, 14" wide x 16" front-to-back x 5" deep bowl, 16/304 stainless steel construction, splash mount gooseneck faucet with wrist handles & mixer valve, marine edge on front & sides, 1/2" NPS water inlet, chrome-plated P-trap, wrist handles, soap dispenser, basket drain, skirt assembly & paper towel dispenser, PHYSICALLY CHALLENGED, NSF
2. One (1) Model -LRS Left & right side splashes

ITEM # 1-133 HANDLE KIT WRIST 2 EACH, 3"W X 6.5"D X 1.5"H

Quantity: One (1)
Manufacturer: Fisher
Model: 75626
SIS No.:W010

1. One (1) Model 75626 Handle Kit Wrist 2 each, 3"W x 6.5"D x 1.5"H
2. One (1) Model 71447 Close Elbows, (2) 1/2", stainless steel
3. One (1) Model 62669 Faucet, backsplash mount, 4" centers, 6" swivel/rigid gooseneck spout (use included star washer to make rigid), lever handles with color coded indexes, 1/2" NPT male inlets, stainless steel, ADA Compliant
4. One (1) 5 year warranty against defects in materials or workmanship, standard

ITEM # 1-134 CUSTOM

Quantity: One (1)
Manufacturer: Power Soak

~~**Model:**~~ ~~**CUSTOM**~~
Model: **POWER SOAKM-**

SIS No.:W010

1. One (1) Model POWER PREPM- (1-134) POWER PREP M-
2. UNIT O.D. 96" LEFT TO RIGHT X 30" FRONT TO BACK AS FOLLOWS:
3. 1.5" LEFT CHANNEL RIM
4. 28.5" SOILED DRAINBOARD
5. 36" 4-BAY WASH TANK X 19" DEEP
6. 28.5" CLEAN DRAINBOARD
7. 1.5" RIGHT CHANNEL RIM
8. UNIT TO SHIP IN (1) SECTION
9. NOTE: THIS POWER PREP UNIT IS NOT AVAILABLE WITH 208/3PH ELECTRICAL. STANDARD ELECTRICAL IS 208/1PH.
10. Model POWERPREP-PSK POWER PREP
11. Model DECK-HEIGHT-PSK Deck Height
12. Model LENGTH-PSK System Length
13. Model WIDTH-30-PSK NARROW 30 INCHES FRONT TO BACK SYSTEM
14. Model TYPE-1PC-PSK ONE-PIECE CONSTRUCTION
15. Model CRES-X-L-SLD-30-PSK 1.5" CHANNEL RIM, SOILED LEFT END
16. Model SDB-30-30-PSK 25-30" SOILED DRAIN BOARD
17. Model WS-36L-PRODUCE-PSK 36" INTRO PRODUCE WASH SINK 4-BAY, 19" DEEP
18. Model PS-50-1PH-230V-PRODUCE-PSK INTRO SINGLE PHASE PRODUCE SOAK CONTROL, 208V/230V
19. Model CDB-30-30-PSK 25-30" CLEAN DRAIN BOARD
20. Model CRES-X-R-CLN-30-PSK 1.5" CHANNEL RIM, CLEAN RIGHT END
21. Model PS-QDC-PSK 1/2" PRE-RINSE COMBO/XTRA-LONG HOSE/VACUUM BRKR/QUICK DSCNCT
22. Model DREBV-PSK DRAIN BALL VALVE REAR OUTLET
23. Model FLANGE-FOOT-PSK FLANGED FOOT
24. Model US-XX-PSK UNDERSHELF/STATIONARY PER INCH, 30 INCH MINIMUM

ITEM # 1-135 PRE-RINSE FAUCET ASSEMBLY

Quantity: One (1)
Manufacturer: Fisher
Model: 53430
SIS No.:W010

1. One (1) Model 53430 Pre-Rinse Unit, spring style, 8" adjustable wall control valve, 21" riser, 36" hose, stainless steel
2. One (1) Model 10197 Ultra-Spray™/PLUS Valve, with long squeeze lever 0.65 gpm, stainless steel
3. One (1) Model 38660 Pre-Rinse Sub-Assembly, includes: 21" riser, spring, 36" hose, hose to pipe adapter, handle & Ultra-Spray™/PLUS spray valve, stainless steel
4. One (1) Model 70459 Control Valve, wall mount, single hole, swivel outlet & swivel stem (without spout), lever handle, 1/2" female inlet, stainless steel, ADA compliant

5. One (1) 5 year warranty against defects in materials or workmanship, standard
6.

ITEM # 1-136 WORK TABLE W/PREP SINK ASSEMBLY

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 22'-0" l x 2'-6" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 6" high back and end splash (where required). Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. One (1) Model PREP SINK Provide 16 ga stainless steel sink tub measuring approximately 18" w x 24" d x 12" h. Welded in place with polished seams.
3. One (1) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish
4. One (1) Model DRAWER Provide 16 ga. type 304 stainless steel enclosed NSF utensil drawer assembly with metal roller track hardware, removable pan, hemmed safety pull and lock, measuring approximately 20"l x 20"w x 5"d.

ITEM # 1-137 WALL SHELF (KNIFE BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 3'-10" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-138 SPARE NO.

ITEM # 1-139 SPARE NO.

ITEM # 1-140 SPARE NO.

ITEM # 1-141 FOOD SLICER, ELECTRIC

Quantity: One (1)
Manufacturer: Globe

Model: S13
SIS No.:W010

1. One (1) Model S13 Premium Heavy Duty Slicer, manual, 13” steel knife, top-mounted removable sharpener with synthetic diamond surfaces, knife cover interlock, kickstand, seamless anodized aluminum base, 1/2 HP knife motor, 115v/60/1-ph, 2.0 amps, NEMA 5-15P, cETLus, ETL-Sanitation, Made in USA (Replaces 3600N; with frozen option replaces 3600NF)
2. One (1) 2 year parts & labor slicer warranty, lifetime sharpening stones warranty, standard
3. One (1) Model S-VEGHOP Vegetable Hopper, for S-Series slicers

ITEM # 1-142 WALL SHELF (KNIFE BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 14'-9" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-143 WALL / SPLASH MOUNT FAUCET

Quantity: One (1)
Manufacturer: Fisher
Model: 53139
SIS No.:W010

1. One (1) Model 53139 Faucet, wall mount, 8" adjustable centers, 12" swing spout, lever handles with color coded indexes, 1/2" NPT female inlets, stainless steel, ADA Compliant
2. One (1) 5 year warranty against defects in materials or workmanship, standard
3.
4. NOTE: FISHER TAKES EXCEPTION TO THE CERAMAS CARTRIDGE

ITEM # 1-144 FOOD PROCESSOR

Quantity: One (1)
Manufacturer: Robot Coupe
Model: R602N
SIS No.:W010

1. One (1) Model R602N Combination Food Processor, 7 liter stainless steel bowl with handle, continuous feed kit with kidney shaped & cylindrical shaped hoppers, includes: (1)"S" blade, (1) 3mm grating disc (28058), (1) 3mm slicing disc (28064), two speeds, 850 & 1750 RPM, 208-240v/60/3-ph, 2.6/2.8 amps, 3 HP, NEMA L15-20P, cETLus, ETL-Sanitation

2. One (1) 1 year parts & labor warranty
3. One (1) Model LP16DISC LP16 Disc Package, (16) disc package includes: (3) slicing discs (3/64", 5/64", 5/32"), (2) grating discs (1/16", 1/8"), (1) French fry kit (3/8" x 3/8"), (3) dicing kits (3/16", 3/8", 25/32"), (3) julienne discs (5/64" x 3/8", 1/10", 5/32"), dice cleaning kit & disc holder

ITEM # 1-145 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-42
SIS No.:W010

1. One (1) Model 7-PS-42 Recessed Hand Sink, 14"W x 10"D x 5" deep sink bowl, includes: 4" OC deck mounted gooseneck faucet with aerator, soap & paper towel dispensers, 4"H side splashes, 304 stainless steel, NSF (countertop opening not to exceed 17-1/4" (front to back) x 17-3/8" (left to right))
2. One (1) Model K-08 Low-flow aerator 0.5gpm, fits 55/64-27 male or 15/16-27 female thread on spout, conforms to California AB 1953
3. One (1) Model 7-PS-14 P-trap, 1-1/2", 22 gauge

ITEM # 1-146 WATER FILTRATION SYSTEM

Quantity: One (1)
Manufacturer: Scotsman
Model: SSM2-P
SIS No.:W010

1. One (1) Model SSM2-P SSM Plus Water Filter Assembly, twin system, 3.34 gallons per minute max flow, designed for cubers over 650 lb and up to 1,200 lb, and for and flakers and nuggets over 1,200 lb, includes AquaArmor by AgION for antimicrobial protection, NSF, cULus
2. One (1) Model SC10-A Coarse Pre-filter, 10", 5 gallons per minute max flow, single system for cubers up to 650 lb, and for flakers, nuggets & nugget dispensers up to 1,200 lb
3. One (1) Model SSMRC1 Replacement Cartridge, for SSM (package of 1)

ITEM # 1-147 FLOOR TROUGH

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 3'-0" l x 1'-6" d. Provide 14 gauge type 304 stainless steel floor trough with coved corners and integrally pitched toward waste outlet with a stainless steel beehive strainer. Provide IMC Teddy ASFT-ADA stainless steel accessible grating. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-148 SPARE NO.

ITEM # 1-149 SPARE NO.

ITEM # 1-150 SPARE NO.

ITEM # 1-151 ICE MAKER, CUBE-STYLE

Quantity: One (1)
Manufacturer: Scotsman
Model: C1030SA-32
SIS No.:W010

1. One (1) Model C1030SA-32 Prodigy Plus® Ice Maker, cube style, air-cooled, self-contained condenser, production capacity up to 1077 lb/24 hours at 70°/50° (816 lb AHRI certified at 90°/70°), small cube size, AutoAlert™ indicating lights, WaterSense adjustable purge control, one-touch cleaning, harvest assist, front facing removable air filter, unit specific QR code, stainless steel finish, AgION™ antimicrobial protection, 208-230v/60/1-ph, 16.0 amps, cULus, NSF, CE, engineered and assembled in USA
2. One (1) NOTE: Sale of this product must comply with Scotsman's MSRP Policy; contact your Scotsman representative for details
3. One (1) 3 year parts & labor warranties
4. One (1) 5 year parts & labor warranties on Evaporator
5. One (1) 5 year parts on compressor & condenser
6. One (1) Model KVS Prodigy™ Vari-Smart™ Ice Level Control, program ice bin levels to match ice needs (field install only)

ITEM # 1-152 ICE BIN FOR ICE MACHINES

Quantity: One (1)
Manufacturer: Scotsman
Model: B530S
SIS No.:W010

1. One (1) Model B530S Ice Bin, top-hinged front-opening door, 536 lb application capacity, for top-mounted ice maker, 30" width, metallic finish exterior, toolless removable baffle, polyurethane insulation, polyethylene liner, includes 6" legs, NSF, engineered and assembled in USA
2. One (1) NOTE: Sale of this product must comply with Scotsman's MSRP Policy; contact your Scotsman representative for details
3. One (1) 3 year parts & labor warranties

ITEM # 1-153 AIR CURTAIN

Quantity: One (1)
Manufacturer: Berner
Model: CLC08-1048A
SIS No.:W010

1. One (1) Model CLC08-1048A Commercial Series Low Profile Air Curtain, 48"L, unheated, (1) 1/5 hp 2-speed motor, for doors up to 8' high, specify exterior, interior mounting only, cULus, Made in USA
2. One (1) Five year parts warranty (unheated units)
3. One (1) If special freight fees are requested, (See below) all applicable fees will be added to the invoice; fees subject to change; contact factory for addition information.
4. One (1) Model A 120v/60/1-ph
5. One (1) White powder coat exterior finish, standard

ITEM # 2-01 ROLL-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Traulsen
Model: ARI232LUT-FHS
SIS No.:W010

1. One (1) Model ARI232LUT-FHS Spec-Line Refrigerator, Roll-in, two-section, self-contained refrigeration, StayClear™ Condenser, stainless steel exterior, aluminum interior, standard depth cabinet, full-height doors, accepts 66" high racks (by others) with microprocessor controls, 1/2 HP, cULus, NSF
2. One (1) 115v/60/1-ph, 11.4 amps, NEMA 5-15P, standard
3. One (1) 3 year service/labor & 5 year compressor warranty, standard
4. One (1) Standard refrigerant, standard
5. One (1) Left door hinged left/right hinged right, standard

ITEM # 2-02 MOBILE ROLL-IN RACK

Quantity: Two (2)
Manufacturer: Metro
Model: RF13N
SIS No.:W010

1. Two (2) Model RF13N Roll-In Refrigerator Rack, pass-thru, 21-1/4"W x 64"H, 26"D, open frame design, slides on 1-1/2" centers, holds (36) 18" x 26" pans, sized to fit refrigerator, riveted extruded aluminum frame construction, 5" swivel casters (2) with brakes, NSF

ITEM # 2-03 WORK COUNTER

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL

SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 8'-11" l x 2'-6" w. Provide stainless steel work counter with undershelf and/or mid shelf, galvanized metal base, and 6" high back and end splash (where required). Top shall be 14 ga stainless steel, body to be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-04 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-42
SIS No.:W010

1. One (1) Model 7-PS-42 Recessed Hand Sink, 14"W x 10"D x 5" deep sink bowl, includes: 4" OC deck mounted gooseneck faucet with aerator, soap & paper towel dispensers, 4"H side splashes, 304 stainless steel, NSF (countertop opening not to exceed 17-1/4" (front to back) x 17-3/8" (left to right))
2. One (1) Model K-08 Low-flow aerator 0.5gpm, fits 55/64-27 male or 15/16-27 female thread on spout, conforms to California AB 1953
3. One (1) Model 7-PS-14 P-trap, 1-1/2", 22 gauge

ITEM # 2-05 TRASH RECEPTACLES (COUNTER)

Quantity: Two (2)
Manufacturer: Rubbermaid Commercial Products
Model: FG295700GRAY
SIS No.:W010

1. Two (2) Model FG295700GRAY Waste Basket, 41-1/4 quart, 15-1/4"W x 11"D x 19-7/8"H, medium, soft, rolled rims, all plastic, won't chip, rust or dent, gray, Made in USA

ITEM # 2-06 ROLL-IN HEATED CABINET

Quantity: One (1)
Manufacturer: Traulsen
Model: AIH232H-FHS
SIS No.:W010

1. One (1) Model AIH232H-FHS Spec-Line Heated Cabinet, Roll-in, two-section, stainless steel exterior, aluminum interior, standard depth cabinet, full-height doors, accepts 72" high racks (by others) with microprocessor controls, cULus, NSF
2. One (1) 208-230/115v/60/1-ph, 15.5 amps, 3000 watts, direct, standard
3. One (1) Left door hinged left/right hinged right, standard

ITEM # 2-07 MOBILE ROLL-IN RACK

Quantity: Two (2)
Manufacturer: Metro
Model: RF13N
SIS No.:W010

1. Two (2) Model RF13N Roll-In Refrigerator Rack, pass-thru, 21-1/4"W x 64"H, 26"D, open frame design, slides on 1-1/2" centers, holds (36) 18" x 26" pans, sized to fit refrigerator, riveted extruded aluminum frame construction, 5" swivel casters (2) with brakes, NSF

ITEM # 2-08 WALL SHELF (CONCEALED BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 8'-11" l x 1'-0" w. Provide stainless steel wall shelf with concealed brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-09 WALL SHELF (CONCEALED BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 7'-8" l x 1'-0" w. Provide stainless steel wall shelf with concealed brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-10 SPARE NO.

1.

ITEM # 2-11 ROLL-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Traulsen
Model: ARI232LUT-FHS
SIS No.:W010

1. One (1) Model ARI232LUT-FHS Spec-Line Refrigerator, Roll-in, two-section, self-contained refrigeration, StayClear™ Condenser, stainless steel exterior, aluminum interior, standard depth cabinet, full-height doors, accepts 66" high racks (by others) with microprocessor controls, 1/2 HP, cULus, NSF
2. One (1) 115v/60/1-ph, 11.4 amps, NEMA 5-15P, standard
3. One (1) 3 year service/labor & 5 year compressor warranty, standard
4. One (1) Standard refrigerant, standard
5. One (1) Left door hinged left/right hinged right, standard

ITEM # 2-12 MOBILE ROLL-IN RACK

Quantity: Two (2)
Manufacturer: Metro
Model: RF13N
SIS No.:W010

1. Two (2) Model RF13N Roll-In Refrigerator Rack, pass-thru, 21-1/4"W x 64"H, 26"D, open frame design, slides on 1-1/2" centers, holds (36) 18" x 26" pans, sized to fit refrigerator, riveted extruded aluminum frame construction, 5" swivel casters (2) with brakes, NSF

ITEM # 2-13 PIZZA PREP TABLE

Quantity: One (1)
Manufacturer: Traulsen
Model: TS066HT
SIS No.:W010

1. One (1) Model TS066HT Spec Line Prep Table, two-section, 66"W, 15.7 cu. ft., self-contained refrigeration, holds (9) 1/3 size pans, insulated lids, (2) self-closing hinged doors, (4) wire shelves, microprocessor control with LED display, galvanized steel back & bottom, stainless steel top, front & sides, stainless steel interior, non-flammable R-450A refrigerant, 1/2 HP, NSF, cETLus
2. One (1) 115v/60/1-ph, 7.7 amps, 9' cord, NEMA 5-15P
3. One (1) 3 year service/labor, 3 year drawer parts & 5 year compressor warranty, standard
4. One (1) Left door hinged left/right hinged right, standard
5. One (1) Casters, 4" high (set of 6)
6. One (1) Full length composite cutting board 1/2"H x 18"D

ITEM # 2-14 WORK COUNTER

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 2'-0" l x 2'-6" w. Provide stainless steel work counter with undershelf and/or mid shelf, galvanized metal base, and 6" high back and end splash (where required). Top shall be 14 ga stainless steel, body to be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-15 EXHAUST HOOD (TYPE I)

Quantity: One (1)
Manufacturer: Caddy
Model: CUSTOM
SIS No.:W010

1. One (1) Model CUSTOM GENERAL:
Exhaust Ventilator shall be constructed of 18 gauge type 300 series stainless steel. All exposed surfaces to have a #4 finish. Construction to meet all requirements of NFPA 96 and NSF Standard No. 2. To include necessary hanger brackets at front and rear for suspending from building overhead structure.

CONSTRUCTION:
Ventilator and exhaust duct collar shall be of all stainless steel, minimum 18 gauge, type 304. All exposed surfaces shall be number 4 finish. Caddy's optional front low air volume deflector plate we achieve low air volume design with no wiring, motorizations, or jets with giving an aesthetically polished fit and finish.

DESCRIPTION:
The Caddy AirSystems Model "PB" Series ventilator is a dry filter type and is UL listed under the standards set forth in UL 710 "Exhaust Hoods for Commercial Cooking Equipment". This ventilator is 90% grease extraction efficient when operated and maintained in accordance with design specifications. Filters to be UL Classified stainless steel baffle type. This high efficiency is accomplished by utilizing removable stainless steel baffle filters containing a series of horizontal, self-draining baffles. As the air is drawn around the baffles, the grease, dust and lint particles are removed from the airstream by centrifugal force. As the liquefied grease is extracted, it is drained off via a trough into grease collection containers at the end of the ventilator. At the end of the cooking day or at scheduled intervals, the filters are removed for cleaning without having to climb up or onto the cooking equipment. Once removed, the filters can be washed either in a dishwasher or soaked and rinsed off in a pot sink. Each filter is a maximum of 19-1/2" long. Ventilator can also be equipped with an optional manual or automatic air balancing damper.

APPLICATION:
Wall mounted exhaust only canopy style for use over all types of cooking equipment.

MAKE-UP AIR:
Ventilator shall have ceiling supply plenum with 40% open stainless steel perforated panels for downward discharge of tempered or untempered make-up air. Ceiling supply plenums to be constructed of 100% 18 gauge type 300 series stainless steel. No galvanized metal shall be used. Plenums shall include additional perforated baffles below each supply duct inlet to equally disburse air along full length of ceiling supply plenum.

LIGHT FIXTURES:
Ventilator shall be equipped with (4) FOUR 36” recessed double tube LED light fixtures. All light fixtures shall be pre-wired to a single connection point. Ventilators built in multiple sections to be furnished with junction boxes for ease of field connection by the electrical trades. Light bulbs furnished and installed by the Kitchen Equipment Contractor. (or Caddy if LED)

HOOD MOUNTED FAN & LIGHT SWITCH:
Fan control panel to be mounted on top of the ventilator in a NEMA 4 painted enclosure. Enclosure to house a terminal block for field interlocks for the exhaust fan, supply fan, fire suppression system and factory interlocks for the ventilator surface lights, auto-start thermostats, and ventilator front panel mounted fan and light switches. The fan control panel shall include a 5-minute time delay for the auto-start activation of the exhaust and supply fan to eliminate fan cycling. Fan control panel to comply with the IMC Fan Interlock Code 507.2.1.1 to automatically activate the fans via thermostatic interlock during cooking operations in lieu of manual activation.

EXHAUST FANS:
Exhaust fans are to be provided and installed by others in compliance with local codes. Fans should be induced draft, squirrel cage design, equipped with backward inclined blades.

FIRE PROTECTION:
NFPA 96 and local codes require a fire extinguishing system for protection of the duct collar and plenum of all ventilators, as well as for the protection of various cooking appliances such as deep fat fryers, griddles, ranges, and broilers, which may be a source of ignition of grease. Consult factory and local fire officials for exact requirements. UL Listed fire protection systems may be pre-piped by Caddy at the time of manufacture, assuring concealment of piping and detectors

ITEM # 2-16 EXHAUST HOOD TRIM AND CLOSURE PANEL

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 6'-9" l x 5'-0" w. Provide 18 ga stainless steel exhaust hood trim and closure panels with #4 finish. Provide all necessary closure, louvers and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-17 CONVEYOR OVEN, ELECTRIC

Quantity: One (1)
Manufacturer: Middleby Marshall
Model: PS638E-2
SIS No.:W010

1. One (1) Model PS638E-2 WOW! Impingement PLUS Conveyor Oven, electric, double deck, 38" long cooking chamber & 26" width x 65-1/4" length belt (per deck), electronic control, includes:

top, legs, casters & base, stainless steel front, sides, top & interior, cETLus Listed, ETL-Sanitation, CE

2. One (1) One year parts & labor warranty (Oven start-up is included at no additional charge (USA only)
3. One (1) (2) 208v/50/60/3-ph, 22.0kW, 63.0 amps
4. One (1) Belt Direction, left to right

ITEM # 2-18 SPARE NO.

ITEM # 2-19 FIRE PROTECTION SYSTEM

Quantity: One (1)
Manufacturer: Edison Fire
Model: R102
SIS No.:W010

1. One (1) Model R102 Provide One (1) each Fire Protection System complete with nozzles, fusible links, piping, pull box, and actuators, utilizing a wet chemical extinguishing agent fabricated and installed by an approved Ansul system installer. Provide in accordance with complete drawings, details, and specifications section 114000. System to be an R-102 automatic type and be manufactured and installed per the current NFPA guidelines and be U.L. approved. Cylinders shall be mounted on wall in a stainless steel enclosure, or mounted in a stainless steel cabinet attached to the exhaust hood. All piping to be concealed with the exception of drops which shall be chrome sleeved and of as minimal exposure as possible. Size, number, and location of nozzles or fusible links to be in accordance with U.L. limits for this particular system. Fire system contractor shall provide engineered drawings, acquire permit, coordinate start-up and testing with the appropriate Fire Officials, and obtain final certification. Provide as-built drawings at completion of install. Fire System installer to provide adequate job site visits to coordinate installation of un-exposed pipe and installation of system. Include the appropriately sized and approved electronic gas shut-off valve(s).

ITEM # 2-20 FIRE PULL BOX <NIC>

Quantity: One (1)
Manufacturer: Custom
Model: PART OF ITEM #2-19
SIS No.:W010

1. One (1) Model PART OF ITEM #2-19 Fire Pull Box - Box by electrician, Mechanism part of item #2-19 Fire Protection System.

ITEM # 2-21 WORK COUNTER W/ PREP SINK ASSEMBLY & WOOD CUTTING BOARD

Quantity: One (1)
Manufacturer: Custom

Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 17'-10" l x 2'-6" w. Provide stainless steel work counter with undershelf and/or mid shelf, galvanized metal base, and 6" high back and end splash (where required). Top shall be 14 ga stainless steel, body to be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. Two (2) Model PREP SINK Provide 16 ga stainless steel sink tub measuring approximately 18" w x 24" d x 12" h. Welded in place with polished seams.
3. One (1) Model WOOD Approximately 4'-0" l x 2'-6" w x 1 1/2" thick. Provide NSF approved solid maple cutting board. Fabricate and install per complete drawings, schedules, elevations, and details.
4. One (1) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish

ITEM # 2-22 SPARE NO.

ITEM # 2-23 SPARE NO.

ITEM # 2-24 SPARE NO.

ITEM # 2-25 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-42
SIS No.:W010

1. One (1) Model 7-PS-42 Recessed Hand Sink, 14"W x 10"D x 5" deep sink bowl, includes: 4" OC deck mounted gooseneck faucet with aerator, soap & paper towel dispensers, 4"H side splashes, 304 stainless steel, NSF (countertop opening not to exceed 17-1/4" (front to back) x 17-3/8" (left to right))

ITEM # 2-26 WALL / SPLASH MOUNT FAUCET

Quantity: One (1)
Manufacturer: Fisher
Model: 53139
SIS No.:W010

1. One (1) Model 53139 Faucet, wall mount, 8" adjustable centers, 12" swing spout, lever handles with color coded indexes, 1/2" NPT female inlets, stainless steel, ADA Compliant
2. One (1) 5 year warranty against defects in materials or workmanship, standard
3.
4. NOTE: FISHER TAKES EXCEPTION TO THE CERAMAS CARTRIDGE

ITEM # 2-27 ROLL-IN HEATED CABINET

Quantity: One (1)
Manufacturer: Traulsen
Model: AIH232H-FHS
SIS No.:W010

1. One (1) Model AIH232H-FHS Spec-Line Heated Cabinet, Roll-in, two-section, stainless steel exterior, aluminum interior, standard depth cabinet, full-height doors, accepts 72" high racks (by others) with microprocessor controls, cULus, NSF
2. One (1) 208-230/115v/60/1-ph, 15.5 amps, 3000 watts, direct, standard
3. One (1) Left door hinged left/right hinged right, standard

ITEM # 2-28 WALL SHELF (CONCEALED BRACKETS)

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 17'-10" l x 1'-0" w. Provide stainless steel wall shelf with concealed brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-29 SPARE NO.

ITEM # 2-30 SPARE NO.

ITEM # 2-31 MOBILE ROLL-IN RACK

Quantity: Two (2)
Manufacturer: Metro
Model: RF13N
SIS No.:W010

1. Two (2) Model RF13N Roll-In Refrigerator Rack, pass-thru, 21-1/4"W x 64"H, 26"D, open frame design, slides on 1-1/2" centers, holds (36) 18" x 26" pans, sized to fit refrigerator, riveted extruded aluminum frame construction, 5" swivel casters (2) with brakes, NSF

ITEM # 2-32 ROLL-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Traulsen
Model: ARI232LUT-FHS
SIS No.:W010

1. One (1) Model ARI232LUT-FHS Spec-Line Refrigerator, Roll-in, two-section, self-contained refrigeration, StayClear™ Condenser, stainless steel exterior, aluminum interior, standard depth cabinet, full-height doors, accepts 66" high racks (by others) with microprocessor controls, 1/2 HP, cULus, NSF
2. One (1) 115v/60/1-ph, 11.4 amps, NEMA 5-15P, standard
3. One (1) 3 year service/labor & 5 year compressor warranty, standard
4. One (1) Standard refrigerant, standard
5. One (1) Left door hinged left/right hinged right, standard

ITEM # 2-33 MOBILE ROLL-IN RACK

Quantity: Two (2)
Manufacturer: Metro
Model: RF13N
SIS No.:W010

1. Two (2) Model RF13N Roll-In Refrigerator Rack, pass-thru, 21-1/4"W x 64"H, 26"D, open frame design, slides on 1-1/2" centers, holds (36) 18" x 26" pans, sized to fit refrigerator, riveted extruded aluminum frame construction, 5" swivel casters (2) with brakes, NSF

ITEM # 2-34 SERVICE COUNTER

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL / MILLWORK
SIS No.:W010

1. One (1) Model STAINLESS STEEL / MILLWORK Approximately 56'-6" l x 3'-6" w. Provide stainless steel undercounter with stone top, stainless steel intermediate and/or lower shelves, galvanized metal base, millwork die front with hardwood veneer or high pressure laminate finish. See architectural finish schedule for specific finish requirements. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-35 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC

Quantity: One (1)
Manufacturer: Vollrath
Model: FC-6HC-03120
SIS No.:W010

1. One (1) Model FC-6HC-03120 Hot/Cold Well, Drop-In, top mount, (3) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 15.6amp, 120v/60/1-ph, cord with NEMA 5-20P, cULus, NSF, Made in USA (Refer to vollrathfoodservice.com for full warranty policy)
2. One (1) Drip Free Flange, std

ITEM # 2-36 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: GRA-42
SIS No.:W010

1. One (1) Model GRA-42 Glo-Ray® Infrared Strip Heater, 42" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 675 watts, NSF, CE, cULus, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph
6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit
8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)
9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-37 SNEEZE GUARD, STATIONARY

Quantity: One (1)
Manufacturer: BSI
Model: AG2915
SIS No.:W010

1. One (1) Model AG2915 Advance Guard™ Food Shield, single, combo service, fully adjustable, 21-1/4" height, 14" wide tempered glass top shelf & 14" wide vertical offset service shelf, 1" diameter tubing single supports, brushed aluminum finish, NSF-Component, cULus
2. One (1) To meet NSF guidelines, end panels are included on all BSI quotations unless specifically excluded.
3. One (1) 1" radius corner, standard
4. One (1) 3/8" Tempered glass (for shelf or span more than 54", centerline max 66")
5. One (1) Model 2580 Slimline Light, 1-1/2" x 1-3/8", (specify length), cULus, NSF

6. One (1) Lamp type to be specified
7. One (1) Remote Infinite, standard
8. One (1) Wiring exit point to be specified
9. One (1) Lighting frame finish to be specified

~~**ITEM # 2-37 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC**~~

~~**Quantity: One (1)**~~
~~**Manufacturer: Vollrath**~~
~~**Model: FC-6HC-02120**~~
~~**SIS No.:W010**~~

~~**1. One (1) Model FC-6HC-02120 Hot/Cold Well, Drop-In, top mount, (2) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 10.4 amps, 120v/60/1-ph, cord with NEMA 5-15P, cULus, NSF, Made in USA (Refer to vollrathfoodservice.com for full warranty policy)**~~
~~**2. One (1) Drip Free Flange, std**~~

ITEM # 2-38 SPARE NO.

ITEM # 2-39 SPARE NO.

ITEM # 2-40 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: GRA-24
SIS No.:W010

1. One (1) Model GRA-24 Glo-Ray® Infrared Strip Heater, 24" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 350 watts, NSF, CE, cULus, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph
6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit
8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)

9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-41 DOP-IN HOT/COLD UNIT (2 PAN)

Quantity: One (1)
Manufacturer: Vollrath
Model: FC-6HC-02120
SIS No.:W010

1. One (1) Model FC-6HC-02120 Hot/Cold Well, Drop-In, top mount, (2) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 10.4 amps, 120v/60/1-ph, cord with NEMA 5-15P, cULus, NSF, Made in USA

ITEM # 2-42 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC

Quantity: One (1)
Manufacturer: Vollrath
Model: FC-6HC-03120
SIS No.:W010

1. One (1) Model FC-6HC-03120 Hot/Cold Well, Drop-In, top mount, (3) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 15.6amp, 120v/60/1-ph, cord with NEMA 5-20P, cULus, NSF, Made in USA (Refer to vollrathfoodservice.com for full warranty policy)
2. One (1) Model 4358000-2 Control Panel Mounting Frame: control box requires 3-11/16" (9.4 cm) in depth plus 1" (2.5 cm) clearance, mounting frame projects the control box out 1-11/16" (4.3 cm), reducing required space to 2" (5.1 cm) in depth plus 1" (2.5 cm) clearance, for models: FC-6HC-03120-AD, FC-6HC-03208-AD, FC-6HC-03120 & FC-6HC-03208 (Refer to vollrathfoodservice.com for full warranty policy)
3. One (1) Drip Free Flange, std

ITEM # 2-43 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: GRA-42
SIS No.:W010

1. One (1) Model GRA-42 Glo-Ray® Infrared Strip Heater, 42" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 675 watts, NSF, CE, cULus, Made in USA

2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph
6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit
8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)
9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-44 SNEEZE GUARD, STATIONARY

Quantity: One (1)
Manufacturer: BSI
Model: AG2915
SIS No.:W010

1. One (1) Model AG2915 Advance Guard™ Food Shield, single, combo service, fully adjustable, 21-1/4" height, 14" wide tempered glass top shelf & 14" wide vertical offset service shelf, 1" diameter tubing single supports, brushed aluminum finish, NSF-Component, cULus
2. One (1) To meet NSF guidelines, end panels are included on all BSI quotations unless specifically excluded.
3. One (1) 1" radius corner, standard
4. One (1) 3/8" Tempered glass (for shelf or span more than 54", centerline max 66")
5. One (1) Model 2580 Slimline Light, 1-1/2" x 1-3/8", (specify length), cULus, NSF
6. One (1) Lamp type to be specified
7. One (1) Remote Infinite, standard
8. One (1) Wiring exit point to be specified
9. One (1) Lighting frame finish to be specified

ITEM # 2-45 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC

Quantity: One (1)
Manufacturer: Vollrath
Model: FC-6HC-02120
SIS No.:W010

1. One (1) Model FC-6HC-02120 Hot/Cold Well, Drop-In, top mount, (2) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 10.4 amps, 120v/60/1-ph, cord with NEMA 5-15P, cULus, NSF, Made in USA (Refer to vollrathfoodservice.com for full warranty policy)

2. One (1) Model 4357900-2 Control Panel Mounting Frame: control box requires 3-11/16" (9.4 cm) in depth plus 1" (2.5 cm) clearance, mounting frame projects the control box out 1-11/16" (4.3 cm), reducing required space to 2" (5.1 cm) in depth plus 1" (2.5 cm) clearance, for models: FC-6HC-02120, FC-6HC-02120-AD, FC-6HC-02208, FC-6HC-02208-AD (Refer to vollrathfoodservice.com for full warranty policy)
3. One (1) Drip Free Flange, std

ITEM # 2-46 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: GRA-24
SIS No.:W010

1. One (1) Model GRA-24 Glo-Ray® Infrared Strip Heater, 24" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 350 watts, NSF, CE, cULus, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph
6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit
8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)
9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-47 HEATED SHELF FOOD WARMER

Quantity: One (1)
Manufacturer: Hatco
Model: GRSB-48-I
SIS No.:W010

1. One (1) Model GRSB-48-I Glo-Ray® Drop In Heated Shelf with Recessed Top, 49-1/2" x 21", 1/2" deep recessed surface area, hardcoat aluminum top, control thermostat, illuminated on/off switch & mounting bracket, NSF, CE, cUL, UL, UL EPH Classified, CSA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 800-558-0607
4. One (1) 1-Yr Warranty on Blanket Heating Elements against burnout, standard
5. One (1) 120v/60/1-ph, 1000 watts, 8.3 amps, NEMA 5-15P (domestic voltage), standard
6. One (1) NOTE: Recommended for use in metallic countertop, verify that the material is suitable for temperatures up to 200 degree F

7. One (1) Model GRSB-FLUSH-TSTAT Flush mount thermostatic control box with lighted power switch, stainless steel (available at time of purchase only)
8. One (1) Model STANDARD Stainless Steel Finish, flush mounted bezel, standard (available at time of purchase only)
9. One (1) 1-Yr Warranty, standard

ITEM # 2-48 SPARE NO.

ITEM # 2-49 SPARE NO.

ITEM # 2-50 SPARE NO.

ITEM # 2-51 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: GRA-42
SIS No.:W010

1. One (1) Model GRA-42 Glo-Ray® Infrared Strip Heater, 42" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 675 watts, NSF, CE, cULus, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph
6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit
8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)
9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-52 SNEEZE GUARD, STATIONARY

Quantity: One (1)
Manufacturer: BSI
Model: AG2915
SIS No.:W010

1. One (1) Model AG2915 Advance Guard™ Food Shield, single, combo service, fully adjustable, 21-1/4" height, 14" wide tempered glass top shelf & 14" wide vertical offset service shelf, 1" diameter tubing single supports, brushed aluminum finish, NSF-Component, cULus
2. One (1) To meet NSF guidelines, end panels are included on all BSI quotations unless specifically excluded.
3. One (1) 1" radius corner, standard
4. One (1) 3/8" Tempered glass (for shelf or span more than 54", centerline max 66")
5. One (1) Model 2580 Slimline Light, 1-1/2" x 1-3/8", (specify length), cULus, NSF
6. One (1) Lamp type to be specified
7. One (1) Remote Infinite, standard
8. One (1) Wiring exit point to be specified
9. One (1) Lighting frame finish to be specified

ITEM # 2-53 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC

Quantity: One (1)
Manufacturer: Vollrath
Model: FC-6HC-02120
SIS No.:W010

1. One (1) Model FC-6HC-02120 Hot/Cold Well, Drop-In, top mount, (2) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 10.4 amps, 120v/60/1-ph, cord with NEMA 5-15P, cULus, NSF, Made in USA (Refer to vollrathfoodservice.com for full warranty policy)
2. One (1) Drip Free Flange, std

ITEM # 2-54 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: GRA-24
SIS No.:W010

1. One (1) Model GRA-24 Glo-Ray® Infrared Strip Heater, 24" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 350 watts, NSF, CE, cULus, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph
6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit

8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)
9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-55 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC

Quantity: One (1)
Manufacturer: Vollrath
Model: FC-6HC-03120
SIS No.:W010

1. One (1) Model FC-6HC-03120 Hot/Cold Well, Drop-In, top mount, (3) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 15.6amp, 120v/60/1-ph, cord with NEMA 5-20P, cULus, NSF, Made in USA (Refer to vollrathfoodservice.com for full warranty policy)
2. One (1) Drip Free Flange, std

ITEM # 2-56 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: GRA-42
SIS No.:W010

1. One (1) Model GRA-42 Glo-Ray® Infrared Strip Heater, 42" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 675 watts, NSF, CE, cULus, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph
6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit
8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)
9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-57 SNEEZE GUARD, STATIONARY

Quantity: One (1)
Manufacturer: BSI

Model: AG2915
SIS No.:W010

1. One (1) Model AG2915 Advance Guard™ Food Shield, single, combo service, fully adjustable, 21-1/4" height, 14" wide tempered glass top shelf & 14" wide vertical offset service shelf, 1" diameter tubing single supports, brushed aluminum finish, NSF-Component, cULus
2. One (1) To meet NSF guidelines, end panels are included on all BSI quotations unless specifically excluded.
3. One (1) 1" radius corner, standard
4. One (1) 3/8" Tempered glass (for shelf or span more than 54", centerline max 66")
5. One (1) Model 2580 Slimline Light, 1-1/2" x 1-3/8", (specify length), cULus, NSF
6. One (1) Lamp type to be specified
7. One (1) Remote Infinite, standard
8. One (1) Wiring exit point to be specified
9. One (1) Lighting frame finish to be specified

ITEM # 2-58 SPARE NO.

ITEM # 2-59 SPARE NO.

ITEM # 2-60 SPARE NO.

ITEM # 2-61 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC

Quantity: One (1)
Manufacturer: Vollrath
Model: FC-6HC-02120
SIS No.:W010

1. One (1) Model FC-6HC-02120 Hot/Cold Well, Drop-In, top mount, (2) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 10.4 amps, 120v/60/1-ph, cord with NEMA 5-15P, cULus, NSF, Made in USA (Refer to vollrathfoodservice.com for full warranty policy)
2. One (1) Drip Free Flange, std

ITEM # 2-62 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: GRA-24
SIS No.:W010

1. One (1) Model GRA-24 Glo-Ray® Infrared Strip Heater, 24" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 350 watts, NSF, CE, cULus, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph
6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit
8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)
9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-63 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC

Quantity: One (1)
Manufacturer: Vollrath
Model: FC-6HC-03120
SIS No.:W010

1. One (1) Model FC-6HC-03120 Hot/Cold Well, Drop-In, top mount, (3) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 15.6amp, 120v/60/1-ph, cord with NEMA 5-20P, cULus, NSF, Made in USA (Refer to vollrathfoodservice.com for full warranty policy)
2. One (1) Drip Free Flange, std

ITEM # 2-64 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: GRA-42
SIS No.:W010

1. One (1) Model GRA-42 Glo-Ray® Infrared Strip Heater, 42" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 675 watts, NSF, CE, cULus, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph

6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit
8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)
9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-65 SNEEZE GUARD, STATIONARY

Quantity: One (1)
Manufacturer: BSI
Model: AG2915
SIS No.:W010

1. One (1) Model AG2915 Advance Guard™ Food Shield, single, combo service, fully adjustable, 21-1/4" height, 14" wide tempered glass top shelf & 14" wide vertical offset service shelf, 1" diameter tubing single supports, brushed aluminum finish, NSF-Component, cULus
2. One (1) To meet NSF guidelines, end panels are included on all BSI quotations unless specifically excluded.
3. One (1) 1" radius corner, standard
4. One (1) 3/8" Tempered glass (for shelf or span more than 54", centerline max 66")
5. One (1) Model 2580 Slimline Light, 1-1/2" x 1-3/8", (specify length), cULus, NSF
6. One (1) Lamp type to be specified
7. One (1) Remote Infinite, standard
8. One (1) Wiring exit point to be specified
9. One (1) Lighting frame finish to be specified

ITEM # 2-66 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC

Quantity: One (1)
Manufacturer: Vollrath
Model: FC-6HC-02120
SIS No.:W010

1. One (1) Model FC-6HC-02120 Hot/Cold Well, Drop-In, top mount, (2) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 10.4 amps, 120v/60/1-ph, cord with NEMA 5-15P, cULus, NSF, Made in USA (Refer to vollrathfoodservice.com for full warranty policy)
2. One (1) Drip Free Flange, std

ITEM # 2-67 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco

Model: GRA-24
SIS No.:W010

1. One (1) Model GRA-24 Glo-Ray® Infrared Strip Heater, 24" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 350 watts, NSF, CE, cULus, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph
6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit
8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)
9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-68 SPARE NO.

ITEM # 2-69 SPARE NO.

ITEM # 2-70 SPARE NO.

ITEM # 2-71 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC

Quantity: One (1)
Manufacturer: Vollrath
Model: FC-6HC-03120
SIS No.:W010

1. One (1) Model FC-6HC-03120 Hot/Cold Well, Drop-In, top mount, (3) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 15.6amp, 120v/60/1-ph, cord with NEMA 5-20P, cULus, NSF, Made in USA (Refer to vollrathfoodservice.com for full warranty policy)
2. One (1) Drip Free Flange, std

ITEM # 2-72 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco

Model: GRA-42
SIS No.:W010

1. One (1) Model GRA-42 Glo-Ray® Infrared Strip Heater, 42" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 675 watts, NSF, CE, cULus, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph
6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit
8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)
9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-73 SNEEZE GUARD, STATIONARY

Quantity: One (1)
Manufacturer: BSI
Model: AG2915
SIS No.:W010

1. One (1) Model AG2915 Advance Guard™ Food Shield, single, combo service, fully adjustable, 21-1/4" height, 14" wide tempered glass top shelf & 14" wide vertical offset service shelf, 1" diameter tubing single supports, brushed aluminum finish, NSF-Component, cULus
2. One (1) To meet NSF guidelines, end panels are included on all BSI quotations unless specifically excluded.
3. One (1) 1" radius corner, standard
4. One (1) 3/8" Tempered glass (for shelf or span more than 54", centerline max 66")
5. One (1) Model 2580 Slimline Light, 1-1/2" x 1-3/8", (specify length), cULus, NSF
6. One (1) Lamp type to be specified
7. One (1) Remote Infinite, standard
8. One (1) Wiring exit point to be specified
9. One (1) Lighting frame finish to be specified

ITEM # 2-74 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC

Quantity: One (1)
Manufacturer: Vollrath
Model: FC-6HC-02120
SIS No.:W010

1. One (1) Model FC-6HC-02120 Hot/Cold Well, Drop-In, top mount, (2) pan, remote mountable panel with on-off switch, hot/cold toggle with indicator lights for hot or cold, thermostatic temperature rotary knob control in hot mode, preset cold control, manual manifold drain, 300 series stainless well & flange, galvanized wrapper, 625 watts per well, 10.4 amps, 120v/60/1-ph, cord with NEMA 5-15P, cULus, NSF, Made in USA (Refer to vollrathfoodservice.com for full warranty policy)
2. One (1) Drip Free Flange, std

ITEM # 2-75 HEAT LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: GRA-24
SIS No.:W010

1. One (1) Model GRA-24 Glo-Ray® Infrared Strip Heater, 24" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 350 watts, NSF, CE, cULus, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
4. One (1) One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
5. One (1) 120v/60/1-ph
6. One (1) Model REM TOG-1 (1) Remote toggle switch in lieu of standard built-in toggle, shipped loose (max. 15 amp) (available at time of purchase only)
7. One (1) Model IND.LGT-1 Indicator Light (available at time of purchase only) per circuit
8. One (1) Model LEADS5 1'-5' Extended Electrical Leads (available at time of purchase only)
9. One (1) Model STANDARD Clear Anodized Aluminum housing, finish, standard (available at time of purchase only)

ITEM # 2-76 OPEN DISPLAY MERCHANDISER

Quantity: One (1)
Manufacturer: Structural Concepts
Model: B7132
SIS No.:W010

1. One (1) Model B7132 Oasis® Self-Service Refrigerated Merchandiser, 71-3/4"W, high profile, open front, (4) non-lighted shelves, top light, Breeze-E (Type ll) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, one piece formed ABS plastic tub, black interior, full end panels with mirror, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Breeze-E (Type II) with EnergyWise self-contained refrigeration, lower front air intake/upper front air discharge, standard
5. One (1) 208-240v/60/1ph, 15.32 amps, standard

6. One (1) 6 ft straight blade power cord NEMA 6-20P (base exit), standard
7. One (1) NOTE: Compressor air intake through lower front & channeled up rear & out upper front, front panel cannot be blocked
8. One (1) Model CLEAN SWEEP Clean Sweep®, automatic condenser coil cleaner
9. One (1) Base Support: Casters, with levelers, standard
10. One (1) Exterior: Stainless steel
11. One (1) Lower front panel: Stainless steel [Requires Stainless Steel Exterior]
12. One (1) Left end panel: Full with mirrored interior, metal edging, standard
13. One (1) Right end panel: Full with mirrored interior, metal edging, standard
14. One (1) Exterior back panel: Solid back panel, black painted, standard
15. One (1) Digital fahrenheit thermometer, standard
16. One (1) Lights: LED 4000K w/ frosted lens, standard
17. One (1) Night curtain: Retractable, non-locking

ITEM # 2-77 OPEN DISPLAY MERCHANDISER

Quantity: One (1)
Manufacturer: Structural Concepts
Model: B7132
SIS No.:W010

1. One (1) Model B7132 Oasis® Self-Service Refrigerated Merchandiser, 71-3/4"W, high profile, open front, (4) non-lighted shelves, top light, Breeze-E (Type ll) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, one piece formed ABS plastic tub, black interior, full end panels with mirror, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Breeze-E (Type II) with EnergyWise self-contained refrigeration, lower front air intake/upper front air discharge, standard
5. One (1) 208-240v/60/1ph, 15.32 amps, standard
6. One (1) 6 ft straight blade power cord NEMA 6-20P (base exit), standard
7. One (1) NOTE: Compressor air intake through lower front & channeled up rear & out upper front, front panel cannot be blocked
8. One (1) Model CLEAN SWEEP Clean Sweep®, automatic condenser coil cleaner
9. One (1) Base Support: Casters, with levelers, standard
10. One (1) Exterior: Stainless steel
11. One (1) Lower front panel: Stainless steel [Requires Stainless Steel Exterior]
12. One (1) Left end panel: Full with mirrored interior, metal edging, standard
13. One (1) Right end panel: Full with mirrored interior, metal edging, standard
14. One (1) Exterior back panel: Solid back panel, black painted, standard
15. One (1) Digital fahrenheit thermometer, standard
16. One (1) Lights: LED 4000K w/ frosted lens, standard
17. One (1) Night curtain: Retractable, non-locking

ITEM # 2-78 SPARE NO.

ITEM # 2-79 SPARE NO.

ITEM # 2-80 SPARE NO.

ITEM # 2-81 OPEN DISPLAY MERCHANDISER

Quantity: One (1)
Manufacturer: Structural Concepts
Model: B7132
SIS No.:W010

1. One (1) Model B7132 Oasis® Self-Service Refrigerated Merchandiser, 71-3/4"W, high profile, open front, (4) non-lighted shelves, top light, Breeze-E (Type ll) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, one piece formed ABS plastic tub, black interior, full end panels with mirror, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Breeze-E (Type II) with EnergyWise self-contained refrigeration, lower front air intake/upper front air discharge, standard
5. One (1) 208-240v/60/1ph, 15.32 amps, standard
6. One (1) 6 ft straight blade power cord NEMA 6-20P (base exit), standard
7. One (1) NOTE: Compressor air intake through lower front & channeled up rear & out upper front, front panel cannot be blocked
8. One (1) Model CLEAN SWEEP Clean Sweep®, automatic condenser coil cleaner
9. One (1) Base Support: Casters, with levelers, standard
10. One (1) Exterior: Stainless steel
11. One (1) Lower front panel: Stainless steel [Requires Stainless Steel Exterior]
12. One (1) Left end panel: Full with mirrored interior, metal edging, standard
13. One (1) Right end panel: Full with mirrored interior, metal edging, standard
14. One (1) Exterior back panel: Solid back panel, black painted, standard
15. One (1) Digital fahrenheit thermometer, standard
16. One (1) Lights: LED 4000K w/ frosted lens, standard
17. One (1) Night curtain: Retractable, non-locking

ITEM # 2-82 CASHIER STAND

Quantity: One (1)
Manufacturer: Custom
Model: MILLWORK
SIS No.:W010

1. One (1) Model MILLWORK Approximately 3'-0" l x 2'-0" w. Provide millwork cashier stand with hardwood veneer or high pressure laminate finish, stone top, and casters. See finish schedule for specific finish requirements. Stand to include locking cash drawer and cash register and trash can accommodations. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-83 CASH REGISTER <NIC>

Quantity: One (1)
Manufacturer: NIFSEC
SIS No.:W010

1. One (1) Cash Register - NIFSEC

ITEM # 2-84 DISPLAY CASE, REFRIGERATED, SELF-SERVE

Quantity: One (1)
Manufacturer: Structural Concepts
Model: FSE663R
SIS No.:W010

1. One (1) Model FSE663R Oasis® Self-Service Refrigerated End Cap Case, 49-3/8"W, curved open front, (3) non-lit non-adjustable metal shelves, top light, black interior & lower front panel, (1) full end panel with mirror, includes price tag moulding (matches interior color), levelers, Breeze-E (Type II) with EnergyWise self-contained refrigeration system, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Breeze with EnergyWise self-contained refrigeration with evaporator pan, air intake one side/air discharge out other side, standard
5. One (1) 208-240v/60/1ph, 23.07 amps, standard
6. One (1) 6 ft straight blade power cord with NEMA 6-30P, standard
7. One (1) NOTE: Compressor air intake in one side/air discharge out other side, all lower panels cannot be blocked
8. One (1) Base Support: Levelers, standard
9. One (1) Interior: Stainless steel in lieu of standard black
10. One (1) Exterior: Stainless steel (includes lower front panel)
11. One (1) Digital fahrenheit thermometer, standard

ITEM # 2-85 CASHIER STAND

Quantity: One (1)
Manufacturer: Custom
Model: MILLWORK
SIS No.:W010

1. One (1) Model MILLWORK Approximately 3'-0" l x 2'-0" w. Provide millwork cashier stand with hardwood veneer or high pressure laminate finish, stone top, and casters. See finish schedule for specific finish requirements. Stand to include locking cash drawer and cash register and trash can accommodations. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-86 CASH REGISTER <NIC>

Quantity: One (1)
Manufacturer: NIFSEC
SIS No.:W010

1. One (1) Cash Register - NIFSEC

ITEM # 2-87 DISPLAY CASE, REFRIGERATED, SELF-SERVE

Quantity: One (1)
Manufacturer: Structural Concepts
Model: FSE663R
SIS No.:W010

1. One (1) Model FSE663R Oasis® Self-Service Refrigerated End Cap Case, 49-3/8"W, curved open front, (3) non-lit non-adjustable metal shelves, top light, black interior & lower front panel, (1) full end panel with mirror, includes price tag moulding (matches interior color), levelers, Breeze-E (Type II) with EnergyWise self-contained refrigeration system, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Breeze with EnergyWise self-contained refrigeration with evaporator pan, air intake one side/air discharge out other side, standard
5. One (1) 208-240v/60/1ph, 23.07 amps, standard
6. One (1) 6 ft straight blade power cord with NEMA 6-30P, standard
7. One (1) NOTE: Compressor air intake in one side/air discharge out other side, all lower panels cannot be blocked
8. One (1) Base Support: Levelers, standard
9. One (1) Interior: Stainless steel in lieu of standard black
10. One (1) Exterior: Stainless steel (includes lower front panel)
11. One (1) Digital fahrenheit thermometer, standard

ITEM # 2-88 SPARE NO.

ITEM # 2-89 SPARE NO.

ITEM # 2-90 SPARE NO.

ITEM # 2-91 CASHIER STAND

Quantity: One (1)
Manufacturer: Custom
Model: MILLWORK
SIS No.:W010

1. One (1) Model MILLWORK Approximately 3'-0" l x 2'-0" w. Provide millwork cashier stand with hardwood veneer or high pressure laminate finish, stone top, and casters. See finish schedule for specific finish requirements. Stand to include locking cash drawer and cash register and trash can accommodations. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-92 CASH REGISTER <NIC>

Quantity: One (1)
Manufacturer: NIFSEC
SIS No.:W010

1. One (1) Cash Register - NIFSEC

ITEM # 2-93 DISPLAY CASE, REFRIGERATED, SELF-SERVE

Quantity: One (1)
Manufacturer: Structural Concepts
Model: FSE663R
SIS No.:W010

1. One (1) Model FSE663R Oasis® Self-Service Refrigerated End Cap Case, 49-3/8"W, curved open front, (3) non-lit non-adjustable metal shelves, top light, black interior & lower front panel, (1) full end panel with mirror, includes price tag moulding (matches interior color), levelers, Breeze-E (Type II) with EnergyWise self-contained refrigeration system, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Breeze with EnergyWise self-contained refrigeration with evaporator pan, air intake one side/air discharge out other side, standard
5. One (1) 208-240v/60/1ph, 23.07 amps, standard
6. One (1) 6 ft straight blade power cord with NEMA 6-30P, standard
7. One (1) NOTE: Compressor air intake in one side/air discharge out other side, all lower panels cannot be blocked
8. One (1) Base Support: Levelers, standard
9. One (1) Interior: Stainless steel in lieu of standard black
10. One (1) Exterior: Stainless steel (includes lower front panel)
11. One (1) Digital fahrenheit thermometer, standard

ITEM # 2-94 OPEN DISPLAY MERCHANDISER

Quantity: One (1)
Manufacturer: Structural Concepts
Model: B7132
SIS No.:W010

1. One (1) Model B7132 Oasis® Self-Service Refrigerated Merchandiser, 71-3/4"W, high profile, open front, (4) non-lighted shelves, top light, Breeze-E (Type ll) with EnergyWise self-contained

refrigeration system, Blue Fin coated coil, one piece formed ABS plastic tub, black interior, full end panels with mirror, cETLus, ETL-Sanitation

2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Breeze-E (Type II) with EnergyWise self-contained refrigeration, lower front air intake/upper front air discharge, standard
5. One (1) 208-240v/60/1ph, 15.32 amps, standard
6. One (1) 6 ft straight blade power cord NEMA 6-20P (base exit), standard
7. One (1) NOTE: Compressor air intake through lower front & channeled up rear & out upper front, front panel cannot be blocked
8. One (1) Model CLEAN SWEEP Clean Sweep®, automatic condenser coil cleaner
9. One (1) Base Support: Casters, with levelers, standard
10. One (1) Exterior: Stainless steel
11. One (1) Lower front panel: Stainless steel [Requires Stainless Steel Exterior]
12. One (1) Left end panel: Full with mirrored interior, metal edging, standard
13. One (1) Right end panel: Full with mirrored interior, metal edging, standard
14. One (1) Exterior back panel: Solid back panel, black painted, standard
15. One (1) Digital fahrenheit thermometer, standard
16. One (1) Lights: LED 4000K w/ frosted lens, standard
17. One (1) Night curtain: Retractable, non-locking

ITEM # 2-95 OPEN DISPLAY MERCHANDISER

Quantity: One (1)
Manufacturer: Structural Concepts
Model: B7132
SIS No.:W010

1. One (1) Model B7132 Oasis® Self-Service Refrigerated Merchandiser, 71-3/4"W, high profile, open front, (4) non-lighted shelves, top light, Breeze-E (Type ll) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, one piece formed ABS plastic tub, black interior, full end panels with mirror, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Breeze-E (Type II) with EnergyWise self-contained refrigeration, lower front air intake/upper front air discharge, standard
5. One (1) 208-240v/60/1ph, 15.32 amps, standard
6. One (1) 6 ft straight blade power cord NEMA 6-20P (base exit), standard
7. One (1) NOTE: Compressor air intake through lower front & channeled up rear & out upper front, front panel cannot be blocked
8. One (1) Model CLEAN SWEEP Clean Sweep®, automatic condenser coil cleaner
9. One (1) Base Support: Casters, with levelers, standard
10. One (1) Exterior: Stainless steel
11. One (1) Lower front panel: Stainless steel [Requires Stainless Steel Exterior]
12. One (1) Left end panel: Full with mirrored interior, metal edging, standard
13. One (1) Right end panel: Full with mirrored interior, metal edging, standard
14. One (1) Exterior back panel: Solid back panel, black painted, standard
15. One (1) Digital fahrenheit thermometer, standard

16. One (1) Lights: LED 4000K w/ frosted lens, standard
17. One (1) Night curtain: Retractable, non-locking

ITEM # 3-01 ROLL-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Traulsen
Model: ARI232LUT-FHS
SIS No.:W010

1. One (1) Model ARI232LUT-FHS Spec-Line Refrigerator, Roll-in, two-section, self-contained refrigeration, StayClear™ Condenser, stainless steel exterior, aluminum interior, standard depth cabinet, full-height doors, accepts 66" high racks (by others) with microprocessor controls, 1/2 HP, cULus, NSF
2. One (1) 115v/60/1-ph, 11.4 amps, NEMA 5-15P, standard
3. One (1) 3 year service/labor & 5 year compressor warranty, standard
4. One (1) Standard refrigerant, standard
5. One (1) Left door hinged left/right hinged right, standard

ITEM # 3-02 MOBILE ROLL-IN RACK

Quantity: Two (2)
Manufacturer: Metro
Model: RF13N
SIS No.:W010

1. Two (2) Model RF13N Roll-In Refrigerator Rack, pass-thru, 21-1/4"W x 64"H, 26"D, open frame design, slides on 1-1/2" centers, holds (36) 18" x 26" pans, sized to fit refrigerator, riveted extruded aluminum frame construction, 5" swivel casters (2) with brakes, NSF

ITEM # 3-03 ROLL-IN HEATED CABINET

Quantity: One (1)
Manufacturer: Traulsen
Model: AIH232H-FHS
SIS No.:W010

1. One (1) Model AIH232H-FHS Spec-Line Heated Cabinet, Roll-in, two-section, stainless steel exterior, aluminum interior, standard depth cabinet, full-height doors, accepts 72" high racks (by others) with microprocessor controls, cULus, NSF
2. One (1) 208-230/115v/60/1-ph, 15.5 amps, 3000 watts, direct, standard
3. One (1) Left door hinged left/right hinged right, standard

ITEM # 3-04 MOBILE ROLL-IN RACK

Quantity: Two (2)
Manufacturer: Metro
Model: RF13N
SIS No.:W010

1. Two (2) Model RF13N Roll-In Refrigerator Rack, pass-thru, 21-1/4"W x 64"H, 26"D, open frame design, slides on 1-1/2" centers, holds (36) 18" x 26" pans, sized to fit refrigerator, riveted extruded aluminum frame construction, 5" swivel casters (2) with brakes, NSF

ITEM # 3-05 TRASH RECEPTACLES (COUNTER)

Quantity: Two (2)
Manufacturer: Rubbermaid Commercial Products
Model: FG295700GRAY
SIS No.:W010

1. Two (2) Model FG295700GRAY Waste Basket, 41-1/4 quart, 15-1/4"W x 11"D x 19-7/8"H, medium, soft, rolled rims, all plastic, won't chip, rust or dent, gray, Made in USA

ITEM # 3-06 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-42
SIS No.:W010

1. One (1) Model 7-PS-42 Recessed Hand Sink, 14"W x 10"D x 5" deep sink bowl, includes: 4" OC deck mounted gooseneck faucet with aerator, soap & paper towel dispensers, 4"H side splashes, 304 stainless steel, NSF (countertop opening not to exceed 17-1/4" (front to back) x 17-3/8" (left to right))
2. One (1) Model K-08 Low-flow aerator 0.5gpm, fits 55/64-27 male or 15/16-27 female thread on spout, conforms to California AB 1953
3. One (1) Model 7-PS-14 P-trap, 1-1/2", 22 gauge

ITEM # 3-07 WORK COUNTER W/PREP SINK ASSEMBLY

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.:W010

1. One (1) Model STAINLESS STEEL Approximately 32'-6" l x 2'-6" w. Provide stainless steel work counter with undershelf and/or mid shelf, galvanized metal base, and 6" high back and end splash (where required). Top shall be 14 ga stainless steel, body to be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

2. Two (2) Model PREP SINK Provide 16 ga stainless steel sink tub measuring approximately 18" w x 24" d x 12" h. Welded in place with polished seams.
3. Two (2) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish

ITEM # 3-08 SPARE NO.

ITEM # 3-09 SPARE NO.

ITEM # 3-10 SPARE NO.

ITEM # 3-11 WALL / SPLASH MOUNT FAUCET

Quantity: One (1)
Manufacturer: Fisher
Model: 53139
SIS No.:W010

1. One (1) Model 53139 Faucet, wall mount, 8" adjustable centers, 12" swing spout, lever handles with color coded indexes, 1/2" NPT female inlets, stainless steel, ADA Compliant
2. One (1) 5 year warranty against defects in materials or workmanship, standard
3.
4. NOTE: FISHER TAKES EXCEPTION TO THE CERAMAS CARTRIDGE

ITEM # 3-12 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-42
SIS No.:W010

1. One (1) Model 7-PS-42 Recessed Hand Sink, 14"W x 10"D x 5" deep sink bowl, includes: 4" OC deck mounted gooseneck faucet with aerator, soap & paper towel dispensers, 4"H side splashes, 304 stainless steel, NSF (countertop opening not to exceed 17-1/4" (front to back) x 17-3/8" (left to right))
2. One (1) Model K-08 Low-flow aerator 0.5gpm, fits 55/64-27 male or 15/16-27 female thread on spout, conforms to California AB 1953
3. One (1) Model 7-PS-14 P-trap, 1-1/2", 22 gauge

ITEM # 3-13 ROLL-IN HEATED CABINET

Quantity: One (1)
Manufacturer: Traulsen
Model: AIH232H-FHS

SIS No.:W010

1. One (1) Model AIH232H-FHS Spec-Line Heated Cabinet, Roll-in, two-section, stainless steel exterior, aluminum interior, standard depth cabinet, full-height doors, accepts 72" high racks (by others) with microprocessor controls, cULus, NSF
2. One (1) 208-230/115v/60/1-ph, 15.5 amps, 3000 watts, direct, standard
3. One (1) Left door hinged left/right hinged right, standard

ITEM # 3-14 MOBILE ROLL-IN RACK

Quantity: Two (2)
Manufacturer: Metro
Model: RF13N
SIS No.:W010

1. Two (2) Model RF13N Roll-In Refrigerator Rack, pass-thru, 21-1/4"W x 64"H, 26"D, open frame design, slides on 1-1/2" centers, holds (36) 18" x 26" pans, sized to fit refrigerator, riveted extruded aluminum frame construction, 5" swivel casters (2) with brakes, NSF

ITEM # 3-15 ROLL-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Traulsen
Model: ARI232LUT-FHS
SIS No.:W010

1. One (1) Model ARI232LUT-FHS Spec-Line Refrigerator, Roll-in, two-section, self-contained refrigeration, StayClear™ Condenser, stainless steel exterior, aluminum interior, standard depth cabinet, full-height doors, accepts 66" high racks (by others) with microprocessor controls, 1/2 HP, cULus, NSF
2. One (1) 115v/60/1-ph, 11.4 amps, NEMA 5-15P, standard
3. One (1) 3 year service/labor & 5 year compressor warranty, standard
4. One (1) Standard refrigerant, standard
5. One (1) Left door hinged left/right hinged right, standard

ITEM # 3-16 MOBILE ROLL-IN RACK

Quantity: Two (2)
Manufacturer: Metro
Model: RF13N
SIS No.:W010

1. Two (2) Model RF13N Roll-In Refrigerator Rack, pass-thru, 21-1/4"W x 64"H, 26"D, open frame design, slides on 1-1/2" centers, holds (36) 18" x 26" pans, sized to fit refrigerator, riveted extruded aluminum frame construction, 5" swivel casters (2) with brakes, NSF

ITEM # 3-17 SELF-SERVICE REFRIGERATED MERCHANDISER

Quantity: One (1)
Manufacturer: Structural Concepts
Model: B7132
SIS No.:W010

1. One (1) Model B7132 Oasis® Self-Service Refrigerated Merchandiser, 71-3/4"W, high profile, open front, (4) non-lighted shelves, top light, Breeze-E (Type ll) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, one piece formed ABS plastic tub, black interior, full end panels with mirror, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Breeze-E (Type II) with EnergyWise self-contained refrigeration, lower front air intake/upper front air discharge, standard
5. One (1) 208-240v/60/1ph, 15.32 amps, standard
6. One (1) 6 ft straight blade power cord NEMA 6-20P (base exit), standard
7. One (1) NOTE: Compressor air intake through lower front & channeled up rear & out upper front, front panel cannot be blocked
8. One (1) Model CLEAN SWEEP Clean Sweep®, automatic condenser coil cleaner
9. One (1) Base Support: Casters, with levelers, standard
10. One (1) Interior: Stainless steel, in lieu of standard black
11. One (1) Exterior: Stainless steel
12. One (1) Lower front panel: Stainless steel [Requires Stainless Steel Exterior]
13. One (1) Left end panel: Full with mirrored interior, metal edging, standard
14. One (1) Right end panel: Full with mirrored interior, metal edging, standard
15. One (1) Exterior back panel: Solid back panel, black painted, standard
16. One (1) Digital fahrenheit thermometer, standard
17. One (1) Lights: LED 4000K w/ frosted lens, standard
18. One (1) Night curtain: Retractable, non-locking

ITEM # 3-18 SPARE NO.

ITEM # 3-19 SPARE NO.

ITEM # 3-20 SPARE NO.

ITEM # 3-21 SERVICE COUNTER

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL / MILLWORK
SIS No.:W010

1. One (1) Model STAINLESS STEEL / MILLWORK Approximately 51'-0" l x 3'-6" w. Provide stainless steel undercounter with stone top, stainless steel intermediate and/or lower shelves, galvanized metal base, millwork die front with hardwood veneer or high pressure laminate finish. See architectural finish schedule for specific finish requirements. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 3-22 HEATED SHELF FOOD WARMER

Quantity: One (1)
Manufacturer: Hatco
Model: GRSB-60-I
SIS No.:W010

1. One (1) Model GRSB-60-I Glo-Ray® Drop In Heated Shelf with Recessed Top, 61-1/2" x 21", 1/2" deep recessed surface area, hardcoat aluminum top, control thermostat, illuminated on/off switch & mounting bracket, NSF, CE, cUL, UL, UL EPH Classified, CSA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 800-558-0607
4. One (1) 1-Yr Warranty on Blanket Heating Elements against burnout, standard
5. One (1) 120v/60/1-ph, 1220 watts, 10.2 amps, NEMA 5-15P (domestic voltage), standard
6. One (1) NOTE: Recommended for use in metallic countertop, verify that the material is suitable for temperatures up to 200 degree F
7. One (1) Model GRSB-FLUSH-TSTAT Flush mount thermostatic control box with lighted power switch, stainless steel (available at time of purchase only)
8. One (1) Model STANDARD Stainless Steel Finish, flush mounted bezel, standard (available at time of purchase only)
9. One (1) 1-Yr Warranty, standard

ITEM # 3-23 DECORATIVE LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: DLH-760 RL
SIS No.:W010

1. One (1) Model DLH-760 RL Decorative Heat Lamp, High Wattage, (1) bulb type (not included), 8-1/2"H x 12-1/2" diameter shade, 375 watt max, CE, cULus, UL EPH Classified, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: The decorative lamp & Luminaires are NOT returnable
4. One (1) 120v/60/1-ph, 375 watt, standard
5. One (1) No bulb is included, 375 watt max.
6. One (1) Model BNICKEL Bright Nickel plated finish (available at time of purchase only) special process required & extended lead times
7. One (1) Model SPECIFYN/C MUST SPECIFY designer color selected from list of standard colors & indicated on order (available at time of purchase only)

8. One (1) Model R Mounting Style - Retractable (specify cord color) - retractable cord mount, adjusts from 31" to 69-1/2" (available at time of purchase only)
9. One (1) Model S Switch Location - Must Specify (available at time of purchase only)
10. One (1) Model DL-CORD-BK Black Cord, standard, (CL, CU, CT, RL mounts only) (available at time of purchase only)
11. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350

ITEM # 3-24 DECORATIVE LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: DLH-760 RL
SIS No.:W010

1. One (1) Model DLH-760 RL Decorative Heat Lamp, High Wattage, (1) bulb type (not included), 8-1/2"H x 12-1/2" diameter shade, 375 watt max, CE, cULus, UL EPH Classified, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: The decorative lamp & Luminaires are NOT returnable
4. One (1) 120v/60/1-ph, 375 watt, standard
5. One (1) No bulb is included, 375 watt max.
6. One (1) Model BNICKEL Bright Nickel plated finish (available at time of purchase only) special process required & extended lead times
7. One (1) Model SPECIFYN/C MUST SPECIFY designer color selected from list of standard colors & indicated on order (available at time of purchase only)
8. One (1) Model R Mounting Style - Retractable (specify cord color) - retractable cord mount, adjusts from 31" to 69-1/2" (available at time of purchase only)
9. One (1) Model S Switch Location - Must Specify (available at time of purchase only)
10. One (1) Model DL-CORD-BK Black Cord, standard, (CL, CU, CT, RL mounts only) (available at time of purchase only)
11. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350

ITEM # 3-25 OPEN DISPLAY MERCHANDISER

Quantity: One (1)
Manufacturer: Structural Concepts
Model: CO5324R-UC
SIS No.:W010

1. One (1) Model CO5324R-UC Oasis® Self-Service Refrigerated Under Counter Case, 59-1/4"W, 32-3/4"H, Breeze-E (Type II) with EnergyWise self-contained refrigeration system (rear access), LED top light, black interior, laminate exterior, (2) square full end panels, casters with levelers, front panels extends over end panels to blend with adjacent counters (supplied by others), counter surface (supplied by others) extends over top of unit, black toe kick panel, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard

4. One (1) Breeze-E (Type II) with EnergyWise refrigeration (rear access)- NSF Type II compliant, standard
5. One (1) 110-120v/60/1ph, 16.0 amps, 1204 watts, standard
6. One (1) 6 ft straight blade power cord with NEMA 5-20P, standard
7. One (1) NOTE: Compressor air rear intake, front discharge at toe kick, unit MUST remain 4" from wall, front & rear panels cannot be blocked (Not applicable with remote refrigeration)
8. One (1) Interior: Stainless steel, in lieu of standard black
9. One (1) Exterior: Stainless steel
10. One (1) Left end panel: Square full with mirrored interior, standard
11. One (1) Right end panel: Square full with mirrored interior, standard
12. One (1) Back Panel: Solid back panel, black, painted, standard
13. One (1) Digital fahrenheit thermometer, standard
14. One (1) Night curtain, retractable, non-locking (not applicable with security cover)

ITEM # 3-26 SPARE NO.

ITEM # 3-27 POS <NIC>

Quantity: Two (2)
Manufacturer: NIFSEC
SIS No.:W010

1. Two (2) POS - NIFSEC

ITEM # 3-28 SPARE NO.

ITEM # 3-29 SPARE NO.

ITEM # 3-30 SPARE NO.

ITEM # 3-31 OPEN DISPLAY MERCHANDISER

Quantity: One (1)
Manufacturer: Structural Concepts
Model: CO5324R-UC
SIS No.:W010

1. One (1) Model CO5324R-UC Oasis® Self-Service Refrigerated Under Counter Case, 59-1/4"W, 32-3/4"H, Breeze-E (Type II) with EnergyWise self-contained refrigeration system (rear access), LED top light, black interior, laminate exterior, (2) square full end panels, casters with levelers, front panels extends over end panels to blend with adjacent counters (supplied by others), counter surface (supplied by others) extends over top of unit, black toe kick panel, cETLus, ETL-Sanitation

2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Breeze-E (Type II) with EnergyWise refrigeration (rear access)- NSF Type II compliant, standard
5. One (1) 110-120v/60/1ph, 16.0 amps, 1204 watts, standard
6. One (1) 6 ft straight blade power cord with NEMA 5-20P, standard
7. One (1) NOTE: Compressor air rear intake, front discharge at toe kick, unit MUST remain 4" from wall, front & rear panels cannot be blocked (Not applicable with remote refrigeration)
8. One (1) Interior: Stainless steel, in lieu of standard black
9. One (1) Exterior: Stainless steel
10. One (1) Left end panel: Square full with mirrored interior, standard
11. One (1) Right end panel: Square full with mirrored interior, standard
12. One (1) Back Panel: Solid back panel, black, painted, standard
13. One (1) Digital fahrenheit thermometer, standard
14. One (1) Night curtain, retractable, non-locking (not applicable with security cover)

ITEM # 3-32 SPARE NO.

ITEM # 3-33 HEATED SHELF FOOD WARMER

Quantity: One (1)
Manufacturer: Hatco
Model: GRSB-60-I
SIS No.:W010

1. One (1) Model GRSB-60-I Glo-Ray® Drop In Heated Shelf with Recessed Top, 61-1/2" x 21", 1/2" deep recessed surface area, hardcoat aluminum top, control thermostat, illuminated on/off switch & mounting bracket, NSF, CE, cUL, UL, UL EPH Classified, CSA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: Includes 24/7 parts & service assistance, call 800-558-0607
4. One (1) 1-Yr Warranty on Blanket Heating Elements against burnout, standard
5. One (1) 120v/60/1-ph, 1220 watts, 10.2 amps, NEMA 5-15P (domestic voltage), standard
6. One (1) NOTE: Recommended for use in metallic countertop, verify that the material is suitable for temperatures up to 200 degree F
7. One (1) Model GRSB-FLUSH-TSTAT Flush mount thermostatic control box with lighted power switch, stainless steel (available at time of purchase only)
8. One (1) Model STANDARD Stainless Steel Finish, flush mounted bezel, standard (available at time of purchase only)
9. One (1) 1-Yr Warranty, standard

ITEM # 3-34 DECORATIVE LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: DLH-760 RL

SIS No.:W010

1. One (1) Model DLH-760 RL Decorative Heat Lamp, High Wattage, (1) bulb type (not included), 8-1/2"H x 12-1/2" diameter shade, 375 watt max, CE, cULus, UL EPH Classified, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: The decorative lamp & Luminaires are NOT returnable
4. One (1) 120v/60/1-ph, 375 watt, standard
5. One (1) No bulb is included, 375 watt max.
6. One (1) Model BNICKEL Bright Nickel plated finish (available at time of purchase only) special process required & extended lead times
7. One (1) Model SPECIFYN/C MUST SPECIFY designer color selected from list of standard colors & indicated on order (available at time of purchase only)
8. One (1) Model R Mounting Style - Retractable (specify cord color) - retractable cord mount, adjusts from 31" to 69-1/2" (available at time of purchase only)
9. One (1) Model S Switch Location - Must Specify (available at time of purchase only)
10. One (1) Model DL-CORD-BK Black Cord, standard, (CL, CU, CT, RL mounts only) (available at time of purchase only)
11. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350

ITEM # 3-35 DECORATIVE LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: DLH-760 RL
SIS No.:W010

1. One (1) Model DLH-760 RL Decorative Heat Lamp, High Wattage, (1) bulb type (not included), 8-1/2"H x 12-1/2" diameter shade, 375 watt max, CE, cULus, UL EPH Classified, Made in USA
2. One (1) NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
3. One (1) NOTE: The decorative lamp & Luminaires are NOT returnable
4. One (1) 120v/60/1-ph, 375 watt, standard
5. One (1) No bulb is included, 375 watt max.
6. One (1) Model BNICKEL Bright Nickel plated finish (available at time of purchase only) special process required & extended lead times
7. One (1) Model SPECIFYN/C MUST SPECIFY designer color selected from list of standard colors & indicated on order (available at time of purchase only)
8. One (1) Model R Mounting Style - Retractable (specify cord color) - retractable cord mount, adjusts from 31" to 69-1/2" (available at time of purchase only)
9. One (1) Model S Switch Location - Must Specify (available at time of purchase only)
10. One (1) Model DL-CORD-BK Black Cord, standard, (CL, CU, CT, RL mounts only) (available at time of purchase only)
11. One (1) NOTE: Includes 24/7 parts & service assistance, call 414-671-6350

ITEM # 3-36 SELF-SERVICE REFRIGERATED MERCHANDISER

Quantity: One (1)
Manufacturer: Structural Concepts
Model: B7132
SIS No.:W010

1. One (1) Model B7132 Oasis® Self-Service Refrigerated Merchandiser, 71-3/4"W, high profile, open front, (4) non-lighted shelves, top light, Breeze-E (Type ll) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, one piece formed ABS plastic tub, black interior, full end panels with mirror, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Breeze-E (Type II) with EnergyWise self-contained refrigeration, lower front air intake/upper front air discharge, standard
5. One (1) 208-240v/60/1ph, 15.32 amps, standard
6. One (1) 6 ft straight blade power cord NEMA 6-20P (base exit), standard
7. One (1) NOTE: Compressor air intake through lower front & channeled up rear & out upper front, front panel cannot be blocked
8. One (1) Model CLEAN SWEEP Clean Sweep®, automatic condenser coil cleaner
9. One (1) Base Support: Casters, with levelers, standard
10. One (1) Interior: Stainless steel, in lieu of standard black
11. One (1) Exterior: Stainless steel
12. One (1) Lower front panel: Stainless steel [Requires Stainless Steel Exterior]
13. One (1) Left end panel: Full with mirrored interior, metal edging, standard
14. One (1) Right end panel: Full with mirrored interior, metal edging, standard
15. One (1) Exterior back panel: Solid back panel, black painted, standard
16. One (1) Digital fahrenheit thermometer, standard
17. One (1) Lights: LED 4000K w/ frosted lens, standard
18. One (1) Night curtain: Retractable, non-locking

ITEM # 3-37 AIR CURTAIN

Quantity: One (1)
Manufacturer: Berner
Model: CLC08-1072A
SIS No.:W010

1. One (1) Model CLC08-1072A Commercial Series Low Profile Air Curtain, 72"L, unheated, (1) 1/5 hp 2-speed motor, for doors up to 8' high, specify exterior, interior mounting only, cULus, Made in USA
2. One (1) Five year parts warranty (unheated units)
3. One (1) If special freight fees are requested, (See below) all applicable fees will be added to the invoice; fees subject to change; contact factory for addition information.
4. One (1) Model A 120v/60/1-ph
5. One (1) White powder coat exterior finish, standard

ITEM # 3-38 AIR CURTAIN

Quantity: One (1)
Manufacturer: Berner
Model: CLC08-1072A
SIS No.:W010

1. One (1) Model CLC08-1072A Commercial Series Low Profile Air Curtain, 72"L, unheated, (1) 1/5 hp 2-speed motor, for doors up to 8' high, specify exterior, interior mounting only, cULus, Made in USA
2. One (1) Five year parts warranty (unheated units)
3. One (1) If special freight fees are requested, (See below) all applicable fees will be added to the invoice; fees subject to change; contact factory for addition information.
4. One (1) Model A 120v/60/1-ph
5. One (1) White powder coat exterior finish, standard

ITEM # 3-39 AIR CURTAIN

Quantity: One (1)
Manufacturer: Berner
Model: CLC08-1072A
SIS No.:W010

1. One (1) Model CLC08-1072A Commercial Series Low Profile Air Curtain, 72"L, unheated, (1) 1/5 hp 2-speed motor, for doors up to 8' high, specify exterior, interior mounting only, cULus, Made in USA
2. One (1) Five year parts warranty (unheated units)
3. One (1) If special freight fees are requested, (See below) all applicable fees will be added to the invoice; fees subject to change; contact factory for addition information.
4. One (1) Model A 120v/60/1-ph
5. One (1) White powder coat exterior finish, standard

END OF SECTION 11 40 00 FOOD SERVICE EQUIPMENT SPECIFICATIONS

SECTION 116123 - PORTABLE SEATING PLATFORM AND SEAT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Services as listed herein and related to the provision of the following systems:

   a. Audience Seating Risers
   b. Portable Audience Seats

2. The Platform Contractor shall provide all items necessary for a complete, safe, fully functional system as described herein, including all tools, scaffolding, labor, and supervision, even though they may not be specifically enumerated.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 REFERENCES

A. Comply with all national, state and local regulations and the procedures. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, NEC (National Electrical Code), IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 01 for definitions.
B. Owner Representative: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.

1.5 SYSTEM DESCRIPTION

A. Modular platform systems, comprised of portable platform decks, ramp, landing, support frames and railings shall be provided.
B. Loose seats with ability to interlock, including storage carts and accessories shall be provided.

1.6 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.

B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.

C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS

A. Submittals shall be made in accordance with Division 1.

B. Submittals shall be made electronically in PDF format.

C. Submittals shall be made in a timely fashion so as to not affect the project schedule, and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.

D. Submittals shall be reviewed prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process. Approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications.

E. Shop Drawings:

1. Submit component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
2. Shop drawing plans and section shall be at ¼” scale minimum. Details shall be larger scales to fully explain the component.
3. Show storage area diagrams for all components un-used in any particular system.
4. Provide clear space on all shop drawings for comments and approval stamps.

F. Product Data:

1. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.
2. Product data shall be properly identifying each components intended use. Any options or variations must be clearly noted.

G. Samples:

1. Upon 14 days of request by the Owner’s Representative, submit samples for review. Samples may include, but are not limited to:

a. 1 square foot full scale mock-up of a typical platform deck including project-specific finish.

2. At time of delivery, submit six copies of submittals including product data, flame certifications, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents.

H. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, submit six copies of "as built" submittals including shop drawings, product data, flame certifications, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents.
3. Provide (3) 11x17 laminated, assembly instructions for owner use with illustrations or color pictures. Include step by step instructions for each configuration.

   a. Instruction sheets may be dual sided.
   b. If multiple pages are required, full instruction sets shall be bound together.

1.8 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship for a period of three years following the date of acceptance by the Owner.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor, except for safety related items, which shall be corrected within 48 hours of notification.

1.9 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.
B. Specialty subcontractor shall have been continuously engaged in the sales and installation of equipment similar to that specified herein for a minimum of fifteen years.
C. Specialty suppliers shall have at time of bid and continuously maintain throughout the project and warranty period a Specialty Contractor's license valid in the state of the project and appropriate for the work in this Section.
D. Specialty suppliers shall maintain bonds in the amount required for the project.
E. Specialty manufacturers responsible for engineering and manufacturing shall have been continuously engaged in the engineering and manufacturing of equipment similar to that specified herein for a minimum of fifteen years, and shall have provided equipment for at least fifty installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
F. All equipment shall be UL listed and bear the appropriate labels.

1.10 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1.11 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.
B. Field Conditions: All bidders shall fully inform themselves of the conditions under which the work is to be performed. No additional compensation shall be allowed for any labor or item the bidder could have been fully informed of prior to the bid date.

1.12 MAINTENANCE

A. Provide maintenance stock of user-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system commissioning.

PART 2 - PRODUCTS

2.1 PRE-APPROVED PLATFORM SYSTEM MANUFACTURERS

A. The following manufacturers are pre-approved to bid the work in this section:

Series Seating
2224 East Winona Ave
Warsaw, IN 46580
Contact: Thomas Boyd
Tel.: 800-729-1190

StageRight, Inc.
495 Pioneer Parkway
Clare, MI 48617
Contact: Kip Weis
Tel.: (800) 438-4499 ext. 349

Staging Concepts
8400 Wyoming Avenue North, Suite 100
Minneapolis, MN 55445
Contact: Ray Byrnes
Tel.: 619-550-6432
Wenger Corporation
555 Park Drive
Owatonna, MN 55060
Contact : Jeff Kirkpatrick
Tel. : 800-326-8373, ext 260

B. Pre-approval to bid does not imply acceptance of the manufacturer. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received and submittals made are for controls systems that meet or exceed the specifications.

C. All other subcontractors must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.

1. A listing of five equivalent installations including:

   a. Name, address and telephone number of Owner;
   b. Name, address and telephone number of Theatre Consultant;
   c. Scope of work.
   d. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.

2. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.

2.2 MATERIALS

A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.

B. Materials shall conform to the following ASTM and ANSI standard specifications:

1. A-36 - Specification for structural steel
2. A-47 - Specification for malleable iron casting
3. A-48 - Specification for gray iron casting
4. A-120 - Specification for black and hot-dipped zinc-coated (galvanized) steel pipe for ordinary use
5. B18.2.1&2 - Specification for square and hex bolts and nuts
6. B221-02 - Specification for aluminum alloy

C. Materials, devices, assemblies and installation shall meet or exceed applicable ESTA standards.

D. In order to establish minimum standards of safety, the following factors shall be used:

1. Steel - per AISC specifications
2. Bearings – Two times required load at full speed for 2000 hours
3. Bolts - Minimum SAE J429 Grade 5 (ISO R898 Class 8.8), zinc plated
4. Standards of workmanship, design, and fabrication for structural steel shall be AISC Code of Standard Practice and ASTM A36.

E. Welding:

1. Execute welding in shop and field in accordance with standards of American Welding Society. All welders shall be qualified in accordance with standard qualification procedure of American Welding Society.
2. Control welding sequence and technique to minimize secondary stresses and distortions.
3. Net effective weld lengths shall be indicated on the shop drawings and approved before fabrication and installation.

F. All items of incidental hardware shall be furnished plated or painted black u.o.n.

G. All nuts shall be new lock nuts or shall be provided with lockwashers. No exceptions.

H. Fabrication:

1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard nor shall there be any sharp corners accessible to personnel.
2. All moving parts shall have specified tolerances.
3. All equipment shall be built and installed to facilitate future maintenance and replacement.

I. Finishes:

1. Paint shall be the manufacturer’s standard finish and color except as noted.

2. All items of incidental hardware shall be furnished plated or painted black.
3. Components shall be painted with rust inhibiting primer and finished with black paint.

J. Recommended Working Load: This specification calls for minimum recommended working loads for hardware. The manufacturer's recommended working load is the maximum load which the manufacturer recommends be applied to properly installed, maintained, and operated new equipment. Manufacturer's recommended working loads shall be determined by calculations by a Licensed Professional Engineer and destructive testing by an independent testing laboratory. These calculations and reports shall be available for review.

2.3 BLACK BOX AUDIENCE RISERS

A. Platform decking

1. Deck shall be portable and provide a stable surface.
2. Decks shall be a single sided portable platform with 4" high extruded 6005A-T61 aluminum frame, including protective edge, powercoated black finish. Frame shall connect to support system and railings. Subfloor shall be 1" exterior rated group 1 plywood.
3. Performance: Certified, uniformly distributed live-load capacity of 4800 pounds per 4' x 8' section (150 pounds per sq. foot).
4. Finish

    a. Platforms deck top finish surface shall be carpet<.
        1) Color to be selected from standard finishes during the submittal process.

5. Deck shall attach to the Platform Supports by molded corner receptacles, clamps or clips.
6. Decks shall attach to one another with roto-lock clamps.

    a. Provide four (2) T-wrenches for operating roto-locks.

7. Maximum weight of one platform shall be less than 100 lbs

B. Fabric Fascia

1. Provide fabric skirt panels around the platforms and ramp.
2. Fabric shall Commando Cloth black IFR, with 50% fullness. Fascia panels shall be designed to remove in sections and attach with clips.

C. Platform Support Legs

1. Platform support system shall be easy to set up and store and shall provide a stable, robust understructure.

    a. Support legs shall store on bottom of platforms
    b. Support system shall be assembled without tools by as few as two (2) people.
    c. Support system shall be capable of carrying the loads described above for the platforms.

2. Playing height shall be as shown on drawings.

    a. Support legs shall be capable of 2-1/2” of leveling adjustment.
    b. Each screw foot shaft shall have a diameter of no less than 3/4" and have zinc-plated Acme threads. The bottom of the foot shall be molded urethane.

3. Provide support legs in each platform corner and configuration as shown on drawings.

    a. Platform frame shall match deck manufacturer listed above.

D. Railings

1. Provide railings in location as shown on the drawings at the ramp and on three sides of the stage. Railing shall be 2-line black finished 1-1/4” dia aluminum tube with kick plate. Ramp shall have code required hand railing.

E. Carts

1. Provide carts for all equipment as necessary to carry the platforms, platform supports, and any related system accessories.

    a. Minimize quantity of carts and storage footprint as possible.
    b. Carts with platforms shall fit through a 3’-0” standard door and into building elevator.
    c. Carts shall have swivel casters with soft, non-marking rubber wheels.

F. Product shall be:

1. StageRight All Purpose Deck and Bridging Risers
2. Staging Concepts “SC90 Platform” with acoustical infill.
3. Staging Concepts “SC90 Adjustable Height Legs”
4. Wenger Stagetek Seated Risers

2.4 BLACK BOX AUDIENCE SEATING

A. Seats shall be of similar envelope to fixed seating shall be of consistent width.

1. Back shape and seat pan shape shall be similar to fixed seats.
2. Seat back and seat pan shall be upholstered.

    a. Upholstery shall match the upholstery provided on the adjacent telescopic seats, (see section 12 66 23)

3. Seats shall have armrests.

    a. Armrests shall be wood, with a stain matched to the finish of the adjacent telescopic seating.

B. Carts shall be provided for stacking seats.

C. Provide quantity (145) of:

1. Wenger Audience Seat
2. Series Seating Model K

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate scheduling and access with the Contractor and the Owner.
B. Insert operations and maintenance information into the project record documents as specified above in Submittals.

3.2 PERFORMANCE OF THE WORK

A. The Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.
B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.
C. Standards:

1. Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).
2. Fabricate metal work in accordance with standards of first-class workmanship with ornamental work free of blemishes like tool marks, burrs, scars, and abrasions. All edges shall be smooth. All points, welds, and intersections shall be properly made and fitted to provide a uniform finish.

D. All connection points shall be welded and ground smooth.
E. Fit abutting surfaces closely.

1. Provide slotted holes, as needed, in steel members which require accurate alignment.

F. Accurately align and adjust various frame members before final anchoring.
G. Erect metal work level, plumb, square and in proper alignment with adjacent work. Deformed components shall be remedied.
H. Attachments: All equipment shall be securely attached to the building structure.
I. Finishes:

1. All welds must be touched up to match disturbed finishes.
2. All finishes which are disturbed during shipping and installation shall be touched up to match the original.

3.3 CLEAN UP

A. The Contractor shall be responsible for cleanup, including removal of packing materials etc. and the protection of surfaces or equipment provided by other trades.

3.4 INSPECTION AND TESTING

A. Upon completion of the installation the Contractor shall notify the Owner's Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner's Representative's schedule.
B. The Contractor shall arrange for access as necessary for inspection of equipment by the Owner's Representative.
C. In preparation for inspection by the Owner's Representative system components shall be cleared of dust and debris.
D. All systems shall be complete and will be operated by the Owner's Representative for approval. Make available for review by the Owner's Representative:

1. All components for physical inspection.

    a. Contractor shall make provisions for access as necessary.

2. Spare parts inventory.

E. The Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or Owner's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the related Contractor or Owner's Representative to carry out their work.

3.5 TRAINING

A. Upon final approval of the system by the Owner's Representative, representatives from the Platforming System Specialty Sub-Contractor shall instruct designated Owner staff or representatives in the safe use and maintenance of all systems specified herein.
B. Schedule training sessions in advance to fit the Owner staff or representatives' schedules.
C. Provide 4 hours of training.
D. Training shall include, but not be limited to:

1. An overview of the platforming system and all components.
2. Full process for setting up and taking down the system, in all of its configurations.
3. Care and maintenance of the platforming system.

END OF SECTION

SECTION 116133 - PRODUCTION RIGGING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. The Rigging Contractor shall provide all items necessary for a complete, safe, fully functional system as described herein and as shown on drawings, including all tools, scaffolding, labor, and supervision, even though they may not be specifically enumerated.

1.2 RELATED SECTIONS

A. Coordinate with the following sections in carrying out this work:

1. Division 01 – General Conditions
2. Division 05 – Metals
3. Division 6 & 9 - Floor and adjacent architectural finishes
4. Section 11 61 83 – Production Lighting Control
5. Division 21 – Wet Sprinkler Pipe System
6. Division 23 – HVAC and Plumbing
7. Division 26 – Electrical
8. Section 26 05 35 – Production Systems Electrical Installation
9. It shall be under the work in this section to coordinate established clearances to the general contractor and all others trades on the project and maintain necessary clearance requirements for all rigging components and clear zones.

    a. No conduit, raceway, sprinkler pipe, plumbing pipe, duct, any other part of the mechanical systems, or any structural component shall be in a rigging clear zone nor shall they obstruct the operations of the rigging systems nor shall they be within 6” of a moving rigging component, including lift lines.

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.

B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, CEC, IEEE, and all manufacturer’s recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers’ warranties.

C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 01 for definitions.
B. Owner's representative: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.
C. Recommended Working Load: This specification calls for minimum recommended working loads for hardware. The manufacturer's recommended working load is the maximum load which the manufacturer recommends be applied to properly installed, maintained, and operated new equipment. Manufacturer's recommended working loads shall be determined by calculations by a Licensed Professional Engineer and destructive testing by an independent testing laboratory. These calculations and reports shall be available for review.

1.5 SYSTEM DESCRIPTION

A. Blackbox Theatre will have a Tension Wire grid, dead hung battens in the upstage area, and (1) drapery track.
B. Drama Classroom will have a pipe grid and perimeter drapery track and draperies.

1.6 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS

A. Submittals shall be made in a timely fashion so as to not affect the project schedule and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.
B. All submittals shall be made in electronic format.

1. Provide Hard copies if requested by Architect.
2. Files shall be in .pdf format, and submitted via email, direct FTP download, USB memory stick, CD or DVD.

    a. Third party website transfer services which require membership shall not be an acceptable means of transmittal.

C. All submittals shall be prepared for review by the CA Division of the State Architect as "deferred approval" items. As such complete shop drawings and relevant calculations shall be fully engineered and bear the stamp of a Structural Engineer licensed in the State of CA.

D. Submittals shall be reviewed, and field dimensions verified prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process. Approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications.

E. Shop Drawings:

1. Submit component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
2. Upon approval by the Owner's Representative, submit a dedicated set of drawings, product data and test and compliance certifications regarding all aspects of the proscenium fire safety curtain for review by building officials.
3. Shop drawing plans and sections shall be at 1/4" scale minimum. Details shall be larger scales to fully explain the component.
4. Provide clear space on all shop drawings for comments and approval stamps.

F. Product Data:

1. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.
2. Product data shall properly identify each component's intended use. Any options or variations must be clearly noted.

G. Samples:

1. Upon 14 days of request by the Owner's Representative, submit samples for review. Samples may include, but are not limited to:

   a. Tracks and hardware
   b. 12" x 12" mock-up of a tension grid panel, including any permanent internal framing members
   c. Selected drapery materials, 2 bolt yards minimum
   d. Sewing detail sampler demonstrating drapery top, side and bottom.

H. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, submit three (3) paper copies and six (6) electronic copies, in PDF format, of "as built" submittals including shop drawings, product data, flame certifications and listings, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents. Files shall be in .pdf format, and submitted via email, direct FTP download, USB memory stick, CD or DVD.

1.8 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship for a period of three years following the date of acceptance by the Owner.

B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor, except for safety related items, which shall be corrected within 48 hours of notification.

1.9 MAINTENANCE SERVICE:

A. Provide maintenance service for a period of one (1) year after final acceptance of the installation. This service consists of at least one visit to the site for checking and adjusting of equipment. Perform the visit 11 months after the system has been accepted. Time of visit shall be coordinated with Owner and Owner Representative's schedule.

1.10 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty suppliers and manufacturers meeting the qualifications listed herein.
B. Specialty suppliers and the individuals responsible for installation in the field shall have been continuously engaged in the sales and integration of rigging equipment similar to that specified herein for a minimum of fifteen years and shall have completed at least ten installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
C. Specialty suppliers shall have at time of bid, and continuously maintain throughout the project and warranty period, a Specialty Contractor's license appropriate for the work in this section as applicable.
D. Specialty suppliers shall maintain bonds in the amount required for the project.
E. Specialty manufacturers responsible for engineering and manufacturing shall have been continuously engaged in the engineering and manufacturing of rigging equipment similar to that specified herein for a minimum of fifteen years and shall have provided equipment for at least fifty installations of this type and scope. The Owner's Representative shall be the final judge of the suitability of experience.
F. All equipment shall be UL listed and bear the appropriate labels.

1.11 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect materials from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.
D. Draperies shall be packed and shipped in methods and containers that shall prevent crushing of finished goods.

1.12 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.

B. Field Conditions: All bidders shall fully inform themselves of the conditions under which the work is to be performed. No additional compensation shall be allowed for any labor or item the bidder could have been fully informed of prior to the bid date.

1.13 MAINTENANCE

A. Provide maintenance stock of User-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system checkout.

B. Maintenance stock shall include:

1. For each type in the system provide:

   a. One master traveler track carrier for each track type
   b. Four intermediate traveler track carriers for each track type
   c. Four shackles of each type in the system.
   d. Eight wire rope thimbles for each cable size
   e. Eight wire rope compression sleeves for each cable size
   f. Twenty complete replacement tension grid cable assemblies of each size used throughout the project. All fittings shall be shop applied.
   g. Any tools necessary for removal of old tension grid cables and installation of new tension grid cables

PART 2 - PRODUCTS

2.1 PRE-APPROVED SPECIALTY SUBCONTRACTORS

A. The following production systems specialty subcontractors have been pre-approved for bidding for the work in this section:

LVH Entertainment Systems
300 Irving Drive
Oxnard, CA 93030
Tel. (888) 313-2033
Contact: Jason Davis

Protech USA
3431 N. Bruce St
N. Las Vegas, NV 89030
Tel. (702) 639.0290
Contact: Will Brants

Stagecraft Industries, Inc.
5051 North Lagoon Ave
Portland, OR 97217
Tel. (503) 286-1600
Contact: Kevin Shetterly

B. All other manufacturers and installers must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.

1. A listing of five equivalent installations including:

   a. Name, address and telephone number of Owner
   b. Name, address and telephone number of Theatre Consultant
   c. Scope of work
   d. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.
   e. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.
   f. Documentation necessary to show compliance with Quality Assurance, above.

2. Permission to bid does not imply acceptance of the specialty subcontractors. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received, and submittals made are for systems that meet or exceed the specifications.

2.2 SPECIALTY MANUFACTURERS AND SUPPLIERS

A. The following production systems specialty manufacturers may furnish equipment for the work in this section:

H&H Hardware
14850 Don Julian Rd, Suite B
City of Industry, CA 91746

Wenger/J.R.Clancy
7041 Interstate Island Road
Syracuse, NY 13209

Texas Scenic
5423 Jackwood Drive
San Antonio, TX 78238

Thern Stage Equipment
5712 Industrial Park Road
Winona, MN 55987

Automatic Devices Company
2121 South 12th Street
Allentown, PA 18103

2.3 MATERIALS

A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.

B. Materials shall conform to the following ASTM, ANSI and ESTA standard specifications:

1. ASTM A36 – Specification for structural steel
2. ASTM A47 – Specification for malleable iron casting
3. ASTM A48 – Specification for gray iron casting
4. ASTM A120 – Specification for black and hot-dipped zinc-coated (galvanized) steel pipe for ordinary use
5. ASME B18.2.1&2 – Specification for square and hex bolts and nuts
6. ASTM B221-02 – Specification for aluminum alloy

C. Materials, devices, assemblies and installation shall meet or exceed applicable ESTA standards.

D. In order to establish minimum standards of safety, the following factors shall be used:

1. Cables and fittings – 8:1 Safety Factor
2. Cable bending ratio – Sheave tread diameter is 30 times cable diameter
3. Tread Pressures – 500 lbs. for cast iron; 900 lbs. for Nylatron; 1000 lbs. for steel
4. Maximum fleet angle – 1-1/2 degrees
5. Steel – Per AISC specifications
6. Bearings – Two times required load at full speed for 2000 hours
7. Bolts – Minimum SAE J429 Grade 5 (ISO R898 Class 8.8), zinc plated

E. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted black.

F. All nuts shall be new lock nuts or shall be provided with “split lock” lock washers or nylock nuts. No exceptions.

G. Lift Lines:

1. Diameters as noted on drawings or as required, 7 x 19 construction, galvanized wire rope aircraft cable, with the following breaking strengths:

   a. 3/16” diameter: 4,200 lbs.
   b. 1/4” diameter: 7,000 lbs.
   c. 3/8” diameter: 14,400 lbs.

2. Damaged or deformed cable shall not be used. All wire rope rigging shall be installed so as to prevent abrasion of the wire rope against any part of the building construction or other equipment.

H. Fabrication:

1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard nor shall there be any sharp corners accessible to personnel.
2. All moving parts shall have specified tolerances.
3. All equipment shall be built and installed to facilitate future maintenance and replacement.

I. Finishes:

1. Paint shall be the manufacturer’s standard finish and color except as noted.
2. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted black.

2.4 TENSION GRID

A. General:

1. Performance criteria:

   a. The tensioned wire grid shall be designed for a live load capacity of 20 pounds per square foot.
   b. The maximum tension in any one line shall not exceed 650 pounds.
   c. The support frame shall be designed so that compression loads caused by tension in the cables do not exceed 5,000 pounds in any member.
   d. For each module, the aircraft cable mesh shall not deflect more than two inches under a maximum concentrated load of 250 pounds.
   e. A maximum concentrated load of 250 pounds applied within 12” of the edge of the panel frame shall not cause the threaded studs to bend over the edge of the frame.
   f. There shall be no horizontal loads imposed upon the building by the design of the grid
      1) Except for sway braces to add lateral stability, as approved by Owner’s Representative.

2) Except for horizontal loads applied to the purpose designed tension grid perimeter frame which is intended to support the grid panels under tension.

g. The total live load and the weight of the grid shall be transmitted through the hangers or attachment structure to the adjacent building steel.

2. Coordinate work with other trades doing adjoining work to assure proper fit, and installation.
3. The scope of work shall include provision of the tension grid panels. Railings to be provided by Architectural.

B. Materials and Components:

1. All materials shall be new and of best quality. Fittings and fasteners shall be painted or galvanized unless otherwise noted and shall conform to applicable industry requirements and codes.
2. Fittings:

a. Bolts, nuts, washers, lock washers as required for complete fabrication and installation.

C. Workmanship:

1. Fabricate metal work in accordance with standards of first class workmanship, with ornamental work free of blemishes like tool marks, burrs, scars and abrasions. All edges shall be smooth. All points, welds, and intersections shall be properly made and fitted to provide a uniform finish.
2. All connection points shall be welded and ground smooth.
3. Provide slotted holes, as needed, in steel members which require accurate alignment.
4. Fit abutting surfaces closely.
5. Accurately align and adjust various frame members before final anchoring.
6. Erect metal work level, plumb, square and in proper alignment with adjacent work. Deformed components shall be remedied.

a. Frames shall be installed with adequate clearances to permit replacement and tensioning of cables after the frames are welded in place.

D. Tension Grid Frame Construction:

1. The tension grid shall be constructed of welded steel frames prefabricated at the subcontractor's shop to form the final configurations as shown on the drawings.
2. Frames shall have mitered welded corners and shall be shipped as individual units. The tension grid assembly shall not be fabricated in place.
3. The frame members shall have cable holes drilled on 2" centers along the length of each side.

a. The holes shall be located as shown on drawings.
b. Holes shall be chamfered on the interior face of the channels to allow unimpeded cable movement under vertical deflection.
c. The live end of the tensioned wires shall only have nuts on the outside of the frame, so the stud is free to move under vertical deflection.

4. Install plate steel web stiffeners that are substantially welded in place and located at quarter points on each side of the frames and centered between two cable holes.
5. The frames shall be painted, black, prior to weaving.
6. Temporary fabrication and shipping struts as described below shall be installed in the frames prior to the tension grid frames being woven at the factory.
7. Weld frames to support structure provided under this scope.
8. Provide plywood or metal covers for any gaps between adjacent panel frames that are larger than 3” in width.

    a. Covers shall be readily removable to allow access from above to maintain or change cable assemblies.

E. Temporary Fabrication and Shipping Struts

1. Provide temporary fabrication and shipping struts (struts) that are installed before the wire rope cables are woven to prevent deformation of the frames.
2. The struts shall be either 2x4 wooden studs or steel angle. Any required mounting assemblies or residue shall be completely removed from the frames once the temporary struts are removed.
3. The temporary fabrication and shipping struts shall be installed in a cross-pattern to stabilize the frames and mitigate deformation during assembly, shipment and installation. The struts shall remain in the frames until all of the frames, perimeter gussets and tension tabs are welded in place. Upon completion of all welding, remove the struts from the jobsite.

F. Cable Assembly

1. Woven wire tension grid shall be fabricated of wire rope that is attached to the frames.
2. Wire rope shall be 1/8" diameter 7 x 19 galvanized aircraft cable, blackened with electrostatically-applied paint.

    a. Acceptable products shall be by Fehr Brothers, or equal

3. Each cable assembly shall include:

    a. The “dead” end shall be secured with two 1/8" Nicopress wire rope stop sleeves bearing on a washer of appropriate size and thickness. A 1/16” indicator gap shall be provided between the two sleeves.
        1) Double Nicopress Stops
        2) Swaged Headed stud
        3) Double threaded swaged ends

    b. The “live” end shall be a stainless-steel alloy swaged threaded stud fitting bearing on a washer of appropriate size and thickness and locked in place with a nut and a lock nut on the outside of the panel frame. Stud shall be of appropriate length to provide 1” of future tensioning and adjustment after the cables are woven and initially tensioned in the frames.

4. Fittings and their application methods shall not reduce the recommended working load of the cables.

G. Tension tabs and perimeter gussets

1. Tension Tabs shall be provided on both the top and bottom surfaces.
2. Provide 1” wide strap steel tension tabs that are welded between adjacent frames at quarter points along the perimeter frame. Tabs shall be sized and welded to transmit opposing lateral forces between frames.

    a. Center the tension tabs between cables for ease of adjustment.

3. Provide plate steel gussets that are installed along the overall perimeter of the tension grid area that connect the tension grid perimeter channel members to the perimeter support steel provided by structural.

    a. Substantially weld the perimeter gussets on quarter points and centered between cables.

H. Tension Grid Loading Signage

1. Provide advisory sign listing maximum allowable loads.
2. Sign shall meet ANSI Z535 standard for warning signs.
3. Mount to wall as directed by Owner’s Representative.

2.5 PIPE GRID

A. Pipe Grid shall be installed as indicated on the drawings. Mount Pipe Grid using hardware configuration as shown on drawings.
B. Adjust pipes so that they are aligned straight and level.
C. Pipe Grid shall be fabricated from 1-1/2" nominal I.D. (1.9" o.d.) schedule 40 steel pipe.

1. All edges shall be de-burred.
2. Battens shall be finished with a suitable black rust resistant finish.

D. All pipes less than 21’ in length shall be continuous and not spliced.

1. Where splices are necessary on pipes longer than 21’, all joints shall be sleeve spliced with 18" long tight fitting sleeves (mechanical tube - not pipe) extending 9" into each pipe and held by two 3/8" hex bolts and lock nuts on each side of the joint. Threaded couplers shall not be permitted. Spliced battens shall have at least the same overall capacity, deflection, and strength as the component pipe.

E. Intersecting pipes shall be joined with a Clancy #015-100 Cross Grid Connector or by an approved equal. The cross grid connector shall have a recommended working load of at least 2,500 lbs.
F. Each pipe which terminates at the wall shall be mounted to the wall using a flange, anchored into structural backing, as shown on drawings.
G. At each hanging point the hanger shall attach to the overhead structure with an appropriate fitting.
H. Pipe Clamps:

1. Pipe clamps shall be made of two strips of 12 Ga. by 2" hot rolled steel formed to encompass and clamp the pipe batten to prevent its rotation. Corners shall be rounded.
2. There shall be a 3/8" x 1" hex bolt with lock nut above and below the batten. A 5/8" hole in the top of each clamp half allows the attachment of cable, chain, or other fittings.

I. Threaded Rod Hanging Assembly:

1. The grid shall be rigidly hung from the overhead steel structures on centers not exceeding 8’-0” feet in either direction.
2. Each hanging point shall be threaded rod, sized appropriately to support the loading conditions shown in the drawings.

J. Compression Strut Hanging Assembly:

1. Use compression struts in place of threaded rod as needed for seismic bracing.
2. Internally routed diagonal braces shall extend from the pipe grid up to the roof structure. Supply sufficient braces to prevent lateral movement of the pipe grid. Provide diagonal bracing as required.

K. Pipe Grid Loading Signage

1. Provide (1) advisory sign listing maximum allowable distributed and point loads.
2. Sign shall meet ANSI Z535 standard for warning signs.
3. Mount to wall as directed by Owner’s Representative.

2.6 MISCELLANEOUS RIGGING EQUIPMENT

A. Loose Pipe Battens

1. Pipe battens shall be fabricated using materials that support the design loads in accordance with the requirements of these specifications.

   a. Pipe battens shall be fabricated from 1-1/2” nominal diameter (1.9” o.d.) schedule 40 black pipe.
   b. All edges shall be de-burred.
   c. Battens shall be finished with a suitable black rust resistant finish.

2. Provide in the following lengths and quantities:

   a. 25 @ 10’-6”, delivered to the tension grid level and installed as shown on the drawings.
   b. 11 @ 10’-6”, delivered to the stage right catwalk (Catwalk 211) and strapped together in a neat stack for storage.

3. Provide pipe mounting clamps in the following quantities and types:

   a. Provide (60) fixed, right angle “cheeseborough” type clamps
      1) (50) of these are to be used for the installed loose pipe battens described above.
      2) (10) are to be delivered to the stage right catwalk (Catwalk 211).

b. Provide (20) Swivel “cheeseborough” type clamps, delivered to the stage right catwalk (Catwalk 211).
c. All clamps shall be finished black.

4. Mount each pipe as directed by the Owner’s representative.

B. It is under the work in this section to provide miscellaneous guardrails, brackets and other equipment that is called out in the PR drawings and not noted specifically as under the work of other trades. Such equipment shall meet all prevailing codes.

2.7 DRAPERIES

A. Provide in sizes and quantities as noted on the drapery schedules<. Verify in field; scheduled areas for drapes are minimum, and drape area is to be maximized as field conditions allow.

1. Install as shown in drawings.

B. Fabric:

1. Fabric shall be as specified below. Weight and color per drapery schedule.

a. “Black” shall be black.
b. Face fabric shall be IFR velour manufactured by KM Fabrics or J.B. Martin.

2. Flame Retardancy: Fabrics must comply with flame retardancy according to the requirements of the National Fire Protection Association’s NFPA #701.

C. Fullness

1. Pleats: Pleats for draperies specified with fullness shall be box sewn on 12" centers.
2. Fullness shall be sewn into the drape as specified per drapery schedule.

D. Seams:

1. Seams between strips shall be single stitched without puckers using thread of matching color. Drapes shall be sewn so pile runs in the same direction. Seams shall be arranged to be concealed by Pleats.

E. Manufacturer’s contact information, flame certifications, material and drape dimensions shall appear on a label sewn to the rear of a bottom offstage corner of each panel. Label shall be black with white lettering.

F. Sewing

1. Nap shall be sewn up, unless otherwise noted on schedule.
2. Provide a 12” square of face and lining fabric to the rear of a top offstage corner of each panel. This panel shall be available as a cutaway sample for testing of flame retardant characteristics over time.
3. Top Finish: 3-1/2" black nylon webbing shall be double stitched to the top of the curtain with 1" of face fabric turned under the webbing.

a. Brass rustproof grommets shall be inserted in pleat centers or on12" centers on flat curtains. Grommets shall be used as follows: #4 grommets - lined velour, heavy weight fabrics. Grommets shall be black.
b. All drapes shall have two grommets in top corners and spacing shall coordinate with master carrier chains.
c. Track Mounted curtains shall be supplied with black powder coated carabineers at all grommets to attachment to carrier chain.

4. Bottom Hems:

a. All full height curtains shall have 6" bottom hems complete with separate interior chain pockets filled with #8 plated jack chain. Chain pockets shall be stitched so that the chain will ride 2" above the finished bottom edge of the curtain.

5. Side Hems:

a. Side hems shall be 2". Raw edge of fabric shall be turned under the 2” side hem. Stage drapery bi-part curtains shall have the onstage face fabric turned to the back of the drape running 3 feet on the back side on the onstage edges of the panels.

2.8 DRAPERY TRACK

A. Provide drapery track in locations as shown on the drawings.

1. Provide complete with all necessary accessories.
2. Maximize height of tracks so top of tracks clear under obstructions by maximum of 1/2".
3. Each section of track less than 20 feet shall be in one continuous piece. Splice clamps shall be permitted for section lengths over 20 feet.
4. Track shall have sufficient capacity to carry maximum loaded carrier at minimum spacing.
5. All non-moving/movement bearing parts shall be finished flat black.
6. Carriers:

a. Carriers shall be constructed of nylon, supported from two heavy-duty neoprene or urethane-tired wheels riveted to steel body with shielded ball bearings. Each carrier shall be equipped with a free-moving swivel and sufficient trim chain to accommodate a curtain.
b. Each carrier shall have rear fold back-pack tabs and rubber washers shall be provided between each back-pack tab and carrier.
c. Provide one carrier for each 12” of track, plus spares.
d. Provide master carriers at the leading and training edge of each stage drapes.
e. The master carrier block shall be constructed of plated steel having two cable clips to clamp the cord to the carrier. Four wheels in pairs identical to the single carrier above shall support the block.
f. Carriers shall have 25# capacity.

7. Live and dead-end pulleys shall 6” diameter, equipped with sealed precision ball bearings on adequately guarded plated steel housings. Provide end stops at each track end, and as necessary to maintain required clearances around door openings.
8. Provide with 6” diameter adjustable, demountable floor pulley.

a. Fasten to stage floor with threaded inserts and wing bolts for quick removal.

9. Stretch-resistant, cable center operating cord shall be 3/8" in diameter.
10. Stage tracks shall be rigged for bi-parting operation with a 48" center overlap. Hanging clamps will be provided for suspension at five-foot maximum intervals.
11. Traveler Tracks shall be provided as follows:

    a. For curved tracks with drapery over 10' tall:
        1) H&H 500 Series
        2) ADC Patriarc 500 Series

    b. For straight tracks with drapery over 10' tall:
        1) H&H 400 Series
        2) ADC Silent Steel 280 Series

    c. Or equal

PART 3 - EXECUTION

3.1 PERFORMANCE OF THE WORK

A. The Rigging Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.
B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.
C. Standards: Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).
D. Alignment: Mule blocks, cable rollers and guides shall be installed using a precision laser, as required, to provide proper alignment, to maintain minimum fleet angles, and to prevent contact with other surfaces. There shall be no fleet angle where possible, but if required fleet angle shall be no greater than 1½°.
E. Fabricate metal work in accordance with standards of first class workmanship with ornamental work free of blemishes like tool marks, burrs, scars and abrasions. All edges shall be smooth. All points, welds and intersections shall be properly made and fitted to provide a uniform finish.
F. All connection points shall be welded and ground smooth.
G. Provide slotted holes, as needed, in steel members which require accurate alignment.
H. Fit abutting surfaces closely.
I. Accurately align and adjust various frame members before final anchoring.
J. Erect metal work level, plumb, square and in proper alignment with adjacent work. Deformed components shall be remedied.
K. Attachments: All equipment shall be securely attached to the building structure.
L. Finishes:

    1. All welds must be touched up to match disturbed finishes.

2. All finishes which are disturbed during shipping and installation shall be touched up to match the original.

3.2 CLEAN UP

A. The Contractor shall be responsible for clean up, including removal of packing materials etc. and the protection of surfaces or equipment provided by other contractors.

3.3 PRODUCTION RIGGING INSPECTION

A. Third party ESTA ETCP certified production rigger shall be engaged to provide an ANSI rigging inspection and report noting deficiencies and deviations from ANSI E1.47 – 2020 level two for newly installed equipment. The ESTA ETCP certified production rigging inspector shall not be employed by the installing production rigging contractor. General Contractor shall contract this inspector.
B. Report shall be provided with a list all production rigging equipment and individual components in the project.
C. Inspection shall include all items shown on the PR drawings and in this Section.
D. Report shall include the certification and signature of the inspector, a checkoff of individual details of each item and that it has been inspected and the methods of doing so, and the current condition of each item.
E. Report shall be provided to the District's Representative as a part of Contractor's indication of system readiness for final review by District's Representative.

3.4 INSPECTION AND TESTING

A. Upon completion of the installation, and after allowing the draperies to hang out for 2 weeks minimum, the Contractor shall notify the Owner's Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner's Representative's schedule.

1. The Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or Owner's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the related Contractor or Owner's Representative to carry out their work.

B. During the periods where movable systems are operated, the Theatre shall be quiet.
C. In preparation for inspection by the Owner's Representative:

1. Rigging system components cleared of dust and debris.

D. Make available for review by the Owner's Representative:

1. Access to all components for physical inspection.
2. All systems shall be complete and will be operated by the Owner's Representative for approval.
3. Spare parts inventory.

3.5 TRAINING

A. Upon final approval of the system by the Owner's Representative, representatives from the Rigging Specialty Sub-Contractor shall instruct designated Owner staff or representatives in the safe use and maintenance of all systems specified herein.
B. Schedule training sessions in advance to fit the Owner staff or representatives' schedules.
C. Provide 4 hours of training.
D. Training shall include, but not be limited to:

1. An overview of the systems and all components.
2. Care and maintenance of rigging systems.
3. Care and maintenance of drapes including proper folding and storage
4. Basic system visual inspections

END OF SECTION

SECTION 116183 – PRODUCTION LIGHTING CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Services as listed herein and related to the furnishing and commissioning of production lighting dimming and control system equipment.
2. Termination of low voltage lighting control network connections, including but not limited to DMX, and all control wire in the system at control outlets, button stations, LC stations, DMX and 0-10v lighting fixtures, relay panels, and architectural control processor, emergency lighting control and as required for a complete and working system.
3. Programing and addressing of DMX controlled architectural lighting fixtures controlled by the production lighting system.

1.2 RELATED SECTIONS

A. Coordinate with the following sections in carrying out this work:

1. Division 1 – General Conditions
2. Division 26 – Electrical
3. Section 11 61 33 – Production Rigging
4. Section 26 05 35 – Production Systems Electrical Installation
5. Section 27 41 16 - AV Systems

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, CEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 1 for definitions.
B. Owner: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.

1.5 SYSTEM DESCRIPTION

A. The project includes a black box theatre, drama classroom and sports arena, as well as support spaces. The following should be provided:

1. DMX controlled relay or breaker panels, as shown in the drawings.
2. Power and data distribution receptacles, as shown in the drawings.
3. Control equipment
4. Racks and enclosures
5. Control devices for architectural lighting, as required.

   a. Note: it is under the work of this section to review the electrical and architectural lighting drawings and to provide all equipment necessary for a fully functional system, as described in this section, even if this equipment is not shown on the production lighting drawings. It is not necessary to provide any equipment which is specifically shown on the lighting drawings to be provided by Div. 26. It is the responsibility of the lighting integrator to obtain the electrical and architectural lighting drawings.

B. The production lighting control system in all spaces shall be new and complete, and shall control the theatrical lighting, and selected work lighting through interface with networked controlled relays.

C. The system shall be comprised of control panels, control electronics, a data network, controlled relays, and circuit wiring devices.

1.6 CURRENT TECHNOLOGY

A. Only the most current hardware and software shall be provided. In no case will discontinued or superseded products be acceptable. If the manufacturer has developed and successfully released products that meet or exceed the criteria within this specification, the Contractor shall notify the Owner's Representative and submit the new product for review. If accepted, the products will be provided at no additional cost to the Owner. Software upgrades and authorized support services for its proper integration into the system shall be provided at no cost to the Owner throughout the warranty period.

B. In the event of known product defaults or recall, the Contractor shall immediately notify the Owner and Owner's Representative and make immediate arrangements for remedy.

C. None of the stipulations herein shall be grounds for revision to the project schedule.

D. See related procedures under Warranties in this Section.

1.7 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.

B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.

C. All expenses related to the substitution including, but not limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.8 SUBMITTALS

A. Submittals shall be made in accordance with Division 1.

B. If permitted under Division 1, all submittals shall be made in electronic format.

1. Files shall be in .pdf format, and submitted via email, download, CD or DVD.

C. Submittals shall be made in a timely fashion so as to not affect the project schedule and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.

D. Submittals shall be reviewed, and field dimensions verified prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process.

E. Conduit, Backboxes and Electrical Systems Verification Letter:

1. Within 30 days of contract award, the lighting integrator shall review all relevant information pertaining to the production lighting control conduit, backboxes, and line voltage electrical work to be performed by Division 26. A formal memo, indicating acceptance (or desired changes) of the Contract Drawings shall be provided. Failure to provide this memo indicates acceptance of, and liability for, the conduit, backboxes and electrical systems as indicated in the Contract Drawings.

F. Shop Drawings:

1. Submit scaled shop drawings that show the following:

a. Installation requirements.
b. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
c. Detailed relay panel schedules.
d. Detailed circuit and control schedules.
e. Detailed product drawings, as applicable to this Project.
f. Product Data
g. Screenshots of programmed pages for any touchscreen controllers.

2. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.

G. Color Data:

1. Submit color schedule for all equipment and devices, including custom plates & panels, button panels, lighting fixtures, loose cabling, connectors, equipment racks, etc. Room name and number shall be listed.
2. Show standard color options to allow design team to select.
3. Where no option for color is available, indicate as much.

H. Samples:

1. Upon 14 days of request by the Owner's Representative, submit samples for review. Samples may include, but are not limited to: (not electronic)

   a. Connector, panel and cable assemblies
   b. Relay modules
   c. Panel finish samples

I. Record Documents:

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Within 30 days, submit "as built" submittals including shop drawings, product data, operations and instructions manuals for all products provided, CD(s) of control systems programming, care and maintenance instructions, service line and online contacts and warranty documents.

1.9 WARRANTY

A. Warranty shall provide coverage of material and product defects and assembly workmanship or installation for a period of two years following the date of acceptance by the Owner.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor. If warranty claims are not serviced to the satisfaction of the Owner within the 14-day period, the Contractor shall bear all costs that arise as a result of the delay, including, but not limited to, the use of temporary replacement components, additional Owner's staffing or overtime, shipping, and cancelled uses or performances.

1.10 QUALITY ASSURANCE

A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.
B. Specialty subcontractors shall have been continuously engaged in the sales and integration of lighting control equipment similar to that specified herein for a minimum of ten years.

1. Manufacturer shall have been continuously engaged in the manufacturing of lighting control equipment similar to that specified herein for a minimum of ten years.

C. Specialty suppliers shall have at time of bid, and continuously maintain throughout the project and warranty period, a specialty Contractor's license appropriate for the work in this Section.
D. Specialty subcontractors shall have within their employ manufacturer's factory authorized field services technicians, within a four-hour travel distance from the Project site.

E. All equipment shall be UL listed and bear the appropriate labels.

1.11 DELIVERY, STORAGE AND HANDLING

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible for properly sequencing the work and protecting equipment from damage during delivery, handling, storage and installation.
C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1. Devices shall not be delivered to the project site until the site is suitably clean and all adjacent finish work that may be painted or produce dust has been completed. The contractor shall provide and maintain complete protection of all devices until the project has been made available for occupancy by the Owner. The Contractor shall thoroughly clean and remove any dirt or dust that infiltrates system components and shall be responsible for timely replacement of any damaged components.
2. Device labels and connectors shall be delivered with temporary dust and paint protection installed.

1.12 PROJECT CONDITIONS

A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.

1.13 MAINTENANCE

A. Provide maintenance stock of User-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system commissioning.
B. Maintenance stock shall include:

1. One spare relay module of each type in the system.
2. Four fuses of each type in the system.
3. Two control device receptacles and connectors of each type in the system.
4. Four circuit distribution connectors of each type in the system.
5. Four cable mount lighting fixture power connectors of each type in the inventory.
6. Six spare keys of each type in the system.
7. Components recommended by the Manufacturer.
8. Any non-standard tools required for User service.

PART 2 - PRODUCTS

2.1 PRE-APPROVED SPECIALTY SUBCONTRACTORS

A. The following production systems specialty subcontractors have been pre-approved for bidding for the work in this section:

Holzmueller Productions
1000 25th St
San Francisco, CA 94107
Tel. (415) 826-8383
Contact: Jim Schelstrate

Musson Theatrical
890 Walsh Ave
Santa Clara, CA 95050
Tel. (408) 986-0210
Contact: Dave Rimerman

LVH Entertainment Systems
1801 Highland Avenue, Unit E
Duarte, CA 91010
Tel. (800) 716-9408
Contact: Jason Davis

4Wall Entertainment
5435 W. San Fernando Rd.
Los Angeles, CA 90039
Tel. (818) 252-7481
Contact: Brent Prichett

Polaris Lighting
624 Irving Ave
Glendale, CA 91201
Tel. (818) 265-0330
Contact: Floyd Payne

Stagecraft Industries, Inc.
5051 North Lagoon Ave
Portland, OR 97217
Tel. (503) 286-1600
Contact: Wendy Hammatt

B. All other specialty subcontractors must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.

1. A listing of five equivalent installations including:

   a. Name, address and telephone number of Owner;
   b. Name, address and telephone number of Owner Consultant;
   c. Scope of work.
   d. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.
   e. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.
   f. Documentation necessary to show compliance with Quality Assurance, above

C. Permission to bid does not imply acceptance of the specialty subcontractors. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received, and submittals made, are for control systems that meet or exceed the specifications.

2.2 MANUFACTURERS

A. The dimming and control equipment in this Section shall be a cohesive system supplied and warranted as a system by a single manufacturer and shall be the products of the following pre-approved manufacturers, and shall meet the specifications listed herein:

1. Electronic Theatre Controls
2. Doug Fleenor Design (DMX merger/splitter only)
3. Pathway Connectivity (DMX merger/splitter and fader panel only)
4. Or equal. (No known equal. No substitutions.)

2.3 MATERIALS

A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.

2.4 BLACKBOX THEARE CONTROL CONSOLE

A. Provide the following control console:

1. ETC Element 2 – 6K

B. Provide the following accessories:

1. One (1) ETC Pad RFU units, each with the following accessories:

   a. Shoulder Strap
   b. EETi Stylus Pen
   c. Battery Pack with meter
   d. Office Dock

2. One (1) ETC WAP POE wireless access points, configured as noted below:

a. Mount/install access point on steel plate and attach to tension grid in Studio theatre. Plug into network port mounted to tension grid hanger, provide required network cable.
b. Standards 802.11 a/b/g/n/ac
c. Dual band 2.4 and 5 GHz
d. Wireless data rates up to 300Mbps
e. POE – power over ethernet
f. Setup to work with ETC Pad
g. Black in color.
h. Any lights shall be shut off if in view of audience.

3. Control Room Monitors & Keyboards

a. Provide two monitors for the console.
b. Monitors shall be 22" minimum diagonal color (if supported by console) flat panel display monitors. Provide Dell S2240T Touch Screen Monitor or equal.
c. Monitors shall include vertical and tilt adjustment stand.
d. Provide one keyboard & mouse for each console

4. Power supply and surge protector/UPS capable of maintaining the console and monitor for 15 minutes after power is suspended.
5. Console power and all control cables shall be 25' long.
6. Dust covers for console and all monitors.

2.5 GYMNASIUM CONTROL CONSOLE

A. Provide the following control console:

1. ETC / High End Systems HedgeHog 4X

B. Provide the following accessories:

1. Control Room Monitors & Keyboards

a. Provide two monitors for the console.
b. Monitors shall be 22" minimum diagonal color (if supported by console) flat panel display monitors. Provide Dell S2240T Touch Screen Monitor or equal.
c. Monitors shall include vertical and tilt adjustment stand.
d. Provide one keyboard & mouse for each console

2. Power supply and surge protector/UPS capable of maintaining the console and monitor for 15 minutes after power is suspended.
3. Console power and all control cables shall be 25' long.
4. Dust covers for console and all monitors.

2.6 PRODUCTION LIGHTING RELAY PANELS

A. Provide wall mounted relay panels for production lighting relay circuits.

B. General

1. Panels shall be UL 508, UL924 and UL67 listed and so labeled.
2. The panels shall receive ESTA DMX512-A control protocol. Addressing shall be set via the user interface button keypad with any circuit patched to any DMX control address.

    a. 2,500V of optical isolation shall be provided between the DMX512 inputs and the control electronics as well as between control and power components.

3. Panels shall be provided in 12, 24 or 48 circuits as shown on drawings.

    a. Panel shall support dual and three pole circuits at decreased density where each pole constitutes one of the available single pole circuits
    b. Single, Dual or three pole circuits shall be mixed as required for the circuiting shown on the drawings.

C. Electrical

1. Breakers and relays shall be rated to 100% electrical load.
2. Branch circuits shall be 20a unless noted otherwise.
3. Breaker output lugs shall accept 10-14 AWG dual conductor wire
4. Panel shall be fed by 120/208v Three phase, 4-wire plus ground input feeder.
5. Panels shall include a main breaker. See electrical drawings for breaker sizing.

D. Mechanical

1. The panels shall be set up for wall or flush mounting and supplied with cover.

E. Function

1. Panel shall be user programmable.
2. Circuits shall be individually addressable.

F. Provide with the following Breaker Panel Accessories

1. Ethernet Option shall provide advanced control of breakers over streaming ACN (sACN) and transmit status, control override, and measured energy usage per branch circuit to web browser-based interface or central monitoring interface
2. A Contact Input Option shall allow 24 dry contact inputs to be linked for direct or group breaker control, to activate a preset, or to activate a sequence. Controller software shall allow for normally open maintained, normally closed maintained or momentary toggle.
3. A RideThru Option shall provide short-term power backup of control electronics by automatically engaging when power is lost, and recharging when normal power is present
4. A Tamperproof Hardware Kit shall include center reject Torx head screws to prevent access to panel interior by unqualified individuals
5. Main Breaker options

G. Panel shall be of the same manufacturer as the architectural control system.
H. The wall mount relay panel shall be the Sensor IQ Relay Panel as manufactured by Electronic Theatre Controls, Inc.

1. Black Box Theatre: provide 120V panel
2. Gymnasium: Provide both 120V and 208V as indicated

I. Provide the following options:

1. Ethernet Option
2. 0-10V Dimming Option
3. Contact Input Option
4. RideThru Option

2.7 ARCHITECTURAL LIGHTING RELAY PANELS

A. Mechanical

1. The panel shall be 16-gauge steel, surface or recess mounted and complete with locking door/cover. Inner cover shall prevent access to live components, breakers and/or relays.
2. Relay subpanel shall accommodate single, dual or triple pole breakers and relays in any combination.
3. Relay output lugs shall accept 6-14AWG copper wire

B. There shall be a graphical display user interface with number, directional selection buttons; testing shortcut button for relays and presets, status readout and LED indicators and USB receptacle for uploads/downloads and software updates.

C. Functional

1. Pack setup shall be user programmable.
2. Each relay circuit shall be programable with the following attributes.

    a. Type, Name, Circuit, DMX address, sACN address, Space, Circuit Modes, Normal Latch-lock, Fluorescent, DALI, “On” threshold level, “Off” threshold level, Include in UL924 emergency activation, Allow Manual

3. The panel shall be capable of switching all relays on or off at once, or in a user-selectable delay period of 0.1 to 60 seconds, in 0.1 second increments, per relay.
4. Control electronics shall report the following information per branch circuit:

    a. Breaker state
    b. Relay state
    c. Current draw
    d. Voltage
    e. Energy usage over time

D. Built in Control shall include:

1. From the control panel, stations, or timed events it shall be possible to record up to 16 presets and 16 zones per space for up to 8 spaces per panel.
2. Indication of an active preset shall be visible on the LCD display.
3. The panel shall receive ESTA DMX512-A control protocol.

E. The panel shall have a UL924-listed contact input for use in Emergency Lighting systems. The panel shall respond to the contact input by setting relays to "on", while setting non-emergency relays "off". Each relay can be selected for activation upon contact input.

F. Electrical

1. The panels shall consist of up to (30) single pole standard breakers with (24) relay controllable (Echo)
2. Provide with main circuit breaker, sized as shown on drawings.

G. Provide the following accessories

1. Network Interface
2. Low voltage 0-10V Dimming Control
3. Ride-Thru Option
4. Main Breaker
5. ELV dimmer, as required per architectural lighting design.

H. Provide panels in size capacity for and relays in quantities to support loads as shown on drawings. Provide with appropriate module types for the loads as sch eduled on drawings, it is in the scope of this section to review the electrical drawings and provide the appropriate modes for all installed lighting fixtures circuited to these panels.

I. The wall mount relay panels shall be ETC Echo Relay Panel

1. Black Box Theatre: provide 277V panel

2.8 DRAMA CLASSROOM – PRODUCTION LIGHTING RELAY PANEL

A. The Relay Panel shall be used to control circuits for all production lighting fixture outlets.

B. No interconnection to architectural lighting and/or emergency systems is required.

C. The Relay Panel shall accept DMX from the wall button/slider controls.

1. Mini Panels shall support Class 2, ANSI E1.11-2008, USITT DMX512A control communications
2. Mini Panels shall provide a DMX512A wiring connection using terminal blocks for #24 AWG wire
3. Terminal blocks for Cat5e or better wire shall also be available

D. The Relay Panel shall be configurable via ANSI E1.20 Remote Device Management (RDM). RDM parameters shall include:

1. Device Label – configure a name for the device
2. DMX Start Address –set the starting DMX address of the Zone Controller to a value from 1-512
3. DMX Fail Mode (Data Loss) – configure the Zone Controller behavior when DMX is lost: Hold last look, Wait and fade, Go to full (default)
4. Packet Delay – configure the number of packets required before the zone controller activates a change of level (relay on/off or 0-10V output)

E. Provide ETC UFMP8 - Foundry Mini Panel, 8-circuit, 120VAC.

2.9 BLACKBOX THEATRE - ARCHITECTURAL CONTROL ELECTRONICS

A. Provide control electronics with memory capacity and performance as required to meet the functions within these specifications.

1. The system shall permit control of any dimmer or relay on the system by the Control Console or any other DMX512 controller, or the Preset Panels as specified below on a last action basis.
2. Racks shall be configured to normally exchange data via the Ethernet network, with all programming capabilities granted therein.
3. Two optically isolated DMX512 inputs shall be provided, allowing overlapping or separation of any control level. 2,500V of optical isolation shall be provided between the DMX512 inputs and the control module.
4. The system shall send control signal to low voltage relay panels as specified. Architectural control electronics may be housed within or external from dimmer racks.
5. Provide options/modules as necessary to accept an RS-232 control connection from the AV control system.
6. Mount unit in rack mount control enclosure ERn in the control equipment racks indicated on the drawing
7. Products shall be

    a. ETC Paradigm

2.10 GYMASIUM – SHOW CONTROLLER ELECTRONICS

A. Provide show control electronics with memory capacity and performance as required to meet the functions within these specifications.

1. The Controller shall commence show playback automatically on receiving power without additional external inputs.
2. The controller shall be programmable to support sports event lighting, using simple macro-style playback.
3. The Controller shall support multiple remote modules connected via Ethernet for support of additional show control interfaces, such as contact closures, analog inputs, relay outputs, serial audio input, linear time code, MIDI and DALI.
4. The Controller shall support multiple remote button stations connected via Ethernet for use as triggers and user feedback
5. The Controller shall support multiple streams of linear timecode and audio data within a single networked system.
6. The Controller shall be supported by programming software running on either a PC or Mac platform.
7. Products shall be:

    a. ETC Mosaic – MSC-4

8. Provide the following accessories:

    a. ETC Mosaic- Remote Audio Device MRIO-A
    b. ETC DIN-RM – DIN Rail Rackmount Kit

2.11 EMERGENCY SYSTEMS

A. Provide equipment necessary for emergency lighting systems
B. Emergency Power Transfer Switch

1. All Devices shall be UL1008 listed and labeled.
2. Provide ELTS by Electronic Theatre Controls (ETC), with modules in quantities as required by electrical engineer to support the emergency lighting system.

    a. For local emergency systems serving fewer than 4 circuits, the Branch Circuit ELTS shall be an acceptable alternate.

C. Emergency signal devices

1. All devices shall be UL 924 listed and so labeled.
2. Provide Power loss detection kit

    a. Provide ETC Emergency Bypass Detection Kit (EBDK)
    b. Provide in quantities as required by electrical engineer to support the emergency lighting system

3. Provide DMX emergency signal dedication

    a. Provide DMX Emergency Bypass Controller (DEBC)
    b. Provide in quantities as required to serve discrete emergency DMX lines as required by electrical engineer to support the emergency lighting system.

2.12 BRANCH CIRCUIT EMERGENCY LIGHTING TRANSFER SWITCH (BCELTS)

A. General

1. The BCELTS shall provide automatic transfer of a single branch circuit from normal to emergency power source, when normal power fails
2. The BCELTS shall transfer a lighting load branch circuit from a dimmer/ relay or secondary control output to a second power source in the event of a loss of power to the primary power source, a normal system failure, or activation of a fire alarm
3. The system shall be listed under ANSI / UL1008 Transfer Switch Equipment and comply with ANSI / NFPA 110 Standard for Emergency and Standby Power Systems, and ANSI / NFPA 70 (NEC), including Article 700, 701 and 702 safety standards. Emergency transfer systems that do not comply with the below stated NEC articles and sections shall not be permitted

    a. Satisfies requirements of the National Electrical Code (NFPA 70):
        1) Article 700 – Emergency Systems
        2) Article 701 – Legally Required Standby Systems
        3) Article 702 – Optional Standby Systems
        4) Section 518.3(C) – Assembly Occupancies
        5) Section 520.7 – Theatres and Similar Locations
        6) Section 540.11(C) – Motion Picture Projection Rooms

4. The BCELTS shall transfer a single circuit at 120V or 277V up to 20 Amperes in capacity

B. Transfer Switch

1. The BCELTS shall be a UL1008 transfer switch listed for Emergency Systems (NEC Articles 700 and 701; UL CCN WPWR)

   a. Transfer switches not listed under UL1008 shall not be acceptable
   b. Transfer switches listed under UL1008 for Optional Standby (NEC Article 702; UL CCN WPXT) applications only shall not be acceptable
   c. Automatic Load Control Relays (ALCR) listed under UL924 shall not be acceptable

2. The switch shall be positively latched and unaffected by voltage variations or momentary outages so that constant contact pressure is maintained and temperature rise at the contacts is minimized
3. The switch shall be electrically interlocked to ensure only one position, either Normal or Emergency, is engaged at any time
4. The switch shall be break-before-make to ensure that normal and emergency sources are never interconnected within the unit
5. Built-in fuses shall provide 10,000 Ampere Short Circuit Current Rating (SCCR) on the connected emergency circuit
6. Switch contacts shall withstand transfer without welding, with 180º phase displacement between normal and emergency power sources if both sources are energized
7. Transfer switch contacts shall be rated for mixed loads, including electric discharge lamps and tungsten filament lamps
8. Transfer switch shall be rated for a minimum of 6,000 cycles at full tungsten load

C. Control Circuitry

1. The control circuitry shall direct the operation of the transfer switch
2. A field-configurable normally closed (NC) or normally open (NO) dry contact closure input shall be provided

   a. Up to (10) BCELTS devices may be connected to a single remote loop

3. The BCELTS shall support transfer of a 0-10V or DALI controlled circuit

   a. Upon activation of emergency transfer the BCELTS shall break the 0-10V or DALI control circuit, driving connected 0-10V circuits to full output and DALI circuits to their default level.

D. Operation

1. Transfer to alternate emergency supply will occur when normal supply sense voltage drops below 80V when used at 120V or 277V

E. Enclosure

1. The BCELTS shall be mounted in a NEMA 1 interior type enclosure finished in fine-textured epoxy paint
2. The enclosure shall be 8.5”H x 10.5”W x 2.75”D
3. The system shall be provided with an approved overlay mounted on the front of the enclosure, stating, “BRANCH CIRCUIT EMERGENCY LIGHTING TRANSFER SWITCH”
4. The enclosure shall be provided with an approved label indicating that the system is UL1008 LISTED for Emergency Systems

F. Accessories

1. Provide sensor tap kits so the system senses power loss directly from room lighting power source.

G. Provide the Branch Circuit Emergency Lighting Transfer Switch (BCELTS) SC1008 as manufactured by ETC, Inc in quantities as required by electrical engineer to support the emergency lighting system.

2.13 LIGHTING CONTROL ETHERNET NETWORK COMPONENTS

A. Network general specifications:

1. The lighting control system shall operate on an Ethernet TCP/IP based network, with all components and procedures meeting IEEE standard specification 802.3af-2003, for Power over Ethernet, 10/100BaseT and/or 10/100Base FL.
2. The network shall support multiple consoles, computers, file servers, printers, and architectural processors with discrete command lines and control. The network shall support multiple venues/systems on the same network.
3. Device configuration selection, manufacturing, installation shall be accomplished to assure a flexible and robust system for the prevention of data interruption and ease of User maintenance and diagnostics.
4. ESTA ACN protocol shall be supported.

B. Network Nodes

1. DMX and other lighting control data shall be inserted and retrieved on the Ethernet network via protocol translation nodes.
2. Each DMX Node shall have LEDs for indication of power, network activity, and DMX port configuration. Those LEDs used for DMX port configuration indication shall also indicate the presence of valid DMX/EDMX signal.
3. Network configuration shall be via production lighting control manufacturer’s configuration software. The software shall permit complete user flexibility allowing the system operator to patch DMX data over Ethernet DMX (EDMX), assign node labels for easy identification, assign RFUs to specific systems in multi-system networks, assign DMX offsets and provide DMX port prioritization. Each node shall have a specific IP address provided automatically by the software. The user may edit this IP address. Systems that do not support simple Windows configuration, or systems that do not allow complete reconfiguration of the above-mentioned features over Ethernet shall not be acceptable.

4. All configuration data for each network device shall be held at the device and system operation shall not require continuous on-line operation of the network configuration software.
5. Systems connected to the same network shall be capable of arbitrating control over EDMX data. The system shall be capable of alternating control of individual dimmer data between architectural and production lighting systems without intervention by the user. The user shall dictate the conditions under which system shall automatically take control and the network shall allow user override of the user selected defaults. Systems which require direct user intervention to allocate control of dimmers between architectural and production lighting systems shall not be allowed.
6. The network shall allow multiple DMX inputs assigned to the same EDMX range to be set at different priorities. This shall allow the user to assign high or low priority to each DMX input port in the network on a port by port basis. The network shall require a valid DMX signal present at the input to initiate prioritization. Systems that do not allow for prioritization shall not be allowed.
7. Each DMX Node shall control up to 2048 DMX addresses, within the confines of up to 64 DMX (32,767 EDMX address) "universes". The specific DMX data input or output by the Node shall be freely configurable by the user. Duplicate outputs of DMX lines (DMX splitter) and discrete outputs shall be fully supported. Multiple sources may be combined, and a priority may be assigned to each source. Each DMX line may have its own start address and offset for ease of use. DMX ports shall be configurable for either input or output.
8. Maximum delay time from input to output shall not be greater than one packet time (approximately 30 mSec.). A minimum DMX update rate of 40Hz shall be sustained under all conditions.
9. Power for the nodes shall be provided over the Cat5 cable, as PoE as specified herein. The node electronics shall be electrically isolated from the power supplied over the Cat5 cable.
10. DMX inputs shall be fully opto-isolated from the node electronics and from each other. DMX outputs shall be earth-ground referenced. DMX Ports shall be capable of withstanding fault voltages of up to 250VAC without damage.

C. Control Equipment Rack

1. Provide racks in quantities and locations as shown on drawings.
2. Rack general assembly:

    a. Provide industry standard 19" equipment rack for all necessary control equipment specified herein.
    b. Wall mounting with fixed back plane swing out front section for access. Hinges shall be placed on the side appropriate to the mounting condition. Verify in field.
    c. Mounting brackets shall be 14-gauge steel
    d. Engraved label riveted to the case front with the name of the rack as shown on drawings. Rack label characters shall be ½" high.
    e. Bottom air vents and rear knockouts for conduit entry.
    f. All unused sections shall be covered with vent panels no taller than 2 rack units (R.U.). Racks with more than 2RU of unused sections shall have drawers installed in unused portions.
    g. Rack to be configured as shown on Drawings mounted with all controls within wheelchair chair reach as required by the ADA and local codes.

h. Powder coat finish: Black
i. Body and Back pan shall be 18-gauge Steel
j. Rack rail shall be 11-gauge steel
k. Rack shall be height required to fit all required components.
l. Rack shall be Middle Atlantic Products model DWR, or equal

D. Switches

1. Provide Power Over Ethernet (PoE) 24-port and 12-port 1-Gig Ethernet switches in quantities as required, configured appropriately and suitable for lighting system operation.

a. Any switches outside of the Control Equipment Rack shall be provided in a NEMA enclosure
1) Enclosure shall be labeled on the front with an engraved, lamacoid label reading "LIGHTING CONTROL NETWORK SWITCH"

E. Network Patch Bays:

1. Copper: provide RJ45 patch panels for the termination of copper network taps. Leviton Gigamax series patch bays, or similar, to match specified cable type.
2. Labels

a. Patch bay label shall include each patch space number and corresponding field locations. Label as shown on schedule.
b. Provide typed labels in each patch space label insert as shown on schedule.

3. Label each point as shown on drawings.
4. Provide patch space for each Rack, panel or lighting controller that is not shown on the schedule and provide corresponding label.

F. Provide copper and fiber patch cables as required for the inter connection of the system.
G. Fixed Ethernet Node Gateways

1. Fixed nodes shall be provided in quantities and types required for a complete and operational system.
2. CER network patch port number shall be engraved in the faceplate to identify the network port the unit is connected.
3. Provide ETC RSN-DMX1, 2, or 4 for all DMX gateway devices, in quantities and configurations as shown on drawings.
4. Provide (quantity as needed) ETC RSN-DMX4 Four port gateway with N3GA-RM rackmount kit for LED house light gateway at all control rack locations.

H. Portable Ethernet Nodes

1. Each node shall incorporate two 5-pin XLR type DMX connectors. Output connectors shall utilize female connectors and input connectors shall utilize male connectors, but directionality is re-configurable using the configuration software and connector adapters.
2. Nodes shall incorporate a backlit graphic LCD display for identification (soft-labeling) and status reporting. Labeling shall be user configurable using configuration software.

3. The node faceplate shall be constructed of durable cast aluminum. Faceplates manufactured of plastic shall not be acceptable. Nodes shall be provided in matte black finish.
4. Portable nodes shall be provided mounted in a rugged enclosure with yoke and cast C-clamp for mounting. RJ-45 connector shall be XLR type, Neutrik Ethercon Series Connectors.
5. Each node shall be supplied with one 10' Cat5 patch cable with XLR type, Neutrik Ethercon Series Connectors.

    a. Provide six (6) portable node assemblies.
    b. Each node shall be supplied with one 10' Cat5 patch cable with XLR type, Neutrik Ethercon Series Connectors.
    c. Provide industry standard roadcase with casters and handles. Provide with individual compartments for nodes, and storage compartment for cables.
    d. Provide with black safety cable.

2.14 CONTROL RECEPTACLE PANELS

A. General

1. The control receptacle panels shall consist of the appropriate connectors required for the system this Project.

B. Connectors

1. The control receptacle panels shall include for following connector types, per industry standard:

    a. RJ-45 XLR type, Neutrik Ethercon Series Connectors to match specified cable type, configured to accept standard RJ-45 connectors.
    b. 5-Pin male and female XLR connectors for DMX input/output per industry standard
    c. 120VAC Edison convenience power outlets with integral surge-protector.
    d. Other receptacle types as appropriate per manufacturer's standard features.

C. Physical

1. Faceplates shall be .080" aluminum, edges eased, finished in fine texture, scratch-resistant powder coat, with fasteners countersunk.

    a. Panels specified as flush mounted shall overlap back box by 1/2". Surface mounted panels shall match back box size with no gaps or overlap.
    b. Provide all back boxes and coordinate mounting with Div. 26.

2. Color shall be black unless otherwise noted.
3. Panels noted as custom color shall be factory powder coated a color selected by the Owner's Representative. Engraving shall be filled a contrasting color.
4. Engraved and filled labels 1/8" high characters minimum, filled shall be white unless otherwise noted.

a. Network taps and node gateways shall be labeled per the patch bay location and point number as shown on schedule.

5. Wall mounted panels shall mount into an industry standard back box, depending on size and quantity of connectors. A terminal block shall be supplied for terminations.
6. Rack mounted panels shall mount within industry standard equipment racks. Provide local breaker for integral AC power receptacle per Code.
7. Panels mounted in floor boxes shall include a clear flexible vinyl dirt guard as shown on drawings. Guard shall cover receptacles but not labels.
8. Provide complete hardware for mounting on gridiron or catwalk hangers where shown per the Drawings.

2.15 ARCHITECTURAL CONTROL PANELS – BLACKBOX THEATRE

A. Architectural control panels shall be able to control any of the following:

1. Theatrical lighting dimmers / relays
2. Architectural lighting dimmers, relays and non-dims

B. Architectural control panel wiring shall be digital, low voltage wiring that shall be topology free. Panels shall be interactive with each other as described herein.

C. Physical

1. Faceplates shall be .080” aluminum, edges eased, finished in fine texture, scratch-resistant powder coat, with fasteners countersunk.

a. Panels specified as flush mounted shall overlap back box by 1/2”. Surface mounted panels shall match back box size with no gaps or overlap.
b. Provide back box and coordinate mounting with Div. 26.

2. Color shall be black unless otherwise noted.
3. Panels noted as custom color shall be factory powder coated a color selected by the Owner’s Representative. Engraving shall be filled a contrasting color.
4. Engraved and filled labels 1/8” high characters minimum, filled shall be white unless otherwise noted.
5. Wall mounted panels shall mount into an industry standard back box, depending on size and quantity of connectors. Back boxes shall not exceed 4” in recess depth. A terminal block shall be supplied for terminations.
6. Rack mounted panels shall mount within industry standard equipment racks.

D. LCD Touchscreen

1. Rear illuminated LCD touch screen with all standard advertised features.

a. Acceptable devices:
1) ETC Unison Paradigm LCD touch screen

2. Provide, immediately adjacent to LCD Panel:

a. One illuminated, momentary contact "ENTRY PANEL LOCKOUT" pushbutton. The pushbutton shall cause Theatre one-button panels to be inoperative when pressed once and all “LOCKOUT” pilot lights shall illuminate. The pushbutton shall remain lit so long as the "LOCKOUT" status is maintained. “LOCKOUT” status shall be activated or deactivated at any “LOCKOUT” pushbutton, regardless of the last action. Action on an illuminated pushbutton in “LOCKOUT” mode will release the preset panels for operation and the pilot light shall go out. Action on the lockout button shall not cause any change in level status. This button shall have no effect on the controls outside of the Theatre.
b. One on/off button to turn on general worklights and rehearsal lights to be programmed at time of commissioning

E. LCD Panel Operations

1. The following should be used as a basis for the initial soft programming of the architectural control stations. The configuration shall be verified with the Owner’s Representatives at time of commissioning.
2. Request an updated button programing sheet from the theatre consultant before commissioning.
3. LCD panels shall be programmed with soft pages for access to various areas and levels of control.

a. Virtual pushbuttons shall indicate state by a change in appearance. Controls shall be though various pages of controls.
b. Access shall be divided into two security levels minimum. The panels shall “home” to a first level of access which allows the User to play presets changing the levels of the areas shown on the display, without login. The first level of access shall not allow the programming of presets.
c. The program function shall become available as a “record” button on the same preset playback screens upon login to the second level with a four-digit pass code on a virtual keypad. The pass code shall initially be set as “4100”. The login screen shall be a back page visible as a first level page choice and shall include a “logout” pushbutton which shall return the panel to the first level. “Logout” from the second level shall automatically occur after 30 minutes of inactivity.
d. The LCD shall be used to program the multi-button and one-button pushbutton preset panels.
e. The system shall allow the programming of presets and macros through a “snapshot” procedure. Levels shall be set by the control console, by soft sliders at the LCD panel or at the dimmer rack and then captured as a preset to be replayed at any one of the preset buttons.
f. The first page shall be called “House Presets” and shall contain the same number and function of preset buttons as the multi-button preset stations specified herein.
g. The second page shall be called “Work/Reh” and shall have buttons for the various areas of the theatre’s technical areas and the rehearsal groups. The work light buttons shall include control the low voltage relay circuits as well as production circuits selected as rehearsal lights.
h. The third page shall be called “Show Presets” and shall include ten buttons, named as directed by the Owner’s Representative at time of programming.
i. The next page shall only be visible at the second security level and shall be used to program the one-button entry stations.

j. The next pages shall include sliders for each architect control group as listed in the architectural lighting dimming schedule.
k. The general lock screen shall display a "splash" image as provided by the Owner's Representative.

F. Portable LCD Touchscreen Panel

1. Portable touchscreen shall be a tabletop unit with integral folding cover/stand or protective case.
2. Operations shall be as specified above for LCD or Touchscreen Panels.

a. Exception: Entry station lockout and on/off button shall not be included in this panel.

3. Power and control data shall be carried in a single CAT cable with RJ45 network connection. Cable shall be detachable.
4. Quantity: Provide (1) panel assembly
5. Cables: Provide one 10'-0" cable, one 25'-0" cable, and one 100'-0" cable.

G. Multi-Button and One-Button Panels

1. Pushbutton stations shall include programmable buttons with integral LED indicators.
2. Multi button panels shall include a card holder with slide-in tags and clear cover for User labeling.

H. Preset Panel Operations

1. The system shall allow the programming of presets and macros through the LCD as described above.
2. Action on any one button shall cause all identical pushbutton indicators on other panels to mimic the preset state.

2.16 PRODUCTION LIGHTING CONTROL PANELS – GYMNASIUM

A. Touchscreen control panels shall be able to control show controller playbacks only.
B. Architectural control panel wiring shall be digital, low voltage wiring that shall be network/POE based. Panels shall be interactive with each other as described herein.
C. LCD Touchscreen

1. Rear illuminated LCD touch screen with all standard advertised features.

a. Acceptable devices:
1) ETC M-TS5-x Mosaic 5-inch touchscreen

b. At Gym Floor: place touchpanel in AV control panel enclosure. Coordinate with AV integrator.
c. At Gym Control Position: place touchpanel in table-top enclosure with 15' LAN extension.
1) Provide Extron Electronics SMB112 series enclosure (or similar) to match.

D. LCD Panel Operations

1. Provide programming services to allow up to (20) playbacks. Exact playbacks will be determined during commissioning, but may include events such as:

a. Game start / Team Intro (multiple versions)
b. Halftime (multiple versions)
c. Time Out (multiple versions/lengths)
d. Events for other sports

2.17 DRAMA CLASSROOM – DMX CONTROL

A. Provide a wall-mounted button panel for simple preset recall.
B. Each button shall be able to recall a pre-programmed look. All buttons shall be capable of turning on or off individually, so that several looks may be stacked to create a scene.
C. Locate PSU for unit in same enclosure as DMX merger/splitter.
D. Provide Pathway Connectivity:

1. Vignette Wall Station modules per drawings
2. Vignette Architectural Gateway with DMX output
3. Enclosures/interfaces/accessories as needed for a complete system

2.18 WIRING DEVICES

A. Provide power distribution wiring devices in the quantities, types and configurations as shown on drawings. All back boxes shall be supplied by production lighting contractor and manufacture.
B. Devices shall be fabricated from 18 gauge cold rolled steel with 16 gauge covers, finished with flat black powder coat unless otherwise noted. Devices shall be UL listed and labeled for the use specified herein.

1. Back box shall not exceed 6-1/2” high x 4” deep x the widths as shown on drawings.
2. Panels specified as flush mounted shall overlap back box by 1/2”. Surface mounted panels shall match back box size with no gaps or overlap.

C. Receptacles and connectors shall all be of the same manufacturer and be fully black.

1. Connectors of the same type shall be of the same manufacturer throughout the project to minimize maintenance stock.
2. 120VAC Connector type: Provide 20A theatre industry standard 3-pin connectors throughout for standard devices.
3. 208VAC Connector type: Provide 20A theatre industry standard Twist-Lock connectors throughout for standard devices.

a. Connectors shall be Bates, Union, Pro-Pin or equal

D. Receptacles and connectors shall be factory pre-wired to internal feed through terminal blocks and grounded. All wiring and terminals shall be factory numbered. Size all lugs as required based on wire size indicated on the Electrical Drawings. Provide for dedicated neutrals within each device and homerun. Terminals shall be clamp-type compression terminals appropriately listed.

1. All parallel circuits, if applicable shall homerun to the dimmer rack or relay panel, unless otherwise noted.

E. Circuits shall be labeled with engraved lamicoid tags with 1/2" high characters securely riveted to the box and plainly visible. Label color shall be:

1. Production lighting circuits, 120VAC: black tags with white core.
2. Production lighting circuits, 208VAC: blue tags with white core.

F. Provide with all necessary mounting hardware as shown on Drawings and as required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Advise Div. 26 for the proper installation of the dimming and control equipment specified herein.
B. For the commissioning services as listed herein only, coordinate scheduling and access with the Contractor and Owner and provide personnel lifts or ladders as required for access to the lighting equipment.
C. For the commissioning services as listed herein only, remove all packing materials from the jobsite. Insert operations and maintenance information into the project record documents as specified above in Submittals.

3.2 COMMISSIONING AND DEMONSTRATION

A. Coordinate with Division 26.
B. Factory trained and authorized personnel shall review, test, program and otherwise complete the system, providing that the system and all components are fully functional per the Documents and fully covered under the Manufacturer's warranty.

1. It shall be under the work in this section to provide turnkey proper and logical programming of the lighting control systems.
2. It shall be under the work in this section to coordinate the proper and logical programming of the low voltage relay panel supplied under Division 26.

a. The low voltage panel shall be programmed so the control groups of branch circuits match the control and indication on the architectural control panels provided and programmed under this section.

C. Upon completion of the installation, the Contractor shall notify the Owner's Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner's Representative's schedule.

D. Provide to the Owner's Representative the following upon arrival:

1. All Ethernet wiring shall be tested at Category 5 and certified for full bandwidth operation.

E. Make available for review by the Owner's Representative:

1. All components for physical inspection and inventory.
2. All installed controls shall be operational.
3. All portable controls shall be operational at all plug in locations.
4. Demonstration of input and output of lighting control data throughout the data distribution system.
5. All distribution shall be checked for continuity, grounding and polarity.
6. Simulation of dimmer rack failure and power outage conditions.

F. The Contractor shall be liable for any return visits by the Owner's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the Owner's Representative to carry out their work.

G. The Contractor shall arrange for access as necessary for inspection of equipment by the Owner's representatives.

H. Upon completion of the commissioning, the factory trained and authorized personnel shall demonstrate operation and maintenance of the system to the Owner's representatives. Coordinate with the Owner's Representative's schedules two weeks in advance minimum.

I. Provide training as follows:

1. Two days during commissioning period for Owner's forces.
2. One day with Owner's forces one month after initial training.
3. One day with Owner's forces one year after initial training, but prior to warranty expiration.

J. Training shall include, but not be limited to:

1. Safety precautions.
2. Identification of all elements provided under this section.
3. Maintenance, diagnostics and trouble shooting.
4. Control operation training of the console, dimming and control electronics.
5. Operations and maintenance manual orientation.

3.3 APPENDICES

A. This specification is not complete without the following appendices:

1. 11 61 83A: Pushbutton Programming Guide<
2. 11 61 83B: Touchscreen Layout<

END OF SECTION

SECTION 116200 – MUSIC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Music Equipment materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 06 10 00 ROUGH CARPENTRY (Blocking)
   5. 09 29 00 GYPSUM BOARD
   6. 09 65 10 RESILIENT BASE AND ACCESSORIES
   7. 09 72 00 WALL COVERINGS
   8. 09 91 00 PAINTING
   9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   10. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Submit manufacturer's full color range (including any standard and premium colors) for selection by the Architect.
   2. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Samples.
      a. Provide a sample of each color and pattern selected.
   4. Quality Assurance/Control Submittals:
      a. Manufacturer's Written Instructions:
         1) Submit three (3) copies of manufacturer's written instructions.
   5. Closeout Submittals in accordance with the following:
      a. Warranty in accordance with Specification Section - WARRANTIES.

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.

2. Manufacturer/Supplier Qualifications:
   a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be individually wrapped.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six [**6**] inches above ground, allowing air circulation under stacked units.
   a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.5 PROJECT CONDITIONS

A. Environmental requirements:
1. Temperature: Maintain ambient temperature in space to receive products between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit for seven (7) days prior, during, and seven (7) days minimum following installation. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.
2. Humidity: Maintain humidity in space to receive products between 6 percent to 9 percent for four (4) days minimum prior, during, and following installation in accordance with manufacturer's recommendations. Inform the Owner of humidity requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.6 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer:
      a. Instrument Storage Cabinets WENGER CORPORATION.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. Instrument Storage Cabinets:
   1. Design: AcoustiCabinets.
   2. See schedule and drawings for configuration and quantities.
   3. Grille Doors.
      a. Waterfall Design.
      b. Bolt-through construction for door hardware.
      c. Solid steel lock bars.
      d. Owner shall provide all locks.
   4. Polyethylene grooved shelves that are wear-resistant and won’t damage instruments and cases.
   5. Tamper-proof hardware.
   6. Hinges and doors shall be dynamic load-tested at over 300 lbs.
   7. Cabinets shall be designed with built-in ventilation.
   8. Backing: Acoustically absorptive material.

2.3 FINISHES

A. Shop Finishing:
1. Laminate Color:
a. WILSONART, for Color refer to APPENDIX "B": INTERIOR COLOR SCHEDULE
2. Edge Banding:
a. Manufacturer's standard as selected by the Architect. Refer to APPENDIX "B": INTERIOR COLOR SCHEDULE
3. Hardware, Painted Grille and Fasteners:
a. Manufacturer's standard as selected by the Architect. Refer to APPENDIX "B": INTERIOR COLOR SCHEDULE

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
a. Verify that appropriate blocking is provided behind finished wall surfaces for cabinets, system storage, and wall brackets.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.

2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.
3. In accordance with manufacturer's written instructions and recommendations.

3.5 PROTECTION

A. Protection from traffic:
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 116600– ATHLETIC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 05 12 00 STEEL AND FABRICATIONS
   5. 09 64 66 RESILIENT WOOD FLOOR
   6. 09 91 00 PAINTING
   7. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   8. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. In accordance with the following:
   1. CIF California Interscholastic Federation.
   2. NCAA National Collegiate Athletic Association

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Shop Drawings.
      a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
         1) Where installed products are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and stamped by a registered Civil or Structural Engineer in the State of California.
      b. Custom Graphic Wall Padding samples:
         1) Submit one reduced scale color proof showing the overall image of each mural for approval prior to manufacture.
         2) Submit 24" x 24" min. ground full strike-off at full scale of each mural design for approval prior to manufacture.
   2. Quality Assurance/Control Submittals:
      a. Manufacturer's Written Instructions:
         1) Submit three (3) copies of manufactuer's written instructions.
   3. Quality Assurance/Control Submittals:
      a. Manufacturer's Written Instructions:
         1) Submit three (3) copies of manufacturer's written instructions.

b. Engineering Calculations:
   1) Submit four (4) copies of engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.

1.4 Closeout Submittals in accordance with Specification Sections in Division One:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
   c. Project Documents in accordance with Specification Section - PROJECT DOCUMENTS.
   d. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Equipment Qualifications:
      a. Manufacturer's catalog numbers shall constitute basic requirements for each item.
      b. Equipment shall incorporate all features set forth in catalog for standard items, except for such modifications thereto as may be indicated.
   2. Installer Qualifications:
      a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
   3. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:
   1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
      a. Coordinate the work with all other related work.
      b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
   2. Progress: Scheduled by the Contractor during the performance of the work.
      a. Review for proper installation of work progress.
      b. Identify any installation problems and acceptable corrective measures.
      c. Identify any measures to maintain or regain project schedule if necessary.
   3. Completion: Scheduled by the Contractor upon proper completion of the work.
      a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
      b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 PROJECT CONDITIONS

A. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.7 SCHEDULING

A. Custom Graphic Wall Padding: Verify lead time with manufacturer. Assume no less than (14) week lead time from approved submittals.

1.8 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty for Glass Backboards:
a. Warranty Period Twenty (20) Years.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty Period One (1) Year.
b. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.

1.9 OWNER’S INSTRUCTIONS

A. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below:
1. Test and adjust controls and any safeties. Replace damaged or malfunctioning controls and equipment.

1.10 MAINTENANCE

A. Maintenance Service:
1. The installer shall maintain a regular service facility within a 200 mile radius of the area in which the project is located and shall furnish regular maintenance service on products installed under this contract for a period of one year after completion.
2. The installer shall be able to offer the owner agreement for continuing maintenance after expiration of maintenance period provided under the contract.
3. All work shall be done during regular working hours of regular working days.
4. The work shall include regular examinations by trained employees and shall include all necessary adjustments, lubrication if any, and parts to keep the products in operation, except parts made necessary by misuse, accidents or negligence by parties other than the athletic equipment installer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer:
      a. Specified Indoor backstop, backboard, goal, Wrestling Mat Lifter, Gymnasium Curtain Divider (Horizontal Sliding) and wall padding product manufacturer:
         1) PORTER ATHLETIC EQUIPMENT from SOUTHWEST INTERIORS, INC.
      b. Specified Vertical Rolling Gymnasium Curtain Divider product manufacturer:
         1) DRAPER, INC.
      c. Specified Outdoor basketball backstop, backboard and goal product manufacturer:
         1) L.A. STEELCRAFT.
      d. Specified volleyball and badminton floor sleeve insert product manufacturer:
         1) SENOH from SPORTS IMPORTS, INC.
      e. Specified Weight Room Floor Pads:
         1) PAWLING CORPORATION
      f. Specified Ballet Bar product manufacturer:
         1) GIBSON GYMNASTICS.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. Indoor Basketball Equipment:
   1. Backstops:
      a. Main Court Model #90950000W forward fold backstops.
      b. Practice Court Model #90949000W forward fold backstops.
      c. Overhead Supports:
         1) Fastening and intermediate supports as required by manufacturer to adequately suspend from the building structure above.
      d. Operation:
         1) Model #00706000, 3/4 HP, 13 amp, 115V, 60 cycle, single phase, worm gear motor.
         2) Drum: Manufacturer's standard compatible with motor and warranty requirements.
         3) Cable: Manufacturer's standard compatible with motor and warranty requirements.
         4) Automatic stop at "up" "off" and "down" position.
         5) Separate key for raising and lowering operation "safety feature."
      e. Safety Straps:
         1) For each backstop.

2) Model No. 10797100 Saf-Strap Safety Lock.
3) Fully automatic reset requiring no poles, ropes, levers or buttons.

2. Backboards:
   a. Main Court Model #00204000.
      1) Rectangular 6 foot x 3 foot 6 inch tempered float glass backboard with brushed aluminum frame.
      2) Tempered Glass backboards to have safety padding around edges, Model #00227000.
   b. Practice Court Model #00228300.
      1) Rectangular 6 foot x 3 foot 6 inch thermally fused melamine resin surfaces on both sides of a solid laminated wood core board.
      2) Woodcore backboards to have safety padding around edges, Model #00229000.
3. Goals in accordance with NCAA:
   a. Tempered Glass Backboards: Collapsible goal, "no tie" net clips, Model #00243500, with 100 percent Nylon "Anti Whip" net.
   b. Woodcore Backboards: Collapsible goal, "no tie" net clips, Model #00225000, with 100 percent "Anti Whip" net, or approved equivalent.

AD1-SP05 Refer to Specification Section 116600 ATHLETIC EQUIPMENT

1. Add the Article 2.2, A, 4.

*4. **Basketball Shot Clock Support**:*
   a. Porter SCS00312 for 6-5/8" Dia. Backstop Mast.
   b. Provide at each basketball backstop.

2. Omit Article 2.2, B, Outdoor Basketball Equipment.

B. Outdoor Basketball Equipment: PORTER STEELCRAFT:
1. Straight Single Basketball Post Model # 1256.
2. Straight Double Basketball Post Model # 12056.
3. Backboards Model # 01X.
4. Goals Model # SD-4.

C. Wresting Mat Lifter:
1. Stationary Wall Supported Mat Mover, "PORTER ATHLETIC EQUIPMENT"
   • (916)268-0620, Model # 91101150N, 208V, AC, 3-phase with Key Switch. Mat Lifter shall consist of two (2) independent, steel frame sub-assemblies with drive and lifting mechanisms enclosed. Unit shall be a two cable system to assure balanced operation. Cables shall be attached to a load bar, which shall be connected to a fabric sling. Standard unit, load bar, and sling shall be capable of supporting a standard 45' x 45' wrestling mat (weighing approximately 1 lb/sq.ft.).
2. Each hoist shall be driven by two (2) heavy duty 1 HP cycled electric motors with integral 6 lb./ft. brake mechanisms and automic overload protection, attached to a 200:1 ration gearbox assembly operating with 208V, in 3 phase. Lifting and lowering speed shall be approximately 8.5 feet per minute.
3. Lifting drums shall be machine synchronized for cable wrap and driven by a 200:1 ratio gearbox. Drum shall be 4" diameter. Two steel lift cables shall be 5/16" 6-strand, 37 wires per strand, fibre core, 4.26 tons breaking strength.
4. Load Bar shall be connected to a 22 oz. per square yard vinyl fabric sling with heavy duty straps and fasteners. Color of sling as selected by the Architect. For safety purposes, sling capacity shall govern the lift capacity of the system.
5. Movement control shall be key switch control with limit switches.
6. Structural support members and wall connections shall meet the building and unit requirements.

D. Wall Padding:
1. Type 1: Wall Wainscot Padding shall be PORTER #00506-0XX (2-1/4" thick) bonded foam filler (firm), 4lb density, or approved equivalent.
   a. Size: Refer to Interior Elevations:
      1) Panels to be 2'-0" wide by 6'-0" high.
      2) Panels to be 2'-0" wide by 8'-0" high.

b. Panels will be constructed of filler bonded to 3/8" plywood backing board and covered with flame retardant, vinyl-coated Nylon fabric, folded and stapled securely to back of plywood.
   1) A 1" nailing margin shall be provided to top and bottom for securing panels to the wall.
c. Vinyl coated nylon covering (color to be selected by Architect from manufacturer's standard color list) shall have a certificate of flame resistance from the State of California (Registered Fabric No. F-140).
d. The cover material shall have a tear strength of 100 psi and shall be mildew and rot resistant and fortified with an infection combating fungicide.
e. All cutouts in panels shall be made in the field to fit job conditions.
f. Panels must be inspected before installed. Follow manufacturer's written recommendations for proper installation standards. All panels shall be plumb and flat across the visible surface (no concave voids or convex bulges).

2. Type 2: Custom Graphic Wall Wainscot Padding shall be PORTER "DuraSafe #560280xxSP" 2-1/4" thick) bonded foam filler (firm), 4lb density, or approved equivalent.
   a. Size: Refer to Interior Elevations.
      1) Panels to be 2'-0" wide by 6'-0" high.
      2) Panels to be 2'-0" wide by 8'-0" high.
   b. Panels will be constructed of filler bonded to 3/8" plywood backing board and covered with flame retardant, vinyl-coated Nylon fabric, folded and stapled securely to back of plywood.
      1) A 1" nailing margin shall be provided to top and bottom for securing panels to the wall.
   c. Vinyl coated nylon covering (color to be selected by Architect from manufacturer's standard color list) shall have a certificate of flame resistance from the State of California (Registered Fabric No. F-140).
      1) Custom Artwork to be provided by Architect. Refer to Drawings.
   d. The cover material shall have a tear strength of 100 psi and shall be mildew and rot resistant and fortified with an infection combating fungicide.
   e. All cutouts in panels shall be made in the field to fit job conditions.
   f. Panels must be inspected before installed. Follow manufacturer's written recommendations for proper installation standards. All panels shall be plumb and flat across the visible surface (no concave voids or convex bulges).

E. Gymnasium Curtain Divider (Horizontal Sliding) by PORTER:
   1. Provide Model # 90640000 Track Type Walk Draw Gymnasium Divider Curtain.
   2. Curtain Material:
      a. Low section of curtain up to 8'-0" above finished floor shall be solid "Flexivide" material, electronically welded. All hems and pockets on curtain shall be double needle lock stitched seams. Color shall be as selected by the Architect.
      b. Upper section of curtain from 8'-0" up to 28'-0" above finished floor shall be mesh "Flexinet" material, designed with an approximate 80% to 85% open area for air transfer. Material shall be a 7 x 5, 1000 denier polyester base fabric, with a flexible PVC coating and a finished weight of 7 oz. Per square yard. Fabric shall meet Fed. Spec. Std. #191, Method 5903.2, vertical fire retardant requirements. Color shall be as selected by the Architect.
      c. Top hem of curtain shall be 2-3/4" wide, solid material with 3/8" inside diameter metal spur grommets spaced on 12" on center. Color shall be as selected by the Architect.

3. Track material shall be enclosed, formed channel type to protect rollers from collecting dust, etc. which could hinder the free operation of the curtain. Track shall be heavy duty type, 16 gage galvanized steel suspended from building structure at centers not to exceed 8'-0" on center. Support hardware shall be of heavy duty high tensile ductile iron, clamp type castings or other heavy duty supports as prescribed by building conditions and divider locations.
4. Carriers shall be four wheel ball bearing, swivel type master carriers located at each end of curtain. Intermediate carriers shall be spaced on 12" centers and shall be 1" diameter, dual nylon rollers with swivel type hook for attachment of electronically welded and plated, #4 twist line coil chain and S-hooks for attaching to grommets on top hem of curtain with bottom hem hanging approximately 3" above floor.
5. Each end of divider shall b4e equipped with 3/4" snap swivel and wall mounted screw eye for securing to wall. Vinyl nylon strap with snap swivel shall also be provided to secure curtain against wall when not in use.
6. Curtain shall be provided with 1/2" of fullness per foot of room size to allow curtain to easily extend from wall to wall without stretching taunt (example - on a 50' wall to wall dimension the actual curtain length total of both halves would be 52'-1").
7. Curtain stack area - each foot of length (actual curtain length) requires 1" of stack area. Curtain shall be provided in two sections (bi-parting) allowing one half of the curtain to be stacked on each side of the room.

F. Gymnasium Curtain Divider (Vertical Rolling):
1. "Top Roll Gym Divider" • as manufactured by DRAPER, INC., or approved equivalent.
   a. See drawings for Opening Width and Height.
2. Cradle Assembly:
   a. Clamp type malleable, or heavy gage, stamped lug fitting suitable for the curtain size and model number, suspended from the structure above at right angles to the main beams, and approved by DSA.
   b. Refer to drawings for Beam Flange width and thickness.
3. Front Roller:
   a. Rolling action shall be from the top, and shall be achieved without the use of belts and or cables.
   b. Drive pipe shall rotate in precision laser cut and formed drive pipe assembly, located no more than 10' on center from the clamp assembly above attached to the building structure in a manner approved by DSA.
   c. Drive pipe support assembly shall be compact to allow for stored dimension of approximately 14" curtain roll and drive tube shall be kept in place by safety trolley.
   d. Curtain shall roll at a rate of approximately 21 feet per minute.
   e. Drive Pipe Power Mechanism:
      1) 1 H.P., 110-120V AC, 60 cycle, single phase, reversible capacitor motor with built-in thermal overload protection.
         a) Circuit Breaker Rated Amp 20 amp.
         b) Fused Circuit Rated Amp 20 amp.
      2) Minimum Wire Size:
         a) 90' to 140' run 10 gage.
      3) The motor and load holding worm gear reducer shall provide speed reduction in the winch.
      4) Curtain winch shall include limit switches to control the upper and lower limit of the curtain travel.
      5) Winch shall be located at one end of curtain and be external of drive tube to allow for proper cooling and eliminate nuisance thermal overload tripping.
      6) Key Lock, three position, momentary contact wall switch with safety delay included.

7) Switch unit shall fit in a general purpose masonry style switch box and shall be provided with a polished stainless steel wall plate.
8) Key switch or controls shall be in full view of both sides of curtain during operation.

4. Curtain:
   a. Lower Dimension:
      1) Solid Vinyl coated polyester, 22 oz. per square yard.
      2) Color as selected by Architect form standard colors available.
      3) Flammability:
         a) Shall be rated as self-extinguishing by the California State Fire Code and Class A Rated in accordance with NFPA-101.
   b. Upper Dimension:
      1) Weaved Vinyl coated polyester, 9 oz. per square yard.
      2) Color as selected by Architect form standard colors available.
      3) Flammability:
         a) Shall be rated as self-extinguishing by the California State Fire Code and Class A Rated in accordance with NFPA-101.
   c. All seams shall be electronically welded with a 1" full contact weld.
      1) All seams shall be horizontal to allow for even roll of vinyl around drive tube.
      2) Outer edge hems shall be turned with welds.
   d. Curtain shall be rolled on a 5" diameter drive tube to which the top edge of the curtain is secured.
   e. Bottom edge of curtain shall have a 6" wide pocket to accommodate the Bottom Batten.
5. Bottom Batten:
   a. Provide 1-5/8" diameter galvanized steel pipe round batten.

G. Volleyball and Badminton Floor Inserts:
1. As manufactured by SENOH:
   a. Sleeve Model #KA25S.
      1) Steel sleeves, suitable for casting into concrete footing and set into non-shrink grout.
      2) Sleeve barrel shall be 0.140 inches thick and have a 3 inch inside diameter.
      3) Barrel base shall have concrete flanges.
      4) Sleeve screw-down plate flange), at top of sleeve shall be 0.078 inches thick and have 3 pre-drilled and threaded holes for fastening sleeve to floor plate during installation.
      5) Overall depth of sleeve shall be 8.92 inches.
      6) Depth of sleeve when attached to floorplate shall be 9-15/16 inches.
   b. Oversize Floorplate Model #KA250.
      1) Solid cast brass with hinged access cover capable of rotation at least 120 degrees from horizontal to allow desired pole to slip into sleeve (removable or threaded copies not acceptable).

H. Weight Room Floor Pads as manufactured by PAWLING CORPORATION, or approved equivalent:
1. Floor Pads "Protect-O-Pad."
   a. Heavy-duty premium-grade recycled rubber, Model # P-80, Interlocking, Modular Floor System, interlocking tiles, 4' x 4' centers with 2'x 4' beveled borders, and 2' x 2' beveled corners, thickness 1/2", 45 lbs/pad, passing MIL-M-15562F and UL 94 hb, with a static coefficient of friction as follows: Dry – 0.84, Wet – 0.90, ASTM D 2047 "Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine."

1) Color: Black.

I. Ballet Bars:
1. Double Wall Mounted Ballet Barre, as manufactured by GIBSON GYMNASTICS, or approved equivalent:
a. 1-1/2 inch diameter sanded Poplar rails, with chrome plated mounting brackets attached to the barre and the wall.
b. Bottom Barre extends 4 inches from the wall while the Top Barre extends 6 inches from the wall. Barres are to be spaced 8 inches apart.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work specified under this specification section.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
a. Follow manufacturer's written instructions for the installation of volleyball and badminton sleeve inserts for resilient wood floor over concrete slab-on-grade.
b. Follow manufacturer's written instructions for proper curing time and protection during the sleeve insert set-up time.

c. Separate the floorplate from the sleeves in accordance with the manufacturer's written instructions after the proper cure time so that the floorplates "float" separately from the sleeves.

2. In accordance with approved shop drawings.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.

3.4 ADJUSTING

A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.

3.6 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.
1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
a. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.
b. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance.
c. Review data in "Operating and Maintenance Manuals." Refer to Specification Section - PROJECT CLOSEOUT.

END OF SECTION

SECTION 116643 – SCOREBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material. labor, equipment and services necessary to completely install all Scoreboard materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 05 12 00 STEEL AND FABRICATIONS
   6. 07 40 00 METAL PANELS
   7. 09 22 16 METAL FRAMING
   8. 12 66 13 TELESCOPING BLEACHERS
   9. FACILITY SERVICES SUBGROUP for power & data at each electrified item.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
   2. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Quality Assurance/Control Submittals:
      a. Manufacturer's Written Instructions:
         1) Submit three (3) copies of manufacturer's written instructions.
   4. Closeout Submittals in accordance with Specification Sections in Division One:
      a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
      b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
      c. Project Documents in accordance with Specification Section - PROJECT DOCUMENTS.
      d. Warranty in accordance with Specification Section - WARRANTIES.

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:

a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.

2. Manufacturer/Supplier Qualifications:

a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the Work.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted.

B. Storage and protection: Products shall be stored in locked storage building.

1.5 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:

a. Warranty Period One (1) Year.

2. Provide manufacturer's special warranty to begin upon date of substantial completion against defects in workmanship or material, and that the manufacturer will replace or repair without cost to the Owner all items associated with the scoreboard system.

a. Warranty Period Five (5) Years.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES:

a. Warranty period One (1) Year.

1.6 OWNER'S INSTRUCTIONS

A. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below:

1. Test and adjust controls and any safeties. Replace damaged or malfunctioning controls and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer, or approved equivalent:
      a. DAKTRONICS.
      b. Acceptable alternative manufacturers:
         1) ALL AMERICAN SCOREBOARD.
         2) NEVCO.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 CENTER-HUNG SCOREBOARD

A. General:
   1. Approximately 12' W x 7'H.
   2. Model Number LVN-3000-336x588-5.9MN-MA-CNTLRM-SR-LT

B. Video Displays:
   1. Matrix: 336 lines by 588 columns.
   2. Line Spacing: 5.9 mm.
   3. LED Color: RGB.
   4. Cabinet Dimensions: approx 6'-10"H x 11'-9"W x 6"D.
   5. Max Power: 4800 watts per display.
   6. Weight: 468 lbs per display.

C. Floor Frame and Shrouding:
   1. Floor: Canvas or Sheet Metal.
   2. Lower Sling:
   3. Shroud Decoration: 4 sides.

D. Input:
   1. Video Input: DVN/LVN Control-1 video input (Primary/Backup Player & Display Interface) with Laptop
   2. Real Time Data Input:

E. Control Console:
   1. All sports control console kit.

F. Accessories:

AD1-SP06 Refer to Specification Section 116643 SCOREBOARDS.

1. Refer to Article 2.2 Center-Hung Scoreboard. Refer to the Control Consult and add the following:
   - All Sport Pro software is installed on a laptop or tablet.
   - Show Control Computer
   - Handheld Timing Switches with Scoring Interface.
2. Refer to Article 2.3 Wall Hung Scoreboard. Strike out model number ~~BB02144-W~~. Replace it with model number **BB-2155 6' X 10'**.

2.3 WALL HUNG SCOREBOARD

A. General: indoor single-sided LED basketball scoreboard displays period time to 99:59, home and guest scores to 199, period to nine, fouls to 9, time outs left to nine, and possession indicator arrow. When period time is less than one minute, scoreboard displays time to 1/10 second.

1. Approximately 10' W x 6'H.
2. Model Number ~~BB02144-W~~.

2. Refer to Article 2.3 Wall Hung Scoreboard. Strike out model number ~~BB02144-W~~. Replace it with model number **BB-2155 6' X 10'**.

B. Display:

1. Digital Home and Away team name heading and scores.
2. Digital Player/jersey number and foul/number.
3. Vinyl Period caption with digital period number.
4. Digital arrow possession indicator and digital bonus indicator.
5. Vinyl Time Outs Left caption with digital number.
6. Digital team fouls heading with digital team foul number.
7. Digital clock.

C. Horn: vibrating horn mounted behind scoreboard face sounds automatically when period clock counts down to zero, or manually controlled by control console operator.

D. Construction:

1. Aluminum cabinet capable of withstanding high-velocity impact from sports balls without the need for screens.
2. ETL Listed, tested to CSA standards, and CE-labeled.

E. Control Console:

1. All sports control console kit.
2. Hard-wired via one-pair shield cable of 22 AWG minimum. Cover plate with outlet box.
3. Segment timer mode.
4. Time of day mode allows digital clock to function as typical clock.

2.4 SHOT CLOCK

A. General: indoor single-sided LED basketball shot clock timer displays shot times up to 99 seconds.

1. Approximately 1' 10" W x 1 7"H x 6"d.
2. Model Number BB2114.

B. Display:

1. Digits: red, LED, 13" high.
2. Background Color: black.

C. Construction:

1. Aluminum cabinet capable of withstanding high-velocity impact from sports balls without the need for screens.
2. ETL Listed, tested to CSA standards, and CE-labeled.
3. Power: 30 watts, 0.3 amp.

D. Control:

1. Hand-held start/stop/reset switch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the Work under this specification section, inspect the installed Work executed under other specification sections of this Project Manual which affect the execution of Work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin Work until unacceptable conditions have been corrected.
   3. Execution of Work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate Work under this specification section with Work specified under other specification sections to ensure proper and adequate interface of Work specified under this specification section.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved shop drawings.
   3. Set plumb, level and square.

B. Layout:
   1. Lines shall be straight and true.

3.4 ADJUSTING

A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

3.5 CLEANING

A. Clean in accordance with Specification Sections - TEMPORARY FACILITIES AND CONTROLS and PROJECT CLOSEOUT.

B. In accordance with manufacturer's written instructions and recommendations.

3.6 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.
   1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
      a. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.
      b. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance.
      c. Review data in "Operating and Maintenance Manuals." Refer to Specification Section - PROJECT CLOSEOUT.

END OF SECTION

SECTION 12 24 13 – SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:
   1. Provide all material, labor, equipment and series necessary to completely install all roller shades and accessories.

B. Related Sections: The following Project Manuel Sections contain requirements that relate to this section:
   1. DIVISION 00 SPECIFICATION SECTIONS
   2. DIVISION 01 SPECIFICATION SECTIONS
   3. 05 12 00 STEEL AND FABRICATIONS
   4. 06 10 00 ROUGH CARPENTRY
   5. 06 22 00 MILLWORK
   6. 08 11 00 METAL DOORS AND FRAMES
   7. 08 41 00 STOREFRONTS
   8. 08 80 00 GLASS
   9. 09 22 16 METAL FRAMING
   10. 09 24 00 CEMENT PLASTER
   11. 09 29 00 GYPSUM BOARD
   12. 09 50 00 ACOUSTICAL CEILINGS
   13. 09 72 00 WALL COVERINGS
   14. 09 91 00 PAINTING
   15. SPECIFICATIONS IN THE FACILITY SERVICES SUBGROUP

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ASTM American Society for Testing and Materials
      b. NFPA National Fire Protection Association
      c. WCMA Window Covering Manufacturers Association

1.3 SUBMITTALS

A. Submit in accordance with specification section – SUBMITTAL PROCEDURES:
   1. Product Data:
      a. Submit manufacturer's full color range (including standard and premium colors) for selection by the Architect.
      b. Submit data sheets on each piece of material being installed.
   2. Shop Drawings:
      a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
         1) Include shadeband fabric orientation to rollers and their seam and batten locations.

2) For motor operated shades include details of installation and diagrams for power, signal, and control wiring.

3. Samples:
   a. Provide two 6 inch square samples of proposed fabric.
   b. Provide aluminum finish color samples.
4. Quality Assurance/Control Submittals:
   a. Test Reports:
      1) Submit four (4) copies of Fire Test Response Characteristics.
      2) Submit four (4) copies of No Growth when exposed to Fungi.
   b. Manufacturer's Written Installation Instructions.
   c. Statement of Installer's Qualifications.
5. Closeout Submittals in accordance with the following:
   a. Maintenance Data in accordance with Specification Section – PROJECT CLOSEOUT.
   b. Operation Data in accordance with Specification Section – PROJECT CLOSEOUT.
   c. Record Documents in accordance with Specification Section – RECORD DOCUMENTS.
   d. Warranty in accordance with this specification and Specification Section – WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
   a. Roller shade must pass NFPA 701 "Fire Test Response Characteristics for small and large scale vertical burn." Materials tested shall be identical to products proposed for use.
   b. Roller shade must posses anti-microbial characteristics and show "No Growth" per ASTM G21 "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi."
   c. Electrical components shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Installer Qualifications:
   a. Engage an experienced Installer who has successfully been in continuous business of providing and installing Roller Shade Systems and Accessories for a minimum period of five (5) years.
   b. Completed five (5) projects of similar scope and size to that indicated for this project.
3. Manufacturer/Supplier Qualifications:
   a. A company experienced in successfully producing/supplying products similar to that indicated for this project, with sufficient capacity to produce and supply required materials without causing delay in the work.

B. In accordance with specification section – REGULATORY REQUIREMENTS.

C. Meetings:
1. Pre- Installation……Schedule prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems, which may impede the planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress:……Scheduled by the Contractor during the performance of the work.

a. Review for proper installation of work.
b. Inspect and identify any problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.

3. Completion:……Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems which may impede issuance of warranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be individually wrapped and in factory packages.
   2. Products shall be handled in such a manner as to assure that they are free from dents, tears, and other damage.
   3. Shadeband fabric shall be protected from snagging, soil, and other damage. In the event that fabric suffer damage, the fabricator shall clean, repair or replace at no additional expense.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened packaging with labels indicating manufacturer, product name, and location for installation using same designation indicated on drawings.
   2. Damaged product will not be accepted.
   3. Products shall not be delivered to the project site until the area is ready for installation.

C. Storage and protection
   1. Products shall be stored in a dry protected area.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.6 PROJECT CONDITIONS

A. Existing conditions:
   1. Examine project site and building(s) and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Verify actual dimension of openings and construction contiguous with the roller shades by field measurements before fabrication.

1.7 WARRANTY

A. Contactor's General Warranty:
   1. In accordance with specification section – WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer’s written standard warranty.
      a. Hardware System and Shadebands 10 years.

C. Installer's Warranty:

1. In accordance with the terms of the specification section- WARRANTIES but the period of time shall be for: 1 year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified Manual Shade System product manufacturer:
      a. MECHOSHADE SYSTEMS INC., Long Island City, New York
      b. Acceptable alternative manufacturers:
         1) DRAPER INC., Spiceland, Indiana
         2) HUNTER DOUGLAS CONTRACT, Nysan Solar Control, Poway, CA
   2. Specified Shadeband product manufacturer, or approved equivalent:
      a. MECHOSHADE SYSTEMS INC., Long Island City, New York
      b. Acceptable alternative manufacturers:
         1) DRAPER INC., Spiceland, Indiana
         2) HUNTER DOUGLAS CONTRACT, Nysan Solar Control, Poway, CA

B. Products from other manufacturers not listed must submit in accordance with specification section – SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Shadeband:
   1. Light-Filtering Fabric: Typical, UNO. See Opening Schedule.
      a. Manufacturer MECHOSHADE SYSTEMS INC.
      b. Product Name ThermoVeil Screens.
      c. Color Silver Birch
      d. Physical Characteristics:
         1) Type 75% PVC Coating, 25% polyester yarn.
         2) Weave Mesh.
         3) Thickness 0.043 inches.
         4) Weight 15.3 oz/sq yd.
         5) Openness Factor 3 percent.
         6) Maximum Roll Width As wide as available to minimize seams.
      e. Performance Characteristics:
         1) Flame Retardant meets NFPA 701
         2) GreenGuard Indoor Air Quality Certified
   2. Blackout Fabric: Where indicated, See Opening Schedule.
      a. Manufacturer MECHOSHADE SYSTEMS INC.
      b. Product Name Classic Blackout 0700 Series.
      c. Color Light Grey
      d. Physical Characteristics:
         1) Type 75% vinyl coating, 25% fiberglass yarn.

2) Weave Mesh.
3) Thickness 0.015 inches.
4) Weight 0.875 lbs/sq yd.
5) Openness Factor 0 percent.
6) Maximum Roll Width 72 inches.

e. Performance Characteristics:
1) Flame Retardant meets NFPA 701
2) GreenGuard Indoor Air Quality Certified

2.3 MANUFACTURED UNITS

A. General:
1. Furnish a complete and operational shade system with accessories necessary for operation including brackets, operating mechanisms, rollers, couplers, shadeband, mounting hardware, and fasteners.
2. Provide shade hardware that allows for the removal of shade roller tubes from brackets and center supports without removing hardware from opening.
3. Provide shade hardware required to support 150 percent of the full weight of each shade.
   a. Hardware shall be corrosion resistant.
4. Provide positive mechanical engagement of drive mechanism to shade roller tube.
5. Roller Tube shall be extruded aluminum of a diameter and wall thickness required to support shade fabric without deflection.
   a. Shadeband attachment to Roller Tube: **Manufacturer's standard method.**
      1) Shade hardware shall allow for the removal and re-mounting of shadeband without having to remove the shade tube from operating mechanism or support brackets.
   b. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
   c. Direction of Shadeband Roll shall be **Regular, from back of roller**
6. Roller-Coupling Assemblies shall be coordinated with operating mechanism and designed to join up to three in line rollers into a multiband shade that is operated by one roller drive-end assembly.

B. Manual Shade System:
1. Provide MECHOSHADE SYSTEM Mecho/5.
2. Provide Chain and Clutch operating mechanism with continuous-loop bead chain and clutch that stops shade movement when bead chain is released.
   a. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
   b. Bead chains shall be #10 stainless steel with upper and lower limit ball stops.
      1) Chain retainer type: **Jamb Mounted Clip**
      2) Loop length shall be **full length of shade, except where high windows occur and chain would not be accessible, provide longer, accessible chain.**
   c. Provide manufacturer's standard Spring Lift Mechanism for shadebands that weigh more than 10 lbs.
3. Blackout:
   a. Provide Side Channels with guides and light seals to eliminate light gaps as shades are drawn.
   b. Provide Sill Channel or Sill Angle designed to eliminate light gaps at bottom of shades.
4. Double Rollers:
   a. Mounting configuration shall be **side by side**.

2.4 ACCESSORIES

A. Front Fascia:
1. Provide L-shaped aluminum extrusion to conceal roller, shadeband and operating mechanism and attaches to roller endcaps without exposed fasteners.

B. Endcap Covers:
1. Provide aluminum extrusion to cover endcaps and match Front Fascia.

C. Exposed Headbox:
1. Provide extruded aluminum rectangular enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.

D. Recessed Shade Packet:
1. Provide extruded aluminum rectangular enclosure designed for recessed ceiling installation with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
   a. Provide pocket with lip at lower edge to support acoustical ceiling panel.

E. Closure Panel:
1. Provide removable aluminum panel and snap-in wall clip for installation at bottom of site-built ceiling recess or pocket. Size as indicated.

2.5 FABRICATION

A. Shadebands:
1. Fabricate manual shade system to comply with WCMA A100.1 for requirements relative to flexible chain-loop devices.
2. Fabricate units in sizes to fill window and other openings as follows, measured at 74 degrees Fahrenheit.
   a. Inside Jamb installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch. Length equal to head-to-sill or –floor dimension of opening in which shade is installed less 1/4 inch , plus or minus 1/8 inch.
   b. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end –to-end installations at centerlines of mullion or other defined vertical separations between openings.
3. Fabricate shadebands without battens or seams to extent possible except as follows:
   a. At vertical shades where width-to-length ratio of shadeband is equal to or greater that 1:4, provide battens and seams at uniform spacing’s along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
   b. Railroad material where roll width is less that the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.
   c. At blackout shadebands, when used in side channels, shall have horizontally mounted, roll-formed stainless steel or tempered-steel battens not more that 3 feet on center extending fully into the side channels.
   d. Battens, when required or indicated, shall be concealed in a integrally-colored fabric to match the inside and outside colors of the shadeband.
      1) Battens shall be roll-formed of stainless steel or tempered steel and concave to match the contour of the roller tube.
4. Fabricate shadebands to hang flat without buckling or distortion.

5. Fabricate bottom hem with hem weights.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Before proceeding, verify plans match existing conditions.
2. If conflicts are encountered, report it to the Architect. Then prepare recommendation(s) for correction and submit to Architect for review.
3. Coordinate work under this specification section with work specified under other sections.

B. Protection:
1. Protect all adjacent surfaces from potential damage from work under this specification section.

C. Surface Preparation:
1. Prepare surface in accordance with manufacturer's instructions and recommendations.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's instruction and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with regulatory requirements.
4. Set plumb, level, and square and align with adjacent units as indicated.
5. Allow proper clearances for window operation hardware.
6. Locate shadeband to be no closer than 2 inches to interior face of glass.
7. Connect motor-operated shades to building electrical system.

3.4 ADJUSTING

A. Adjustment:
1. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.5 CLEANING

A. Clean in accordance with specification section – PROJECT CLOSEOUT:
   1. Immediately clean any soiled surfaces to remain.
   2. After installation clean in accordance with manufacturer’s instructions and recommendations.

3.6 DEMONSTRATION

A. In accordance with specification section – PROJECT CLOSEOUT.
   1. Engage a factory authorized representative to train owner's maintenance personnel to adjust, operate, and maintain shade systems.
   2. Schedule training with seven days of advance notice.

END OF SECTION

SECTION 126613.02 – TELESCOPING BLEACHERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install Telescoping Bleachers with Molded Plastic Seating, materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 05 12 00 STEEL AND FABRICATIONS
   6. 06 10 00 ROUGH CARPENTRY
   7. 09 22 16 METAL FRAMING
   8. 09 64 66 RESILIENT WOOD FLOOR
   9. 11 66 43 SCOREBOARDS
   10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP for electrical connections.

1.2 DEFINITIONS

A. Telescoping bleacher system shall consist of banks of tiered, closed deck platforms with attached seating, with all necessary accessories such as wheelchair truncations, handrails, aisles, guardrails and controls.
   1. The bleacher units shall be electrically operated units, with all tiers stacking in a vertical position.
   2. The bleacher units shall have the capability of being locked in intermediate positions other than completely out, or completely in.

1.3 SYSTEM DESCRIPTION

A. Structural Performance: Design, engineer, fabricate, and install telescoping bleachers to withstand the following structural loads without exceeding the allowable design working stresses of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each bleacher section.
   1. Refer to DSA IR 16-5.
   2. Design loads specified in NFPA 102, Chapter 5, ICC 300, and in compliance with CBC.
      a. Seats and Decking to resist live load of 120 lbs. Per lineal foot.
      b. Uniformly Distributed Live Load:
         1) Not less than 100 lbs. Per sq. ft. of gross horizontal projection.
         2) 120 lbs per lineal foot.
         3) Treads shall be designed to at least a minimum concentrated load of 300 lbs.
      c. Parallel sway load of 24 lbs. Per linear foot of row.
      d. Perpendicular sway load of 10 lbs. Per linear foot of row.

3. Hand Railings, Posts and Supports: Engineered to with the following forces applied separately:
   a. Concentrated load of 200lbs. applied at any point and in any direction.
   b. Uniform load of 50 lbs. per foot applied in any direction.
4. Guard Railings, Post and Supports. Engineered to withstand the following forces applied separately:
   a. Uniform load of 50 lbs. per lineal foot applied horizontally and outward at top rail and a 25 lbs. per lineal foot applied horizontally and outward at mid rail.
5. Guard Railings, Infill Components: Intermediate Rails (all those except the handrail), Balusters and Panel Fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot, including openings and space between Rails. Reactions due to this loading are not required to be superimposed with the uniform loads or concentrated loads.
6. Operation: Provide telescoping bleacher sections incorporating manufacturer's standard telescoping system of seating and under structure members that permit opening and closing with respect to adjacent rows, that allow any or all rows to be locked open for use, and that close with vertical faces of upper skirts in same vertical plane.
   a. Power Operation: Frame drive system, each section of seating shall be fully automatic. Each section of seats shall be electrically operated by the Manufacturer's written recommended power System. The system shall be fully reversible and will lock the sections in any desired position. The telescopic seating manufacturer will provide the motor starter safety switch, or pendant switch, and all wiring from the power source to and within the seating sections.

B. Design Requirements: Provide telescoping bleacher bank incorporating manufacturer’s seating profiles and aisles in accordance with ICC 300.

C. Anchorage: Anchorage must be to back wall in accordance with manufacturer’s recommended installation requirements as the Telescoping Bleachers are to be installed over a "floating" resilient hardwood floor.

1.4 DEFERRED APPROVAL

A. The plans and specifications shall be prepared and stamped by a structural engineer licensed in the State of California.

B. The drawings shall clearly establish the loading and performance criteria; Title 24, Part 1, 4-317 (g).

C. Anticipate the DSA review and approval process to take 6 months in duration.

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Product data for each type of telescoping bleacher bank and accessory indicated.
   2. Shop Drawings.
      a. Shop drawings indicating layout of telescoping bleacher bank and sections coordinated with available field measurements and including aisles, seat heights, row spacing and rise, overall dimensions in closed and open position, connections and relationship to adjoining work, accessories, types of materials, and finishes.

1) Seating Manufacturer shall comply with the requirements of and provide all required engineering data for the Division of the State Architect, Office of Regulations Services, Structural Safety Section, Fire and life Safety Section and comply with all accessibility requirements of the Access Compliance Section.
   a) All drawings and structural calculations for the entire project as provided by the manufacturer (suitable for submission to **DSA**) and shall be submitted to the Owner's Architect within 35 days after award of the Contract.
   b) The Owner's Architect will upon review and revision (if any) of the shop drawings, submit to **DSA** for approval of the project. Any further modifications or revisions required by **DSA** shall be accomplished by the manufacturer within ten days of receipt of the document, and resubmit to the Architect.
   c) When approved by **DSA** and the Architect, the drawings and structural calculations shall be delivered to the Contractor for distribution, manufacturing and installation.
2) Where installed products are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by a qualified professional structural engineer registered in the state of California responsible for their preparation.

b. Wiring diagrams from the manufacturer for electrically operated units.

3. Samples for initial selection purposes in form of manufacturer's color charts consisting of actual units or sections for units showing full range of colors and textures available for each exposed material involving such selections.
4. Samples for verification purposes of the following items, prepared on samples of size indicated below and of same thickness and material as indicated for final unit of Work:
   a. Plywood Material and Finishes: 12-inch square samples of standard footrest material finished with manufacturer's standard coating. Half of sample shall show additional coating required for decking applications.
   b. Steel Material and Finishes: 6-inch square sample of steel sheet finished with baked enamel coating or nickel plating finish as standard with the manufacturer.
   c. Molded Plastic Seat Material and Finishes: One seat in the color choice(s) of the Architect, showing an end condition.
5. Maintenance data in the Operating and Maintenance manual shall include detailed instructions indicating proper means for operating and maintaining each type of bleacher section and accessory required.
6. Qualification data for firms and persons specified in "QUALITY ASSURANCE " Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer located and licensed in the state of California specialized in the installation of types of telescoping bleachers similar to that required for this project and who is certified by the manufacturer of telescoping bleachers.

1) The installer shall maintain a regular service facility within a 250 mile radius of the area in which the bleachers are located and shall furnish regular maintenance service on each bleacher completed under this contract for a period of one year after completion.
2) The manufacturer shall be able to offer the owner agreement for continuing maintenance after expiration of maintenance period provided under the contract.
3) All work shall be done during regular working hours of regular working days. The work shall include regular examinations by trained employees and shall include all necessary adjustments, greasing, oiling and parts to keep the bleacher equipment in operation, except parts made necessary by misuse, accidents or negligence by parties other than the bleacher installer.

b. The installer shall have completed within the Contract Stated Time of Completion without time extensions at least five DSAprojects in California in the last two years.
c. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel" and D1.3 "Structural Welding Code - Sheet Steel."

2. Manufacturer/Supplier Qualifications:
a. Manufacturer's Engineer Qualifications: Professional engineer licensed to practice in the state of California and experienced in providing engineering services of the kind indicated that have resulted in the successful installation of telescoping bleachers similar in material, design, and extent to those indicated for this Project.
b. The manufacturer shall have in the past two years, had at least five (5) projects approved by DSA and installed in California within the Contract Stated Time of Completion without time extensions.
c. The manufacturer shall have a ten (10) year history of producing DSA approved bleachers.

B. Regulatory Requirements:
1. All work shall comply with the requirements of Specification Section – REGULATORY REQUIREMENTS, and the following codes and regulations. Special reference in other Sections of the Specifications to a specific code will be by use of the abbreviation given in front of the Code, and in accordance with the following:
a. AQMCD Air Quality Management Control District in the area where the project is located.
b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
c. DOC PS U.S. Department of Commerce, National Institute of Standards and Technology, Product Standards.

C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of installation.
a. Coordinate the work with all other related work.
b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems that may impede issuance of warrantie3s or guaranties.

b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted at final inspection.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six [**6**] inches above ground, allowing air circulation under stacked units.
a. Cover materials and protect against wetting prior to use.

1.8 PROJECT CONDITIONS

A. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

B. Field Requirements:
1. Check actual dimensions of completed construction affecting telescoping bleachers by accurate field measurements before fabrication,; show recorded measurements on final shop drawings.
2. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1.9 WARRANTY

A. Contractor's General Warranty, in accordance with Specification Section – WARRANTIES.

B. Manufacturer's Warranty, in accordance with manufacturer's written standard warranty:
1. Warranty Period:
a. Understructure: Ten Years.
b. Plastic, wood, Painted Components, Electrical & Power Components: Five Years.

C. Installer's Warranty, in accordance with Specification Section - WARRANTIES:
1. Warranty period: Five Years.

1.10 OWNER'S INSTRUCTIONS

A. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below:
1. Test and adjust controls and any safeties. Replace damaged or malfunctioning controls and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer:
      a. HUSSEY SEATING COMPANY "Maxam 26 Series" with Courtside Collection XC10 (10") seats.
   2. Acceptable alternative manufacturers:
      a. IRWIN TELESCOPING BLEACHERS with Infinity Seat (10").
      b. INTERKAL INC.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - Substitution Procedures.

2.2 MATERIALS

A. Molded Plastic Seating: Polyethylene Polymer, ASTM D 1248, Type III, Class B; molded, color-pigmented, textured, impact-resistant, structural formulation; in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.
   1. 18 inch long section of high-density polyethylene, 10 inches wide. Provide color graphics shown at no additional added cost with at least 15 optional colors.

B. Plywood Decking: Softwood plywood panels, 5/8 inch nominal thickness, 5-ply construction with grade designation APA A-C Exterior, with solid crossbands, Group 1 veneer species for all plies, and exterior glue, tongue and groove type, APA grade trademarked, complying with DOC PS-1.

C. Structural Steel Shapes, Plates, and Bars: ASTM A 36 "Standard Specification for Carbon Structural Steel," except where higher strength steel is indicated or standard with manufacturer.

D. Uncoated Steel Strip (Non-structural Components): ASTM A 1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength," Commercial Quality, Hot Rolled strip.

E. Uncoated Steel Strip (Structural Components):
   1. ASTM A 1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength," Grade 33, 40, 45, or 50, Structural Quality, Hot-Rolled Strip.
   2. ASTM A 1008 "Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable," Grade 50, High-Strength, Low Alloy, Hot-Rolled Strip.

F. Galvanized Steel Strip: ASTM A 653 “Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process,” Grade C, zinc coated by the hot-dip process, structural quality.

G. Steel Tubing: ASTM A 501 “Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing,” hot-formed or ASTM A 500 “Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes,” cold-formed.

H. Aluminum Tubing: ASTM B 429 “Specification for Aluminum-Alloy Extruded Structural Pipe and Tube,” 6063-T6, Schedule 40.

I. Fasteners: Vibration-proof, of size and material standard with manufacturer.
   1. Locking bolts or self-tapping screws with lock nuts. The use of self-tapping bolts or screws without locking nuts are unacceptable.

J. Power Operation:
   1. Specified Product Service Required: One-20 amp, 120/208 volt, three phase service, with 4 wire plus ground service for each bleacher bank (5 wire). Provide a 12” x 12” x 6” J & non-fused manual disconnect box for each bleacher section in a bank.
   2. Manufacturers with differing electrical requirements shall coordinate and provide all interface items needed for a complete operating system at no additional expense to the Owner.
   3. Motors provided by bleacher manufacturer shall be of the proper horsepower and number of motors as is standard for the indicated bleacher section by the manufacturer each of the bleacher sections.
   4. Frame drive system, each section of seating shall be fully automatic.
      a. Each section of seats shall be electrically operated by the manufacturer's written recommended Power System.
      b. The system shall be fully reversible and will lock the units in any desired position. The telescopic seating manufacturer will provide the motor starter safety switch, or pendant switch, and all wiring from the power source to and within the seating bank.
         1) Provide safety electrical system that is not energized “hot” at underside bleacher wiring until activated by pendant control.
         2) Provide electrical system that has complete system UL listed. UL listing shall be to the entire wiring system, and not just to a few of the individual components.
      c. Wheels shall be non-marring with a soft rubber face to protect wood and synthetic floor surfaces and self-lubricating bushings, and in sufficient quantity to distribute load adequately and evenly.
   5. Coordinate wiring requirements and current characteristics of motors and control stations with building electrical system.
   6. Pendant control receptacle shall be a single receptacle for both forward and reverse beneath row 1 to prevent unauthorized access.

2.3 ACCESSORIES

A. Provide the following accessories of manufacturer's standard design and construction at locations indicated or required.
   1. Removable end curtains covering exposed ends of bleacher units in closed and open position.

2. Rear fillers including supports for closing openings between top aisle and rear wall of adjoining construction. Provide any custom cut-outs at rear wall of building for columns if required. Scribe and fit to meet wall/column conditions.
3. End railings of telescoping, self-storing type.
   a. End railing spacing must comply to current CBC requirements as required by DSA Access Compliance and Structural Safety Sections. No sphere 4 inches in diameter shall be able to pass through end railing. End railing shall be 42 inches high above seat.
4. Guardrails at accessible locations or other areas where adjacent walking surfaces are 30" minimum above the gymnasium floor.
5. Risers: Provide galvanized steel and painted nosings and rear risers to be sized as required by **DSA**
6. Skirt Board: All skirt boards to be fixed in place.
   a. Fixed skirt panels to block access to motor areas.
7. ADA Areas: Provide truncated areas as shown on the drawings per requirements of **DSA** and the ADA.
   a. Truncated areas are to meet **DSA** requirements for accessibility seat locations with companion seats.
   b. ADA truncations to be permanent.
   c. Provide rigid front rails. Provide a full width front closure panel at accessible area, extending from underside of second tier to within 1-1/2 inch of finished floor.
   d. Disabled Access Signs: provide signs as required.
8. Scorer's Table: Provide a Scorer's Table as indicated on the drawings (minimum of 18" x 8'-0" if not shown on the drawings). Table to have folding capacity for storage within the bleachers and shall be designed for use at any location on the bleachers.
9. Foot-Level Aisles: Provide deck level full width vertical aisles located as indicated.
10. Cross Aisle (If any): Provide continuous top cross aisle per plan of seating. Construction materials and railing materials and design shall match telescoping bleacher seating.
11. Provide at front edge of each step of aisle locations an adhesive-backed abrasive non-slip tread surface.
12. Vertical Aisle Handrails: Provide removable folding 34 inch high above deck, hand rail along centerline of each vertical aisle, discontinuous at no more than every five rows. Hand rails shall be provided with an intermediate horizontal mid-rail.
13. Seat Numbers: Provide seat numbers recessed into the seat to minimize vandalism. Seat numbers to be contrasting and coordinated with the logos for the plastic seats.
14. Row Numbers: Provide row numbers recessed into the seat to minimize valdalism. Seat numbers to be contrasting and coordinated with the logos for the plastic seats.

2.4 FABRICATION

A. General: Provide manufacturer's standard telescopic bleacher system fabricated to comply with requirements indicated.
   1. Smoothly round corner, edges, and exposed fasteners, if any, to eliminate snagging and pinching hazards.
   2. Form exposed sheet metal with flat, flush surfaces, true to line and level, and without cracking and grain separation.
   3. Perform welding by operators and processes complying with AWS requirements.

B. Molded Plastic Seating:
   1. Seat Modules: 18" long assembled, gas assisted injection-molded, high density, 100% recyclable HDPE (high density polyethylene) modules in monochromatic colors providing, dual textured scuff resistant 10” or 12” wide seat surface with 1/2" minimum interlock on seat and face. Unit structural tested to 600 lbs occupant load.
   2. Seat Module:

a. Comfort Profile:
   1) 10” depth continuous comfort curve style bench seat module.
   2) Ergonomically contoured forward “waterfall” edge for enhanced spectator comfort and minimization of sensitive pressure point area, regardless of leg positioning.
   3) Fore & Aft contoured seat surface for uniform support and minimize high pressure points under the buttocks.
   4) Seat height from deck to top of seat: 18-3/4”.
   5) 21” clear foot space area, regardless of leg positioning.
b. Custom color graphic logo design application for recessed end aisle seats.
c. Integrally molded recess pockets to accept seat number and row letters, and aisle seat logos.
d. Integrally molded rear closure panel at back of seat to allow for Continuous clean sweep of debris at deck level and minimized visibility of structural ribbing.
e. Seat Attachment: Each polymer seat module shall be securely anchored by a 10 ga steel clamp bracket that provides steel-to-steel, through bolted attachment to the front nose beam of the bleacher. Attachment eliminates fore / aft movement of the seat module on the nose beam.

C. Lower Risers and Foot Rests: Provide recessed lower riser and fully closed footrest construction. Fabricate riser from steel sheet with baked enamel, or galvanized finish as standard with manufacturer. Fabricate footrest from plywood as standard with manufacturer. No gaps shall be allowed between sections.

D. Understructure: Fabricate understructure from structural steel members of size, spacing, and form required to support design loads with cantilevered bench seat supports to produce toe space uninterrupted by vertical bracing.
   1. Provide low profile rowlock design, minimizing tripping hazard at underside of bleachers. Provide row locks on all rows at each section.
   2. Provide ease/rounded edge bleacher components as follows under bleachers. Diagonal or X-braces, deck support/stabilizers, diagonal/X-brace deck supports. Systems provided with sharp edges or corners, to be rounded in the field and field painted.

E. Support Column Wheels: Provide manufacturer's standard wheel assembly under each support column. Include wheels of size, number, and design required to support bleacher units and to achieve smooth operation without damage to flooring surface, a minimum of 4 wheels per column, and not less than 4 inches in diameter and 1 inch wide.

F. Row Spacing: Fabricate units with a row spacing as indicated by the “Open Dimension” on the drawings.

G. Row Rise: Fabricate units with a row of 12” at rows 1 to 9 as required for even rise and run for rear exiting.

H. Type of Bleacher Bank: Provide assemblies of the following type fabricated in lengths and number of rows indicated.
   1. Wall-Attached Type: Construct sections to provide for permanent attachment of rear of understructure to wall construction.

2.5 FINISHES

A. Steel Finishes:
   1. Comply with NAAMM “Metal Finishes Manual” for recommendations relative to application and designations of finishes.

2. Surface preparation: Solvent-clean surfaces in compliance with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel in compliance with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).
3. Baked Enamel or Powder Coat Finish: Immediately after cleaning and pretreatment, apply manufacturer's standard 2-coat baked enamel or powder coat finish consisting of prime coat and topcoat to exposed and concealed metal surfaces including understructure, except where other types of finishes are indicated.
   a. Steel Railings.
   b. Steel Understructure: Provide baked enamel or powder coat paint with silicon additive to enhance scratch resistance.
4. Galvanized Finish: In accordance with ASTM A 653 “Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process,” G-60.

B. Wood Finishes:
1. Wood or Plywood, and Transparent Finish: Prepare surfaces by triple machine sanding, supplemented by hand sanding where required, followed by application of sealer coats and transparent top coats of type, in number, and by process standard with manufacturer. Apply to Wood or Plywood surfaces except where otherwise indicated.

C. Aluminum Finishes:
1. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

D. Deck Board Finishes:
1. Provide the option of Transparent Finish or Gray textured Panelan finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other contracts to ensure proper and adequate interface of work specified under this specification section.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Install telescoping bleacher sections to comply with manufacturer's written instructions and final shop drawings.
   a. All anchorage must be to walls as installation is over a “floating” resilient hardwood floor,
   b. Provide accessories indicated and anchors, fasteners, inserts, and other items required for installation of sections and permanent attachment of sections to adjoining construction.

B. Layout:
1. Lines shall be straight and true.

C. Assistance:
1. Installation shall be in direct consultation and review of manufacturer’s authorized representative.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's filed services:
1. Provide the services of a factory-authorized service representative to supervise the field assembly of components and installation of products or systems and related connections specified within this section, and to report the results in writing to the Architect.

3.5 ADJUSTING

A. Upon completion of installation, including work of other trades, lubricate, test, and adjust each telescoping bleacher unit to operate easily and in compliance with manufacturer’s specifications.

3.6 CLEANING

A. Clean installed bleacher sections on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.

3.7 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.

1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
   a. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.
   b. Review data in Operating and Maintenance Manuals. Refer to Specification Section - PROJECT CLOSEOUT.

3.8 PROTECTION

A. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 12 66 23 – TELESCOPIC SEATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provision of services as listed herein and related to the manufacturing, delivery and complete installation of a telescoping seating system with integral chairs and matching loose and ganged seats.
2. Coordination with all related sections doing adjacent or integrated work.

1.2 RELATED SECTIONS

A. Coordinate with the following sections, as well as any other related sections, in carrying out this work:
B. Division 01 – General Conditions
C. Floor and adjacent architectural finishes
D. Division 26 – Electrical

AD4-SP01 Refer to Specification Section 126613.02 - TELESCOPING BLEACHERS.

1. Omit Specification Section 126613.02 - TELESCOPING BLEACHERS and replace it with the attached 126613.02 - TELESCOPING BLEACHERS AD4.

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
C. Labor shall be provided per applicable labor regulations and practices.

1.4 DEFINITIONS

A. Refer to Div. 01 for definitions.
B. Owner's Representative: For the scope in this Section, authorized personnel representing the Owner and The Shalleck Collaborative, Inc., Theatre Consultants.

1.5 SYSTEM DESCRIPTION

A. Telescoping Platform Seating includes electrically operated systems of multiple-tiered seating rows comprising of seats, deck components, understructure that permits closing without requiring dismantling, into a nested configuration for storing.

1. The platform shall have programmed stop positions:

a. Fully Opened

SECTION 126613.02 – TELESCOPING BLEACHERS

AD4-SP01 Refer to Specification Section 126613.02 - TELESCOPING BLEACHERS.

PART 1 - GENERAL 1. Omit Specification Section 126613.02 - TELESCOPING BLEACHERS and replace it with the attached 126613.02 - TELESCOPING BLEACHERS AD4.

1.1 SUMMARY

A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install Telescoping Bleachers with Molded Plastic Seating, materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. 03 30 00 CAST-IN-PLACE CONCRETE
4. 04 22 00 CONCRETE MASONRY UNITS
5. 05 12 00 STEEL AND FABRICATIONS
6. 06 10 00 ROUGH CARPENTRY
7. 09 22 16 METAL FRAMING
8. 09 64 66 RESILIENT WOOD FLOOR
9. 11 66 43 SCOREBOARDS
10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP for electrical connections.

1.2 DEFINITIONS

A. Telescoping bleacher system shall consist of banks of tiered, closed deck platforms with attached seating, with all necessary accessories such as wheelchair truncations, handrails, aisles, guardrails and controls.
1. The bleacher units shall be electrically operated units, with all tiers stacking in a vertical position.
2. The bleacher units shall have the capability of being locked in intermediate positions other than completely out, or completely in.

1.3 SYSTEM DESCRIPTION

A. Structural Performance: Design, engineer, fabricate, and install telescoping bleachers to withstand the following structural loads without exceeding the allowable design working stresses of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each bleacher section.
1. Refer to DSA IR 16-5.
2. Design loads specified in NFPA 102, Chapter 5, ICC 300, and in compliance with CBC.
   a. Seats and Decking to resist live load of 120 lbs. Per lineal foot.
   b. Uniformly Distributed Live Load:
      1) Not less than 100 lbs. Per sq. ft. of gross horizontal projection.
      2) 120 lbs per lineal foot.
      3) Treads shall be designed to at least a minimum concentrated load of 300 lbs.
   c. Parallel sway load of 24 lbs. Per linear foot of row.
   d. Perpendicular sway load of 10 lbs. Per linear foot of row.

3. Hand Railings, Posts and Supports: Engineered to with the following forces applied separately:
   a. Concentrated load of 200lbs. applied at any point and in any direction.
   b. Uniform load of 50 lbs. per foot applied in any direction.
4. Guard Railings, Post and Supports. Engineered to withstand the following forces applied separately:
   a. Uniform load of 50 lbs. per lineal foot applied horizontally and outward at top rail and a 25 lbs. per lineal foot applied horizontally and outward at mid rail.
5. Guard Railings, Infill Components: Intermediate Rails (all those except the handrail), Balusters and Panel Fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot, including openings and space between Rails. Reactions due to this loading are not required to be superimposed with the uniform loads or concentrated loads.
6. Operation: Provide telescoping bleacher sections incorporating manufacturer's standard telescoping system of seating and under structure members that permit opening and closing with respect to adjacent rows, that allow any or all rows to be locked open for use, and that close with vertical faces of upper skirts in same vertical plane.
   a. Power Operation: Frame drive system, each section of seating shall be fully automatic. Each section of seats shall be electrically operated by the Manufacturer's written recommended power System. The system shall be fully reversible and will lock the sections in any desired position. The telescopic seating manufacturer will provide the motor starter safety switch, or pendant switch, and all wiring from the power source to and within the seating sections.

B. Design Requirements: Provide telescoping bleacher bank incorporating manufacturer’s seating profiles and aisles in accordance with ICC 300.

C. Anchorage: Anchorage must be to back wall in accordance with manufacturer’s recommended installation requirements as the Telescoping Bleachers are to be installed over a "floating" resilient hardwood floor.

1.4 DEFERRED APPROVAL

A. The plans and specifications shall be prepared and stamped by a structural engineer licensed in the State of California.

B. The drawings shall clearly establish the loading and performance criteria; Title 24, Part 1, 4-317 (g).

C. Anticipate the DSA review and approval process to take 6 months in duration.

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Product data for each type of telescoping bleacher bank and accessory indicated.
   2. Shop Drawings.
      a. Shop drawings indicating layout of telescoping bleacher bank and sections coordinated with available field measurements and including aisles, seat heights, row spacing and rise, overall dimensions in closed and open position, connections and relationship to adjoining work, accessories, types of materials, and finishes.

1) Seating Manufacturer shall comply with the requirements of and provide all required engineering data for the Division of the State Architect, Office of Regulations Services, Structural Safety Section, Fire and life Safety Section and comply with all accessibility requirements of the Access Compliance Section.
   a) All drawings and structural calculations for the entire project as provided by the manufacturer (suitable for submission to **DSA**) and shall be submitted to the Owner's Architect within 35 days after award of the Contract.
   b) The Owner's Architect will upon review and revision (if any) of the shop drawings, submit to **DSA** for approval of the project. Any further modifications or revisions required by **DSA** shall be accomplished by the manufacturer within ten days of receipt of the document, and resubmit to the Architect.
   c) When approved by **DSA** and the Architect, the drawings and structural calculations shall be delivered to the Contractor for distribution, manufacturing and installation.
2) Where installed products are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by a qualified professional structural engineer registered in the state of California responsible for their preparation.

b. Wiring diagrams from the manufacturer for electrically operated units.

3. Samples for initial selection purposes in form of manufacturer's color charts consisting of actual units or sections for units showing full range of colors and textures available for each exposed material involving such selections.
4. Samples for verification purposes of the following items, prepared on samples of size indicated below and of same thickness and material as indicated for final unit of Work:
   a. Plywood Material and Finishes: 12-inch square samples of standard footrest material finished with manufacturer's standard coating. Half of sample shall show additional coating required for decking applications.
   b. Steel Material and Finishes: 6-inch square sample of steel sheet finished with baked enamel coating or nickel plating finish as standard with the manufacturer.
   c. Molded Plastic Seat Material and Finishes: One seat in the color choice(s) of the Architect, showing an end condition.
5. Maintenance data in the Operating and Maintenance manual shall include detailed instructions indicating proper means for operating and maintaining each type of bleacher section and accessory required.
6. Qualification data for firms and persons specified in "QUALITY ASSURANCE " Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer located and licensed in the state of California specialized in the installation of types of telescoping bleachers similar to that required for this project and who is certified by the manufacturer of telescoping bleachers.

1) The installer shall maintain a regular service facility within a 250 mile radius of the area in which the bleachers are located and shall furnish regular maintenance service on each bleacher completed under this contract for a period of one year after completion.
2) The manufacturer shall be able to offer the owner agreement for continuing maintenance after expiration of maintenance period provided under the contract.
3) All work shall be done during regular working hours of regular working days. The work shall include regular examinations by trained employees and shall include all necessary adjustments, greasing, oiling and parts to keep the bleacher equipment in operation, except parts made necessary by misuse, accidents or negligence by parties other than the bleacher installer.

b. The installer shall have completed within the Contract Stated Time of Completion without time extensions at least five DSAprojects in California in the last two years.
c. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel" and D1.3 "Structural Welding Code - Sheet Steel."

2. Manufacturer/Supplier Qualifications:
a. Manufacturer's Engineer Qualifications: Professional engineer licensed to practice in the state of California and experienced in providing engineering services of the kind indicated that have resulted in the successful installation of telescoping bleachers similar in material, design, and extent to those indicated for this Project.
b. The manufacturer shall have in the past two years, had at least five (5) projects approved by DSA and installed in California within the Contract Stated Time of Completion without time extensions.
c. The manufacturer shall have a ten (10) year history of producing DSA approved bleachers.

B. Regulatory Requirements:
1. All work shall comply with the requirements of Specification Section – REGULATORY REQUIREMENTS, and the following codes and regulations. Special reference in other Sections of the Specifications to a specific code will be by use of the abbreviation given in front of the Code, and in accordance with the following:
a. AQMCD Air Quality Management Control District in the area where the project is located.
b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
c. DOC PS U.S. Department of Commerce, National Institute of Standards and Technology, Product Standards.

C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of installation.
a. Coordinate the work with all other related work.
b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems that may impede issuance of warrantie3s or guaranties.

b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted at final inspection.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six [**6**] inches above ground, allowing air circulation under stacked units.
a. Cover materials and protect against wetting prior to use.

1.8 PROJECT CONDITIONS

A. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

B. Field Requirements:
1. Check actual dimensions of completed construction affecting telescoping bleachers by accurate field measurements before fabrication,; show recorded measurements on final shop drawings.
2. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1.9 WARRANTY

A. Contractor's General Warranty, in accordance with Specification Section – WARRANTIES.

B. Manufacturer's Warranty, in accordance with manufacturer's written standard warranty:
1. Warranty Period:
a. Understructure: Ten Years.
b. Plastic, wood, Painted Components, Electrical & Power Components: Five Years.

C. Installer's Warranty, in accordance with Specification Section - WARRANTIES:
1. Warranty period: Five Years.

1.10 OWNER'S INSTRUCTIONS

A. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below:
1. Test and adjust controls and any safeties. Replace damaged or malfunctioning controls and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer:
      a. HUSSEY SEATING COMPANY "Maxam 26 Series" with Courtside Collection XC10 (10") seats.
   2. Acceptable alternative manufacturers:
      a. IRWIN TELESCOPING BLEACHERS with Infinity Seat (10").
      b. INTERKAL INC.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - Substitution Procedures.

2.2 MATERIALS

A. Molded Plastic Seating: Polyethylene Polymer, ASTM D 1248, Type III, Class B; molded, color-pigmented, textured, impact-resistant, structural formulation; in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.
   1. 18 inch long section of high-density polyethylene, 10 inches wide. Provide color graphics shown at no additional added cost with at least 15 optional colors.

B. Plywood Decking: Softwood plywood panels, 5/8 inch nominal thickness, 5-ply construction with grade designation APA A-C Exterior, with solid crossbands, Group 1 veneer species for all plies, and exterior glue, tongue and groove type, APA grade trademarked, complying with DOC PS-1.

C. Structural Steel Shapes, Plates, and Bars: ASTM A 36 "Standard Specification for Carbon Structural Steel," except where higher strength steel is indicated or standard with manufacturer.

D. Uncoated Steel Strip (Non-structural Components): ASTM A 1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength," Commercial Quality, Hot Rolled strip.

E. Uncoated Steel Strip (Structural Components):
   1. ASTM A 1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength," Grade 33, 40, 45, or 50, Structural Quality, Hot-Rolled Strip.
   2. ASTM A 1008 "Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable," Grade 50, High-Strength, Low Alloy, Hot-Rolled Strip.

F. Galvanized Steel Strip: ASTM A 653 “Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process,” Grade C, zinc coated by the hot-dip process, structural quality.

G. Steel Tubing: ASTM A 501 “Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing,” hot-formed or ASTM A 500 “Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes,” cold-formed.

H. Aluminum Tubing: ASTM B 429 “Specification for Aluminum-Alloy Extruded Structural Pipe and Tube,” 6063-T6, Schedule 40.

I. Fasteners: Vibration-proof, of size and material standard with manufacturer.
   1. Locking bolts or self-tapping screws with lock nuts. The use of self-tapping bolts or screws without locking nuts are unacceptable.

J. Power Operation:
   1. Specified Product Service Required: One-20 amp, 120/208 volt, three phase service, with 4 wire plus ground service for each bleacher bank (5 wire). Provide a 12” x 12” x 6” J & non-fused manual disconnect box for each bleacher section in a bank.
   2. Manufacturers with differing electrical requirements shall coordinate and provide all interface items needed for a complete operating system at no additional expense to the Owner.
   3. Motors provided by bleacher manufacturer shall be of the proper horsepower and number of motors as is standard for the indicated bleacher section by the manufacturer each of the bleacher sections.
   4. Frame drive system, each section of seating shall be fully automatic.
      a. Each section of seats shall be electrically operated by the manufacturer's written recommended Power System.
      b. The system shall be fully reversible and will lock the units in any desired position. The telescopic seating manufacturer will provide the motor starter safety switch, or pendant switch, and all wiring from the power source to and within the seating bank.
         1) Provide safety electrical system that is not energized “hot” at underside bleacher wiring until activated by pendant control.
         2) Provide electrical system that has complete system UL listed. UL listing shall be to the entire wiring system, and not just to a few of the individual components.
      c. Wheels shall be non-marring with a soft rubber face to protect wood and synthetic floor surfaces and self-lubricating bushings, and in sufficient quantity to distribute load adequately and evenly.
   5. Coordinate wiring requirements and current characteristics of motors and control stations with building electrical system.
   6. Pendant control receptacle shall be a single receptacle for both forward and reverse beneath row 1 to prevent unauthorized access.

2.3 ACCESSORIES

A. Provide the following accessories of manufacturer's standard design and construction at locations indicated or required.
   1. Removable end curtains covering exposed ends of bleacher units in closed and open position.

2. Rear fillers including supports for closing openings between top aisle and rear wall of adjoining construction. Provide any custom cut-outs at rear wall of building for columns if required. Scribe and fit to meet wall/column conditions.
3. End railings of telescoping, self-storing type.
   a. End railing spacing must comply to current CBC requirements as required by DSA Access Compliance and Structural Safety Sections. No sphere 4 inches in diameter shall be able to pass through end railing. End railing shall be 42 inches high above seat.
4. Guardrails at accessible locations or other areas where adjacent walking surfaces are 30" minimum above the gymnasium floor.
5. Risers: Provide galvanized steel and painted nosings and rear risers to be sized as required by **DSA**
6. Skirt Board: All skirt boards to be fixed in place.
   a. Fixed skirt panels to block access to motor areas.
7. ADA Areas: Provide truncated areas as shown on the drawings per requirements of **DSA** and the ADA.
   a. Truncated areas are to meet **DSA** requirements for accessibility seat locations with companion seats.
   b. ADA truncations to be permanent.
   c. Provide rigid front rails. Provide a full width front closure panel at accessible area, extending from underside of second tier to within 1-1/2 inch of finished floor.
   d. Disabled Access Signs: provide signs as required.
8. Scorer's Table: Provide a Scorer's Table as indicated on the drawings (minimum of 18" x 8'-0" if not shown on the drawings). Table to have folding capacity for storage within the bleachers and shall be designed for use at any location on the bleachers.
9. Foot-Level Aisles: Provide deck level full width vertical aisles located as indicated.
10. Cross Aisle (If any): Provide continuous top cross aisle per plan of seating. Construction materials and railing materials and design shall match telescoping bleacher seating.
11. Provide at front edge of each step of aisle locations an adhesive-backed abrasive non-slip tread surface.
12. Vertical Aisle Handrails: Provide removable folding 34 inch high above deck, hand rail along centerline of each vertical aisle, discontinuous at no more than every five rows. Hand rails shall be provided with an intermediate horizontal mid-rail.
13. Seat Numbers: Provide seat numbers recessed into the seat to minimize vandalism. Seat numbers to be contrasting and coordinated with the logos for the plastic seats.
14. Row Numbers: Provide row numbers recessed into the seat to minimize valdalism. Seat numbers to be contrasting and coordinated with the logos for the plastic seats.

2.4 FABRICATION

A. General: Provide manufacturer's standard telescopic bleacher system fabricated to comply with requirements indicated.
   1. Smoothly round corner, edges, and exposed fasteners, if any, to eliminate snagging and pinching hazards.
   2. Form exposed sheet metal with flat, flush surfaces, true to line and level, and without cracking and grain separation.
   3. Perform welding by operators and processes complying with AWS requirements.

B. Molded Plastic Seating:
   1. Seat Modules: 18" long assembled, gas assisted injection-molded, high density, 100% recyclable HDPE (high density polyethylene) modules in monochromatic colors providing, dual textured scuff resistant 10” or 12” wide seat surface with 1/2" minimum interlock on seat and face. Unit structural tested to 600 lbs occupant load.
   2. Seat Module:

a. Comfort Profile:
   1) 10” depth continuous comfort curve style bench seat module.
   2) Ergonomically contoured forward “waterfall” edge for enhanced spectator comfort and minimization of sensitive pressure point area, regardless of leg positioning.
   3) Fore & Aft contoured seat surface for uniform support and minimize high pressure points under the buttocks.
   4) Seat height from deck to top of seat: 18-3/4”.
   5) 21” clear foot space area, regardless of leg positioning.
b. Custom color graphic logo design application for recessed end aisle seats.
c. Integrally molded recess pockets to accept seat number and row letters, and aisle seat logos.
d. Integrally molded rear closure panel at back of seat to allow for Continuous clean sweep of debris at deck level and minimized visibility of structural ribbing.
e. Seat Attachment: Each polymer seat module shall be securely anchored by a 10 ga steel clamp bracket that provides steel-to-steel, through bolted attachment to the front nose beam of the bleacher. Attachment eliminates fore / aft movement of the seat module on the nose beam.

C. Lower Risers and Foot Rests: Provide recessed lower riser and fully closed footrest construction. Fabricate riser from steel sheet with baked enamel, or galvanized finish as standard with manufacturer. Fabricate footrest from plywood as standard with manufacturer. No gaps shall be allowed between sections.

D. Understructure: Fabricate understructure from structural steel members of size, spacing, and form required to support design loads with cantilevered bench seat supports to produce toe space uninterrupted by vertical bracing.
   1. Provide low profile rowlock design, minimizing tripping hazard at underside of bleachers. Provide row locks on all rows at each section.
   2. Provide ease/rounded edge bleacher components as follows under bleachers. Diagonal or X-braces, deck support/stabilizers, diagonal/X-brace deck supports. Systems provided with sharp edges or corners, to be rounded in the field and field painted.

E. Support Column Wheels: Provide manufacturer's standard wheel assembly under each support column. Include wheels of size, number, and design required to support bleacher units and to achieve smooth operation without damage to flooring surface, a minimum of 4 wheels per column, and not less than 4 inches in diameter and 1 inch wide.

F. Row Spacing: Fabricate units with a row spacing as indicated by the “Open Dimension” on the drawings.

G. Row Rise: Fabricate units with a row of 12” at rows 1 to 9 as required for even rise and run for rear exiting.

H. Type of Bleacher Bank: Provide assemblies of the following type fabricated in lengths and number of rows indicated.
   1. Wall-Attached Type: Construct sections to provide for permanent attachment of rear of understructure to wall construction.

2.5 FINISHES

A. Steel Finishes:
   1. Comply with NAAMM “Metal Finishes Manual” for recommendations relative to application and designations of finishes.

2. Surface preparation: Solvent-clean surfaces in compliance with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel in compliance with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).
3. Baked Enamel or Powder Coat Finish: Immediately after cleaning and pretreatment, apply manufacturer's standard 2-coat baked enamel or powder coat finish consisting of prime coat and topcoat to exposed and concealed metal surfaces including understructure, except where other types of finishes are indicated.
   a. Steel Railings.
   b. Steel Understructure: Provide baked enamel or powder coat paint with silicon additive to enhance scratch resistance.
4. Galvanized Finish: In accordance with ASTM A 653 “Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process,” G-60.

B. Wood Finishes:
1. Wood or Plywood, and Transparent Finish: Prepare surfaces by triple machine sanding, supplemented by hand sanding where required, followed by application of sealer coats and transparent top coats of type, in number, and by process standard with manufacturer. Apply to Wood or Plywood surfaces except where otherwise indicated.

C. Aluminum Finishes:
1. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

D. Deck Board Finishes:
1. Provide the option of Transparent Finish or Gray textured Panelan finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other contracts to ensure proper and adequate interface of work specified under this specification section.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Install telescoping bleacher sections to comply with manufacturer's written instructions and final shop drawings.
   a. All anchorage must be to walls as installation is over a “floating” resilient hardwood floor,
   b. Provide accessories indicated and anchors, fasteners, inserts, and other items required for installation of sections and permanent attachment of sections to adjoining construction.

B. Layout:
1. Lines shall be straight and true.

C. Assistance:
1. Installation shall be in direct consultation and review of manufacturer’s authorized representative.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's filed services:
1. Provide the services of a factory-authorized service representative to supervise the field assembly of components and installation of products or systems and related connections specified within this section, and to report the results in writing to the Architect.

3.5 ADJUSTING

A. Upon completion of installation, including work of other trades, lubricate, test, and adjust each telescoping bleacher unit to operate easily and in compliance with manufacturer’s specifications.

3.6 CLEANING

A. Clean installed bleacher sections on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.

3.7 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.

1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
   a. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.
   b. Review data in Operating and Maintenance Manuals. Refer to Specification Section - PROJECT CLOSEOUT.

3.8 PROTECTION

A. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

PART 4 - APPENDIX A: TELESCOPIC SEATING ATTRIBUTES

4.1 BASIS OF DESIGN PRODUCT

A. Basis of design platforming system shall be: <

1. Jezet Retractable Platform
2. Acceptable alternates are:

    a. Audience Systems Retractable Platform (36” row depth)
    b. Irwin Standard Deck Retractable Platform

B. Basis of design chair shall be:<

1. Jezet Galant
2. Acceptable alternates are:

    a. Audience Systems Espace 628
    b. Irwin Integra

4.2 CHAIR FINISHES

1. Upholstry Fabric: As described belowsection
2. Armrest Material: Architect’s selection from Manufacturer’s Standards during submittal process
3. Stain: Architect’s selection from Manufacturer’s Standards during submittal process.
4. Finish: Architect’s selection from Manufacturer’s Standards during submittal process

4.3 UPHOLSTERY FABRIC

A. Upholstery fabric shall meet the following requirements:

1. Quality – The finish goods are to be graded “First Quality”. This precludes the use of seconds or of 1st run seconds. No flaws, piercing, or discoloration will be accepted.
2. Width of fabric: 56”<
3. Weight: 19.26oz per linear yard<
4. Fabric: 100% Acrylic face, 100% Polyester back<
5. Cleanability: Upholstery shampoo or mild dry-cleaning solvent. Bleach solutions of up to 10%
6. Color Fastness to Light: 40 hours
7. Surface Abrasion: 100,000 double rubs, minimum<
8. Flame Resistance (meet or exceed):

    a. State of California Technical Bulletin #117-2013

B. Color and style:

1. Manufacture: Fidivi<
2. Style: Jet 9108<

3. Color: As selected by architect from manufacturer's standard line.<

4.4 EXPOSED METAL EXCEPT HANDRAILS AND GUARDRAILS

A. Metal parts visible from the front, top, sides, or underside of the telescopic seating unit, and any parts visible on the chair shall be:

1. Color: Black<

4.5 GUARDS, HANDRAILS, AND RAILINGS

A. Handrails and Guardrails shall be:

1. Material:
2. Design: Guards, Handrails, and Railings shall be from manufacturer's standard line as selected by architect.

   a. Provide edge framing of 3/16"x2" flat steel bar.
   b. Lower portion of the railing shall be:
      1) Perforated metal sheet
      2) Top edge shall be 30" measured above the riser nose of each platform deck and intermediate step.
      3) Upper portion shall be a series of 1.25" round steel tube or bar spaced evenly and set at 34", 38" and 42" above the riser nose of each platform deck and intermediate step.
      4) Front railings shall not have upper round tubes or bars.

3. Side rails shall fold down over the aisle and first seat for storage.
4. Front rail shall be removable.

   a. Mechanism shall be operated via lever or discreet thumbscrew. Mechanisms requiring the use of tools to remove or reinstall the front railing are not acceptable.

5. Finish: Architect's selection from Manufacturer's Standards during submittal process
6. Color: Architect's selection from Manufacturer's Standards during submittal process
7.

4.6 EXPOSED PLASTIC

A. Exposed plastic parts on the telescopic seating unit and chair shall be:

1. Color: Black<

4.7 CARPET

A. Color and style:

1. Manufacture: As selected by architect from platform manufacturer's standard line. <

2. Style: As selected by architect from platform manufacturer's standard line. <
3. Color: As selected by architect from platform manufacturer's standard line. <

4.8 FACIA / TOE BOARDS

A. Fascia panels and toe boards shall be solid wood or wood veneer covered plywood.

1. Veneer Plywood shall have 1/4" hardwood edge banding, not veneer edge banding.

B. Species: Manufacturer's Standard
C. Stain: Architect's selection from Manufacturer's Standards during submittal process
D. Finish: Architect's selection from Manufacturer's Standards during submittal process

4.9 SIDE CLOSURE PANELS, FABRIC

A. Fabric side closure panels shall be:

1. 22oz IFR velour, installed nap down, with 50% fullness.
2. Color: As selected by architect from fabric manufacturer's standard line.<

4.10 ROW AND SEAT IDENTIFICATION

A. Provide all aisles with row ID plates, with minimum ½" < letters.

1. Plates shall be inset in face of riser in each step, and shall be also mounted to the back half of the aisle armrests.<.
2. ID plate shall be finished in brushed aluminum< with black< characters.

B. Provide all seats with ID numbers, with minimum 5/16" < letters.

1. Seat ID number plate to be installed on the underside of the seat pan, centered left to right and 1" down from the lip of the pan.
2. Seat ID number plate to be finished in brushed aluminum < with black< characters.

END OF SECTION

SECTION 129313 – BICYCLE RACKS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all install Bicycle Racks, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
   2. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Closeout Submittals in accordance with the following:
      a. Warranty in accordance with Specification Section - WARRANTIES.

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

1.5 PROJECT CONDITIONS

A. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.6 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
   a. Warranty Period One (1) Year.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified Bicycle Rack Manufacturer:
   a. BRANDIR ENTERPRISES
      1) Ribbon Rack, Type 7 Model RB-7, 7 bicycle capacity.
      2) Ribbon Rack, Type 9 Model RB-9, 9 bicycle capacity.
      3) Ribbon Rack, Type 11 Model RB-11, 11 bicycle capacity.
   b. Acceptable alternative manufacturers:
      1) SITESCAPES Echo Serpentine Style.
      2) HUNTCO SUPPLY, LLC BR Series.
      3) DERO BIKE RACK CO. Rolling Bike Rack.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. Ribbon Rack
1. Design:
a. Bent pipe:
1) Schedule 40 pipe in accordance with ASTM 53, "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless."
2) Size: 2.375" OD. x 0.154" thick wall.
2. Mount:
a. In-ground type with anchoring pin.
b. 10 (ten) inch embedment minimum.

2.3 MIXES

A. Footing:
1. In accordance with Specification Section - CAST-IN-PLACE CONCRETE.
a. Five (5) sacks of cement minimum per cubic yard of aggregate.

2.4 FABRICATION

A. Shop Assembly:
1. Single pipe hydraulically bent to form smooth curves.

2.5 FINISHES

A. Shop Finishing:
1. Hot-dipped G60 galvanized after fabrication.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.

B. Layout:
   1. Lines shall be straight and true.

3.4 CLEANING

A. Clean in accordance with Specification Section – PROJECT CLOSEOUT.
   1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
   2. Clean any soiled surfaces immediately.
   3. In accordance with manufacturer’s written instructions and recommendations

END OF SECTION

SECTION 142423 – HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material. labor, equipment and services necessary to completely install all Hydraulic Passenger Elevator materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
   2. This specification covers and includes the furnishing, installing and maintaining of elevator equipment as hereinafter specified. It is the intention of this specification to outline broadly the equipment required, but not to cover the details of design and construction, except as herein specifically stated.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 04 22 00 CONCRETE MASONRY UNITS
   5. 05 12 00 STEEL AND FABRICATIONS
   6. 06 10 00 ROUGH CARPENTRY
   7. 07 14 16 FLUID-APPLIED WATERPROOFING
   8. 08 70 00 HARDWARE
   9. 09 22 16 METAL FRAMING
   10. 09 29 00 GYPSUM BOARD
   11. 09 91 00 PAINTING
   12. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   13. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Coordination Drawings:
      a. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
   2. Product Data.
      a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
   3. Shop Drawings.
      a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
      b. Include structural computations, material properties, and other information needed for structural analysis that has been signed and stamped by a registered Civil or Structural Engineer in the State of California.
   4. Samples.

a. Provide exposed materials for selection of colors and acceptance of finish materials for interior of cab and the hoistway entrances to the cab.

5. Quality Assurance/Control Submittals:
   a. Certificates:
      1) Submit three (3) copies of certificates showing compliance with standards designated and governing codes.
6. Closeout Submittals in accordance with Specification Sections in Division One:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
   c. Project Documents in accordance with Specification Section - PROJECT DOCUMENTS.
   d. Warranty in accordance with Specification Section - WARRANTIES.

1.3 DEFERRED APPROVAL:

A. Elevator guide rails and support anchorage ll openings exceeding 10 feet in width or 10 feet in height will require DSA review and approval.
   1. The plans and specifications shall be prepared and stamped by a structural engineer licensed in the State of California.
   2. The drawings shall clearly establish the loading and performance criteria; Title 24, Part 1, 4-317 (g).
      a. Anticipate the DSA review and approval process to take 6 months in duration.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
      b. Single Source responsibility:
         1) Provide Hydraulic Passenger Elevator and all related equipment for a complete operating system from one source and produced by a single manufacturer. Manufacturer shall be regularly engaged in manufacture, installation and maintenance of elevators and be able to provide direct acting plunger, pumping unit, storage tank, controllers, selectors, car frames, safeties, governors, buffers, door operators, and signals that are it's products alone.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. ADA Americans with Disabilities Act.
      b. ANSI American National Standards Institute's "Safety Code for Elevators and Escalators"

c. ASME American Society of Mechanical Engineers
d. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
e. CCR California Code of Regulations
1) Title 8 Industrial Relations, Division 1 Department of Industrial Relations, Chapter 4 Division of Industrial Safety, Subchapter 6 Elevator Safety Orders, Groups I thru IV.
f. CEC California Electrical Code, California Code of Regulations, Title 24, Part 3, CCR-T24.
g. NEMA National Electrical Manufacturer's Association.

C. Certificates:
1. Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.

D. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
a. Coordinate the work with all other related work.
b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.
b. The warranty excludes: ordinary wear and tear, improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the elevator contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES, but the period of time shall be for One (1) Year.

1.6 OWNER'S INSTRUCTIONS

A. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below:
   1. Test and adjust controls and any safeties. Replace damaged or malfunctioning controls and equipment.

1.7 MAINTENANCE

A. Maintenance Service:
   1. Starting at the date of Substantial Completion, provide full maintenance of units for a period of three (3) months on a weekly surveillance basis, followed by nine (9) months on a monthly surveillance basis.
      a. Correct operational imperfections and restore or replace defective or deteriorated components and finishes.
      b. Use only genuine parts, components, and supplies as used in the manufacture and installation of original equipment.
   2. Continuing maintenance shall include systematic examination, adjustment, lubrication of elevator equipment whenever required and replacement of defective parts with parts of same or better manufacture as required for proper operation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer:
      a. UNITED TECHNOLOGIES (OTIS ELEVATOR):
         1) Model No. HYDROFIT No. 3,500.
   2. Acceptable alternative manufacturers:
      a. THYSSEN KRUPP ELEVATOR CORPORATION
      b. Acceptable alternative manufacturers must supply any step-up or step-down transformers as may be required for proper operation of their equipment as part of the Base Bid.
         1) No allowance for extras or Change Orders will be allowed for differing manufacturing electrical requirements.
      c. Sizes of equipment rooms, clearances around equipment and the elevator shaft are based on the specified manufacturer.
         1) All others (including acceptable alternative manufacturers) must accept planned sizes of rooms, clearances and shafts without any changes or cost increases.
         2) No allowance for extras or Change Orders will be allowed for differing manufacturing dimensional requirements.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system.
   1. Elevator Rated Capacity - 3,500 lbs., Class A, Passenger and Freight.
   2. Hydraulic Machines and Elevator Equipment: Provide hydraulic plunger-cylinder units of type indicated below, with electric pump-tank-control system equipment in machine room as indicated.
      a. Hydraulic Machines: Holeless telescoping, beside-the-car, hydraulic plunger-cylinder units.
      b. Pump Unit: Positive displacement pump with a maximum of 10 percent variation between no load and full load and fan-cooled squirrel cage induction motor.
         1) Provide isolation springs or pads as standard with the manufacturer to isolate the pump units from generated noise and vibrations to the adjacent slab or floor areas.
   3. Power Supply:
      a. Machine Room 480 V, 60 Hz, 3 phase, for each elevator.
   4. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide isolation couplings to prevent sound/vibration transmissions from pump unit.
   5. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.
   6. Car Frame and Platform: Welded steel units.
   7. Guide Rails: Manufacturer shall verify structural floor to floor supports for guide rails and supply heavy duty guide rails (approximately 18lbs to 21lbs) of sufficient strength and weight to span floor to floor (a minimum of 16 feet) supports.

2.3 EQUIPMENT

A. Operation Systems:
   1. General: Provide manufacturer's standard microprocessor operation system for each elevator or group of elevators of the type of operation indicated.
      a. Single Elevator--Passenger: Provide "Simplex Collective Operation" as defined in ASME A17.1.
         1) Automatic by means of the car and hall buttons.
         2) If all calls in the system have been answered, the car shall park at the last landing served.

B. Auxiliary Operations:
   1. Automatic Standby Power Operation (Battery) with Manual Override.
      a. Allows for lowering to bottom floor in the event of a power outage.

C. Security Features: In addition to above operational features, provide the following security features for passenger elevators, except where otherwise indicated. Security features shall not affect emergency firefighters service.
   1. Key switch operation at interior cab "stop" button. Key is required to activate "stop" button. Key is removable only in the deactivated position.

2. Key switch operation at elevator hall "call" push button plate. Key is required to activate elevator hall "call" push buttons. Key is removable only in the deactivated position.
3. Key switch operation only at elevator hall "call" plate in lieu of push buttons. Key is required to call the elevator.

D. Signal Equipment:
1. General: Provide signal equipment for each elevator or group of elevators complying with requirements indicated below.
   a. "White" Illuminated hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate of acrylic or other permanent translucent plastic that is ADA accessible.
   b. Except for buttons and illuminated elements, fabricate signal equipment with exposed surfaces as follows:
      1) Car Fixtures: Satin stainless steel.
      2) Hall Fixtures: Satin stainless steel.
   c. Car Control Stations: Provide manufacturer's standard semi-recessed car control station in each car. Include call buttons for each landing served and other buttons, switches, and controls required for specified car operation. Provide operating device symbols as required by code. Mark other buttons and switches with manufacturer's standard identification for required use or function. Mount in return panel adjacent to car door, if not otherwise indicated.
      1) Mount controls as shown or scheduled and at heights complying with ADA Accessibility Guidelines.
   d. Emergency Communication System: Provide hands-free audio (and visual flashing light that indicates the line is open) 2-way emergency communication between each car and a 24-hour monitoring service (*not a recording service*) on a dedicated phone line. System automatically dials preprogrammed number of monitoring service and identifies elevator location to monitoring service. System is contained in flush-mounted cabinet complete with identification, instructions for use, and battery back-up power supply, and complies with ADA regulations.
   e. Car Position Indicator: For passenger elevator cars, provide either illuminated-signal type, digital-display type, or segmented type, located above the car door or above the car control station. Also provide ADA compliant audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
      1) Include travel direction arrows if not provided in car control station.
   f. Hall Push-Button Stations: Provide ADA compliant hall push-button stations at each landing for each elevator or group of elevators as indicated.
      1) Provide units with flat faceplate designed for mounting on wall with body of units recessed in wall: 2-button stations at intermediate landings; 1-button stations with direction indication at terminal landings.
   g. Hall Lanterns: Provide units with illuminated arrows, but provide single arrow at terminal landings. Match materials, finishes, and mounting method of hall push-button stations.
      1) Place lanterns either above or beside each hoistway entrance, unless otherwise shown. Mount at minimum of 72 inches above finished floor.
      2) With each lantern, provide ADA compliant audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
   h. Hall Position Indicator: Provide illuminated-signal type or digital-display type, located above each hoistway entrance at ground floor. Match materials, finishes, and mounting method of hall push-button stations.

E. Door Safety Devices:

1. Door Edge Device: Provide retractable edge shoes on elevator entrance doors that cause doors to stop and reopen upon contacting an obstruction.
2. Photo-Eye Device: Provide electronic photo-eye device with timed cutout, projecting dual-light beams across car entrance at 5-inch and 29-inch heights, that when interrupted cause doors to stop and reopen.

2.4 COMPONENTS

A. Passenger Elevator Car Enclosures:
1. General: Provide manufacturer's standard car enclosures of the selections indicated. Include ventilation, lighting, access doors, doors, power door operators, sills (thresholds), trim, accessories, and wall and ceiling finishes. Provide manufacturer's standard flush-panel horizontal-sliding doors of type indicated. Provide manufacturer's standard protective edge trim system for door and wall panels, except as otherwise indicated.
   a. See interior finish schedule for floor finish designations.
2. Materials and Fabrication: Provide selections indicated for each car enclosure surface; provide manufacturer's standards, but not less than the following:
   a. Aluminum Sills: Extruded aluminum, with grooved surface, 1/4 inch thickness, mill finish.
   b. Wall Finishes: Plastic Laminate.
      1) High-pressure type complying with NEMA LD 3, Type GP-50; color, texture, and pattern as selected by Architect from plastic laminate manufacturer's full range of products (standard, premium or custom colors).
      2) Fabricate car with recesses and cutouts for signal equipment.
   c. Door Finishes: Satin Stainless Steel.
      1) ASTM A 167 “Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip”, Type 302 or 304, with No. 4 satin finish.
      2) Fabricate car door frame integrally with front wall of car.
   d. Ceiling Finishes: Luminous Ceiling.
      1) LED light fixtures and compatible ceiling panels complying with flammability requirements.
   e. Handrails - Satin Stainless Steel.
      1) ASTM A 167 “Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip”, Type 302 or 304, with No. 4 satin finish.
      2) Provide manufacturer's standard stainless-steel handrails on side walls and back wall, unless otherwise indicated.
   f. Pad Hooks:
      1) Provide manufacturer's standard pad hooks at the top of each wall panel in the car enclosure.

B. Passenger Hoistway Entrances:
1. General: Provide manufacturer's standard hollow-metal, sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Match car doors for size, number of panels, and door movement. Provide frame size and profile to coordinate with hoistway wall construction.
   a. Where gypsum board wall construction is indicated, fabricate frames with reinforced head sections.
2. Fire-Rated Hoistway Entrance Assemblies: Door-and-frame assemblies comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.

a. Fire-Protection Rating: 1 hour.

3. Materials and Fabrication: Provide selections indicated; provide manufacturer's standards, but not less than the following:
   a. Satin Stainless-Steel Frames: Formed stainless-steel sheet, ASTM A 167 "Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip," Type 302 or 304, with No. 4 satin finish.
   b. Satin Stainless-Steel Panels: Flush construction, fabricated from ASTM A 167 "Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip." Type 302 or 304 stainless steel, with No. 4 satin finish.
   c. Aluminum Sills: Extruded aluminum, with grooved surface, 1/4 inch thickness, mill finish.
   d. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, non gaseous grout complying with ASTM C 1107 "Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)." Provide grout specifically recommended by manufacturer for grouting door sills and similar applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
      a. Examine elevator areas, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of elevator work.
      b. Examine hoistways, hoistway openings, pits, and machine rooms, as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed.
      c. For the record, prepare a written report, endorsed by the Installer, listing dimensional discrepancies and conditions detrimental to the performance of elevator work.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.
2. Install plunger-cylinder units plumb and accurately centered for elevator car position and travel; anchor securely in place, supported at the pit floor.
3. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts.
   a. Comply with AWS standards for workmanship and for qualifications of welding operators.
4. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby, eliminate sources of structure-borne noise from elevator system.
5. Install piping above the floor, where possible. Where not possible, cover underground piping with permanent protective wrapping before backfilling.
6. Lubricate operating parts of systems, including ropes, if any, as recommended by manufacturers.
7. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars.
   a. Where possible, delay installation of sills and frames until car is operable in shaft.
   b. Reduce clearances to minimum, safe, workable dimension at each landing.
8. Leveling Tolerance: 1/4 inch, up or down, regardless of load and direction of travel.
9. Set sills flush with finished floor surface at landings. Fill space under sills solidly with non-shrink, non-metallic grout.

C. Assistance:
1. Provide the services of a factory-authorized service representative to supervise the field assembly of components and installation of products or systems and related connections specified within this section, and to report the results in writing to the Architect.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.
   a. Acceptance Testing: Upon nominal completion of elevator installation, and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by the "Code" and by governing regulations and agencies.

B. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Owner's Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 ADJUSTING

A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

3.6 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. Finish shall be clean and ready for the application of any additional finishes.
   3. In accordance with manufacturer's written instructions and recommendations.

3.7 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.
   1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
      a. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.
      b. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance.
      c. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies.
      d. Review data in "Operating and Maintenance Manuals". Refer to Specification Section - PROJECT CLOSEOUT.
      e. Make a final check of each elevator operation with Owner's personnel present and just prior to date of Substantial Completion.
         1) Determine that operation systems and devices are functioning properly.

3.8 PROTECTION

A. Protection from traffic:
   1. Temporary Use:
      a. Do not use elevators for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage.
         1) Provide full maintenance service by skilled, competent employees of the elevator Installer for elevators used for construction purposes.
         2) Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity.
         3) Use parts and supplies as used in the manufacture and installation of original equipment.
      b. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevators.
         1) If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so that no evidence remains of correction work.
         2) Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

2. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 21 00 00 - FIRE SPRINKLER SYSTEM

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions, Section 23 00 00, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. General: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The entire building shall be fire sprinklered. Note, all Science Classrooms shall be Ordinary Hazard, Group 2.

B. Design/Calculations: The sprinkler system has been designed and sized by hydraulic calculations in accordance with 2016 NFPA No. 13 and fire authority requirements. Calculations have been included in submittals. Provide current fire flow information from flow test at nearest fire hydrant. Fire flow test shall be done within 6 months of installation of sprinkler system.

C. Preparation of Drawings and Material Data Sheets: A complete fire sprinkler submittal (drawings, specifications, materials and hydraulic calculations) has been prepared. Hydraulic calculations shall conform to 2016 NFPA 13, paragraph 23.3.5 in all respects.

D. Coordination Drawings: Contractor shall submit coordination drawings with Contractor title block to Engineer for review, in addition to materials submittals. Deviations between bid documents and coordination drawings shall be specifically noted on drawings (highlighted, clouded, etc.). Any contractor requested design changes to these documents, including layout, materials, or calculations, may be considered a substitution and shall comply with paragraph 1.4 below.

1.3 WORK SPECIFIED ELSEWHERE:

A. Electrical wiring.

B. Fire alarm system.

C. Painting of exposed piping.

1.4 DESIGN CHANGES/SUBSTITUTIONS:

A. General: Design changes or substitutions of fire sprinkler system shall be submitted to Engineer for review and approved by DSA in the form of a CCD.

B. Significant changes in design or substitution of materials may require a change order, requiring resubmission to the authority having jurisdiction, as determined by the Engineer. Contractor shall bear all expenses incurred due to preparation and processing of design substitutions, up to and including submission to, and obtaining approval from, authority having jurisdiction. Refer to Section 23 00 00, 1.11, B.

C. Any substitution of “Flexible” type piping in lieu of “Rigid” pipe or any changes to size, manufacturer or lengths of “Flexible” type piping will require resubmittal of piping plans, product data sheets and hydraulic calculations to Engineer and authority having jurisdiction for review and approval.

D. Contractor shall submit design or field change(s) through proper channels. Engineer shall have a minimum of 5 working days after receipt of design or field change(s) to submit to DSA. Architect and Engineer shall not be liable for any delays due to DSA review time scheduling, or Contractor’s failure to identify changed areas and/or substituted materials in shop drawings and submittals.

PART 2 - PRODUCTS

2.1 STANDARDS:

A. All materials shall be in accordance with 2016 NFPA No.13 "Standard for the Installation of Sprinkler Systems". Underground mains shall be in accordance with 2016 NFPA No. 24 "Standard for the Installation of Private Fire Service Mains and Their Appurtenances".

2.2 PIPING MATERIALS:

A. General: The pressure rating of all piping, valves, flanges and other piping accessories shall be in accordance with code and fire authority requirements. Pressure ratings shall exceed the highest possible working pressure.

B. Piping:
1. Underground to Civil P.O.C.: Polyvinyl chloride, FM Class 200, DR 14, AWWA C900, with rubber ring joints, ASTM D1869. Cast or ductile iron fittings, AWWA C110 or C153, Class 250 or higher, with rubber ring joints, ASTM D1869.
2. Above Grade:
   a. 2" and Smaller: Threaded black steel pipe, ASTM A53, schedule 40. 175 psi WOG (min.) black cast iron threaded fittings, ANSI B16.4, UL listed. Unions shall be Class 150 malleable iron threaded, ANSI B16.3.
   b. 2-1/2" and Larger: Welded black steel pipe, ASTM A53, schedule 10. Standard weight carbon steel welding fittings, ANSI B16.9. Flanges shall be steel, ANSI B16.5. Roll grooved pipe couplings may be used for assembling welded sections, Victaulic, Grinnell, Gruvlok.

C. Gate Valve:
1. 2" and Smaller: All bronze, rising stem. UL listed.
2. 2-1/2" and Larger: Iron body, bronze mounted, outside screw and yoke. UL listed. (UL listed butterfly valves may be substituted for 4" and larger gate valves above grade.)

D. Check Valve:
   1. 2" and Smaller: All bronze swing check. UL listed.
   2. 2-1/2" and Larger: Iron body, bronze mounted swing check. UL listed.

E. Drain Valve: All bronze angle globe valve. UL listed.

F. Anchors and Hangers: Shall comply with 2016 NFPA No. 13.

2.3 SPRINKLER HEAD:

A. Automatic sprinkler head, concealed type in areas with finished ceilings and recessed or suspended lighting, semi-recessed in areas with finished ceilings and surface lighting, upright or pendent heads elsewhere (as allowed by NFPA 13). Heads in finished areas shall be Victaulic FireLock V38 quick response concealed, Tyco RFII quick response concealed, or Globe Fire Sprinkler Corp., Quick Response GL Series Concealed Pendent, with chrome-finish metal cover plate. Heads elsewhere shall be quick response, Victaulic FireLock V27, Tyco, Model TY-FRB or Globe Fire Sprinkler Corp., Model GL Quick Response, with standard finish. UL listed. Temperature ratings shall be in accordance with NFPA No. 13. Provide extra heads (of each type installed) in accordance with code requirements. Exposed heads installed with deflector lower than 7'-6" above floor shall have wire guards.

2.4 ALARM VALVE ASSEMBLY:

A. Standard wet type alarm valve assembly and electric bell complete with trim as required by the authority having jurisdiction. Provide flow switch for connection to alarm system. Provide tamper switch. UL listed. Coordinate with Division 28.

2.5 POST INDICATOR VALVE:

A. UL listed valve with lockable operating handle, tamper switch and target visible through a glass covered post, reading either "OPEN" or "SHUT".

PART 3 - EXECUTION

3.1 PIPING INSTALLATION:

A. General: Piping shall be concealed in walls, above the ceilings or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location shall be approved by the Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. Depth of cover in traffic areas shall be 36 inches (minimum).
   1. Installer Certification: Installation shall be performed by certified fire sprinkler fitter(s) as required by CCR, Title 19, Divisions 1, Chapter 5.5. See CAL FIRE – Office of the State Fire Marshall Information Bulletin 17-002 for more information. The Bulletin can be downloaded from the following:

http://osfm.fire.ca.gov/informationbulletin/pdf/2017/IB_AESCert_final_05_25_17.pdf

B. Standards: All piping shall be installed in accordance with 2016 NFPA No. 13 "Standard for the Installation of Sprinkler Systems". Underground mains shall be installed in accordance with 2016 NFPA No. 24 "Standard for the Installation of Private Fire Service Mains and Their Appurtenances".

C. Miscellaneous:
1. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings or floors in finished areas.
2. Pattern: Sprinklers shall be installed in a symmetrical pattern with lighting fixtures and with ceiling pattern. Heads located in lay-in ceilings shall be centered in panel.
3. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and smaller and 2" annular clearance for piping 4" and larger. Piping through walls and footings below grade shall be sealed with Link Seal. Pipes passing between floors shall have Holdrite HydroFlame water/firestop sleeves, UL listed.
4. Access: Provide access doors as required for all valves, devices, etc.
5. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe, or pipe insulation sealed with fire rated materials in accordance with the requirements of 2019 CBC Section 714. Pipes passing between fire rated floors shall have Holdrite HydroFlame water/firestop sleeves, UL listed.
6. Concrete Thrust Blocks: Shall be constructed at all valves, tees, elbows, bends, crosses, reducers and dead ends in loose-joint pipe. Blocks shall cure a minimum of 7 days before pressure is applied. Concrete shall be 3000 psi mix.
7. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards, except where specifically allowed by CEC.

3.2 IDENTIFICATION:

A. All controls, piping, valves and equipment shall be labeled for function and service in accordance with NFPA No. 13 and No. 24.

3.3 TESTS AND ADJUSTMENTS:

A. Unless otherwise directed, tests shall be witnessed by a representative of the Architect and an inspector of the authority having jurisdiction. Contractor shall notify fire authority at least 48 hours prior to testing. At various stages and upon completion, the system must be tested in the presence of the enforcing agency. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and the entire work retested. Test all systems in accordance with fire authority requirements and NFPA No. 13 and No. 24.

3.4 CERTIFICATION:

A. At completion of the project, a Contractor's Material and Test Certificate, indicating installation and testing in accordance with referenced standards, shall be completed. Copies shall be prepared by Contractor for the approving authorities, Owner and Contractor. Deliver certificates to Owner through Architect.

END OF SECTION

SECTION 22 00 00 – PLUMBING

PART 1: - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions, Section 23 00 00, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
1. Sanitary sewer system.
2. Domestic water system.
3. Storm drain system.
4. Fuel gas system.
5. Drain system (including condensate drain).
6. All equipment as shown or noted on the drawings or as specified.
7. Coordinate and cooperate with commission agent as required by Section 01 91 13.
8. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, braces, housekeeping pads, supports and related items no longer required.
9. Lead Free: All equipment, fixtures, valves and fixture stops providing water for human consumption installed after January 1, 2010, must meet the “Lead Free” requirements for the State of California.

B. Work Specified Elsewhere:
1. Line voltage power wiring, disconnect switches and installation of all starters are included in the Electrical Section unless otherwise noted.
2. Concrete and reinforcing steel unless specifically called for on the drawings or specifications.
3. Painting unless specifically called for in the drawings or specifications.
4. Carpentry.
5. Control of circulating pumps, etc.

PART 2: - PRODUCTS

2.1 PIPING MATERIALS:

A. Sanitary Sewer:
1. Soil, Waste and Vent Piping (Non-Pressurized) - Inside Building, Within Five Feet of Building Walls to Civil P.O.C.: Standard weight coated cast iron pipe and fittings. Plain end, CISPI 301, ASTM A888, or hub end with rubber gaskets, ASTM A74, ASTM C564. ABI, Charlotte, Tyler. Couplings shall be heavy-duty shielded couplings, Type 304 stainless steel, with neoprene gasket, ASTM C-1540. Husky HD 2000, Clamp-All 80, Mission HeavyWeight. MG Couplings are also

acceptable. Size 2" and smaller above grade may be standard weight galvanized steel, ASTM A53, with coated cast iron recessed drainage fittings, ANSI B16.12. 2" and smaller exposed to view shall be galvanized steel, ASTM A53, with coated cast iron recessed drainage fittings, ANSI B16.12.

Where required by soil conditions, as determined by the method described in ASTM A74-09, Appendix X2, below grade cast iron pipe and fittings shall have 8 mil (minimum) Polyethylene Encasement (Poly Wrap), Per ANSI/AWWA C105/A21.5.

Below Grade at Kitchens: Standard weight epoxy-coated cast iron pipe and fittings. Plain end, CISPI 301, ASTM A888. The inside of each pipe shall be reamed prior to coating to decrease the coefficient of friction. Pipe coating shall be chemically deposited zinc-phosphate pretreatment layer followed by an electrically deposited, high-performance cathodic epoxy coating, and finally an electrically deposited, high performance anodic epoxy top coat. Pipe and fitting coatings must pass the following performance specifications per EN 877: 350 hours of salt spray testing, resistance to wastewater for 30 days at 73° F, chemical resistance from pH 2 to pH 12 for 30 days at 73° F, resistance to hot water for 24 hours at 203° F. Cutting of piping and field coating of all cut joints shall be in accordance with the manufacturer's installation guidelines. Couplings shall be heavy-duty shielded couplings, Type 304 stainless steel, with neoprene gasket, ASTM C1540. Husky HD 2000. Charlotte Edge HP Iron.

2. Cleanouts: Comparable models of Josam, Wade, Mifab or Zurn are acceptable. Grease plug prior to installation. Floor Cleanouts: Smith 4023 with nickel bronze top in finished areas; Smith 4223 in utility areas. Wall Cleanouts: Smith 4532 with stainless steel cover and screw. Pipe Cleanouts: Iron body with threaded brass plug. Site cleanouts more than 5' outside building may be PVC with PVC plug.
3. Cleanout Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.

B. Storm Drain (Including Rain Water Leader, RWL) - Inside Building and Within Five Feet of Building Walls: Same as Soil, Waste and Vent Piping, except as otherwise noted on drawings. Where exposed to view on exterior of building, piping shall be galvanized steel with recessed drainage fittings.

C. Water and Gas:
1. Cold Water Piping: Materials used in the water system, except valves and similar devices, shall be of like material, except where otherwise approved by Engineer and Authority Having Jurisdiction, prior to start of work. For existing water systems of galvanized steel or copper, materials shall match existing.
   a. Inside Building, Within Five Feet of Building Walls, and All Above Grade to Civil P.O.C.:
      (1) Schedule 40 galvanized steel pipe, ASTM A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3.

      -or- (2) Hard temper seamless copper, ASTM B88. Wrought copper fittings, ANSI B16.22. Type L with brazed joints (1100F, min.). 1-1/2" and smaller above grade may be soldered, 95-5 tin-antimony solder. All nipples shall be lead-free red brass (85% copper). Above grade fittings may be copper press fittings, ASME B16.18 or ASME B16.22. EPDM O-rings. Installation shall be in

accordance with the manufacturer's installation instructions. ProPress, Apollo, Mueller Streamline.

b. Outside Building - Below Grade to Civil P.O.C.:

(1) Same as Inside Building. Galvanized steel shall have protective coating.

-or- (2) 3" and Smaller: Schedule 80 Polyvinyl chloride (PVC), ASTM D1785, with Schedule 80 PVC solvent weld fittings, ASTM D2466 where approved by administrative authority.

-or- (3) 4" and Larger: Polyvinyl chloride, AWWA C900, Class 150, ASTM D1784, ASTM D2241, where approved by administrative authority, cast or ductile iron fittings, AWWA C110 or C153, Class 150, with rubber ring joints, ASTM D1869.

2. Hot Water Piping:

a. Inside Building - Above Slab: Same as Cold Water Piping - Inside Building.

b. Outside Building or Below slab: Pre-insulated. Type L copper core. 1" foamed polyurethane insulation for less than 1" nominal pipe, 1-1/2" for 1" and larger nominal pipe. See Title 24, Part 6 "California Energy Code" for temperatures above 140ºF. Polyvinyl chloride or high density polyethylene jacket. Sealed ends. Brazed joints (1100F, min.) Fittings shall be wrought copper, with brazed joints (1100F, min.). Provide anchor points and bolster pads as required. Submit shop drawing from manufacturer showing anchor points and bolster pad locations. Perma-Pipe/Ricwil, Thermacor, Thermal Pipe Systems.

3. Gas Piping:

a. Inside Building and All Above Grade: 2" and Smaller: Schedule 40 galvanized steel pipe, ASTM A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3, ANSI B31.8. Flexible connections shall be corrugated stainless steel, CSA (US) approved. 2-1/2" through 4": May be screwed pipe as above or welded pipe as below. 6" and larger: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9.

b. Inside Building - Below Grade to Five Feet Outside Building: Same as Inside Building and All Above Grade. Provide sleeves and vents acceptable to administrative authority.

c. Outside Building - Below Grade: Polyethylene pipe and fittings, ANSI B31.8, ASTM D2513, where allowed by administrative authority, Driscopipe 6500, Dupont Aldyl "A", Plexco. Otherwise, piping shall be coated schedule 40 steel, ASTM A53.

4. Valves and Specialties:

a. Valves:

(1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Kitz, Milwaukee, Nibco, Stockham, Walworth or Watts are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer. Butterfly valves may be substituted for 2-1/2" and larger gate valves above grade; see specification below. Provide a minimum of two operating "T" handles for underground valves for each underground system where valves are required. The lengths of the handles are dependent upon the depth of the valves and the

ability of the handles to fully open and/or close the valves. At least one “T” handle for each system shall be on site at the beginning of the installation of a particular system for emergencies, and the Construction Manager shall have access to these “T” handles and valves.

(2) Gate Valve: 2" and Smaller: All bronze. Non-rising stem. Threaded bonnet. Wedge disk. Malleable iron handwheel. 200 psi CWP. Nibco T-113-LF. 2-1/2" and Larger: Iron body, bronze mounted. Non-rising stem. Resilient wedge. 200 psi CWP. Flanged or AWWA hub end as applicable. Nibco F-619-RWS. Underground valves shall have square operating nut.

(3) Butterfly Valve: Ductile iron threaded lug body. Aluminum bronze disk. EPDM molded-in liner and seals. 416 stainless steel shaft. 6" and smaller valves shall have multi-position lever handle. 8" and larger valves shall have gear operator. Provide 2" extension neck at insulated pipes. Nibco LD-2000.

(4) Check Valve: 2" and Smaller: Lead-free bronze swing check, regrinding. 200 psi CWP. Nibco T-413-Y-LF. For vertical applications use lead-free bronze, spring-loaded, lift-type. Nibco T-480-Y-LF. 2-1/2" and Larger: Iron body, flanged, bronze mounted, swing check. 200 psi CWP. Stockham G-931.

(5) Ball Valve: Full port. Lead free brass body, cap, stem, disk and ball. Screwed connection. Lever handle. PTFE seat and stem packing. Min. 400 psi CWP. CSA-US and UL listed. Nibco T-FP-600A-LF.

(6) Plug Valve: Valves in gas piping systems must be UL or CSA listed for gas distribution. 4" and Smaller: Eccentric bronze or nickel plated semi-steel plug. Semi-steel body. Bronze bushings. Buna-N-rings. 175 psi WOG. KeyPort Valve Series 400. 2" and smaller above grade may be listed full port ball valves, except in publically accessible locations. Apollo, Jomar, Nibco. 6" and Larger: Lubricated plug cock. Cast iron or semi-steel body and plug. 200 psi WOG. Flanged. Wrench handle. Provide one operating "T" handle for underground valves. Resun R-1431.

(7) Valve Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.

b. Instruments:

(1) Thermometer: 3" dial. Stainless steel case. Back or bottom connected as required. 1/2" NPT. 20F-240F, 2F divisions for hot water. 25F-125F, 2F divisions for chilled water. 2" insertion length. Allowance to be made for insulation thickness. For installations over 7 feet above finish floor, provide digital thermometer with remote reader. Marshalltown, Moeller, Taylor, Tel Tru, Winters.

(2) Thermometer Well: Brass well. Suitable for thermometer above. Provide 2" extension at insulated pipes.

(3) Pressure Gage: Phosphor bronze tube. Bronze bushed. 1% accuracy. Cast aluminum case. 3-1/2" white dial. Adjustable pointer. Operating pressure at midscale. 1/4" NPT brass socket.

Provide brass porous core pressure snubber and gage cock. Trerice, Weksler, Winters.

(4) Gage Cock: Lever handle brass cock. 1/4" NPT connections.

(5) Instrument Well: Suitable for temperature sensing element. Coordinate with supplier of temperature controls.

c. Miscellaneous Specialties:

(1) Temperature and Pressure Relief Valve: ASME rated fully automatic, reseating combination temperature and pressure relief valve sized in accordance with energy input. Sensing element immersed within upper 6" of tank. Watts.

(2) Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi. Unions for copper piping shall be copper or lead free cast bronze. Anvil. Size 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. EPDM gasket, NSF 61 rated. Victaulic Style 77, Gruvlok.

(3) Dielectric Coupling: Insulating union or flange rated for 250 psig. Wilkins DUXL Series.

(4) Shock Absorber: Multiple bellows. All stainless steel construction. Designed and applied in accordance with PDI WH201. Amtrol, Smith, Wade, Zurn.

(5) Gas Pressure Reducing Valve: Capacity and pressure ratings as indicated on drawings. American Meter.

(6) Flexible Connection: Corrugated bronze or stainless steel core covered with high tensile bronze or stainless steel tubular braid. 150 psi working pressure. 2" and smaller shall have screwed connections. 2-1/2" and larger shall have flanged connections. Flexonics, Keflex.

E. Drain Piping (including Condensate): Same as inside building cold water piping.

1. Condensate Drain Piping for Condensing Gas Fired Equipment: Schedule 40 CPVC piping with solvent weld fittings from equipment to neutralizing kit. Schedule 40 galvanized steel, ASTM A53 downstream of neutralizing kit. If no neutralizing kit, piping shall be CPVC to point of discharge.

F. Flue and Intake Piping (Condensing Gas Fired Equipment): Schedule 40 CPVC piping with Schedule 40 CPVC solvent weld fittings. Install per equipment manufacturer’s instructions.

G. Miscellaneous Piping Items:

1. Pipe Support:

a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendation. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Anvil, Unistrut.

b. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco, Superstrut.

c. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.

2. Flashing: Vent flashing shall be 4 lb/ft2 lead, 16" sq. flange, length sufficient to be turned down 2" into vent. Oatey. Flashing for other piping through roof shall be prefabricated galvanized steel roof jacks with 16" sq. flange. Provide clamp-on storm collar and seal water tight with mastic. For cold process built-up roof, material shall be 4 lb/ft^2 lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer's recommended flashing material.

2.2 PIPING INSULATION MATERIALS:

A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Pre-Molded Fiberglass: Heavy density sectional pre-molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-F at a mean temperature of 50F. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. For hot water piping to 140°F, thickness shall be 1" for pipe sizes less than 1"; 1-1/2" thickness for pipe sizes 1" and larger. See Title 24, Part 6 "California Energy Code" for temperatures above 140°F. Knauf, Johns-Manville, Owens-Corning.

C. Fiberglass Blanket: Unfaced. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-F at a mean temperature of 50F. 1-1/2" thickness. Knauf, Johns-Manville, Owens-Corning.

D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.

E. Aluminum Jacketing: Aluminum pipe and fitting jacketing, 0.016" thickness for straight pipe. 0.024" thickness for fittings. Integral moisture barrier. Stucco-Embossed finish. Provide pre fabricated aluminum strapping and seals by same manufacturer. ITW or RPR.

F. Outdoor Weather Barrier Mastic: Childers CP-10/11, Foster 46-50.

G. Metal Jacketing/Flashing Sealant: Childers CP-76, Foster 95-44.

H. Molded Closed Cell Vinyl (Piping Insulation Under Accessible Lavatories and Sinks): Fully molded closed cell vinyl, 1/8" thick, minimum. Thermal conductivity shall not exceed 1.17 BTU-in/hr-ft^2-ºF at an average temperature of 73ºF. Weep hole in cleanout nut enclosure. Hinged cap over valve to allow access for servicing. Out of sight nylon fastening system and internal ribs on drain insulation to provide air gap (Lav-Guard Only). Truebro Lav-guard, McGuire Pro Wrap, Plumberex.

2.3 FIXTURES:

A. General: Provide rough-in for and install all plumbing fixtures shown on drawings. Except in equipment rooms, all trim, valves and piping not concealed in wall structure, above ceiling or below floors, shall be brass with polished chrome plate finish, unless noted otherwise. All enameled fixtures shall be acid resisting. Standard color is white unless otherwise noted.

B. Schedule: Refer to Plumbing Fixture Schedule on the drawings for list of fixtures and trim. Manufacturer's model numbers are listed to complete description. Equivalent models of American Standard, Eljer, Elkay, Haws, Just, Kohler, T&S Brass, Willoughby or Zurn are acceptable. For drainage fixtures, equivalent models of Josam, Mifab, Smith, Wade or Zurn are acceptable.

C. Stops and P-Traps: All fixtures shall be provided with stops and P-Traps as applicable. Wall mounted faucets, valves, etc. shall have integral stops or wall mounted stops.
   1. Stops: All hot and cold water supplies shall be 1/2" I.P.S. inlet angle stops with stuffing box, loose key lock shield, and brass riser (3/8" for 2-1/2 gpm and less, otherwise 1/2"). ¼ turn ball stops do not require stuffing box. Dahl, McGuire, Speedway.
   2. P-Traps: Semi-cast brass, ground joint. 17-gage. Clean-out plug. Unobstructed waterway. California Tubular, McGuire.

D. Caulking: Caulk fixtures with white G.E. "Sanitary SCS1700", mildew resistant silicone sealant with EPA listed anti-microbial.

2.4 EQUIPMENT:

A. General Requirements:
   1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
   2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
   3. Ratings:
      a. Gas: Gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and shall be CSA (US) or AGA certified.
      b. Electrical: Electrical equipment shall be in accordance with NEMA standards and UL or ETL listed where applicable standards have been established.
   4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
   5. Electrical:
      a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by

equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be manual reset, and shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.

b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.

c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip-proof, NEMA B design on pumps, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction, unless otherwise noted. Design shall limit starting inrush current and running current to values shown on drawings. Motors from 1 horsepower to 5 horsepower shall be the standard high efficiency type, Magnetek E-Plus. Motors 7-1/2 horsepower and larger shall be the premium efficiency type, tested according to IEEE Standard 112, Method B. Motors exposed to weather shall be TEFC. Vertical motors with exposed fans shall have rain caps.

d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.

e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.

f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.

B. Water Heater (WH-1, 2): Gas-fired, tankless, condensing, wall-mounted water heater, direct vent, certified by CSA Group to the latest edition of ANSI standard Z21.10.3/CSA 4.3. Unit shall be designed to burn natural. Water heater shall be vented with 2" or 3” CPVC vent pipe per manufacturer’s installation instructions. Water heater shall be rated for 150 PSI working water pressure and 300 PSI test pressure. Gas supply pressure shall be 3.5" to 10.5" WC for natural gas. Unit shall have a steel case, dual stainless steel heat exchangers, eco premixed burner, negative pressure gas valve, dual venturi, 3/4" inlet gas connection, 3/4" brass inlet/outlet water connections, and a condensate collector. Unit shall include features such as an adjustment for installations at high elevation, temperature lockout, and temperature options from 98-120°F in 1 °F intervals and 125-140°F in 5°F intervals. The unit shall include additional temperature options of 150-180°F in 10°F intervals, and 182°F for high temperature commercial applications. All NPE “A” models shall include an internal circulation pump and 0.5 gallon buffer tank. The water heater shall be controlled by an internal circuit board that monitors the inlet and outlet temperatures with installed thermistors, sensing and controlling flow rate to set point temperature with air-fuel ratio controls in order to maintain thermal combustion efficiency. Unit shall include safety features such as flame sensor system, high limit sensors, overheat prevention device,

freeze protection mode, and fan motor rotation detector. Multi-system (cascade) applications that require 2 to 16 units shall be installed by connecting the units using cable-only connections (Ready-Link). The water heater shall exceed the energy efficiency requirements of ASHRAE 90.1-2013 and shall be listed by SCAQMD rule 1146.2 (Type 1) for Low NOx that complies with 20 ppm NOx requirements @ 3% 02. Water heater shall have a minimum 8-year limited Heat Exchanger warranty and 3-year limited Parts warranty for Commercial use. Navien, Inc. NPE Series.

C. Water Heater (WH-3, 4): Natural gas fired. Minimum 95% thermal efficiency. Water heater(s) shall be of power direct vent design, using CPVC pipe for horizontal and/or vertical vent runs. Water heater(s) shall have seamless, glass-lined steel tank construction and a spiral-shaped heat exchanger placed entirely inside the tank, which shall be glass-lined on the flue gas side to protect against acidic condensate. Advanced electronic control w/ LCD display and actual diagnostic. Water heater(s) shall meet the thermal efficiency and standby loss requirements of the U.S. Department of Energy and current edition of ASHRAE/IESNA 90.1 and be design-certified by CSA or UL (Underwriters Laboratories) according to ANSI Z21.10.3-CSA 4.3 standards governing storage tank water heaters. Water heater shall comply with SCAQMD Rule 1146.2 and other Air Quality Management Districts with similar requirements for low NOx emissions. Water heater shall incorporate the iCOMM™ system connection for remote monitoring, leak detection and fault alert. Powered non-sacrificial anodes. Neutralizing kit. Energy Star qualified. 5 year extended warranty. A.O. Smith.

D. Instantaneous Electric Water Heater: See Equipment Schedule on Plumbing Drawings.

E. Electric Drinking Fountain: Wall hung with bottle filler, see equipment schedule on plumbing drawings. Provide steel mounting brackets. Stainless steel basin. Removable grid drain. Chrome plated brass bubbler with automatic flow regulator and self closing valve. Non ferrous evaporator. Lead solder shall not be used. Hermetic compressor with automatic reset overload protection. Air cooled condenser. Adjustable thermostat. UL listed. ARI certified. Elkay, Haws, Sunroc.

F. Circulating Pump: In line centrifugal. 3-speed motor. Body: Lead Free bronze body, brass impeller. Mechanical seals. Bronze sleeve bearings. Integral thermal overload protection. Bell and Gossett/Xylem, Taco. -OR- Body: Aluminum housing. All parts exposed to fluid, stainless steel. Water lubricated ceramic shaft and bearings. Epoxy encapsulated windings. Grundfos.

2.5 GREASE INTERCEPTOR:

A. Precast reinforced concrete grease interceptor designed and constructed in accordance with California Code of Regulations, Title 24. 24" manholes with gas tight cast iron ring and bolted cover. See schedule on drawings for tank sizing, inlet and outlet sizing and number of manholes. Jensen Precast, M.C. Nottingham, Pro-Cast.

PART 3: - EXECUTION

3.1 PIPING INSTALLATION:

A. General:

1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted.
2. Joints:
    a. Threaded: Pipe shall be cut square and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
    b. Welded or Brazed: Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100F. Welding or brazing shall be performed by a Certified Welder or Brazer as certified by an organization/institution that uses standards recognized by the American Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
    c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
    d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.
3. Fittings and Valves:
    a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
    b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
    c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
    d. Valves: All valves shall be full line size. Provide shut-off valve for each building and each equipment connection. Provide shut-off valve at each point of connection to existing piping. At equipment connections, valves shall be full size of upstream piping, except that gas valves within 18" of the point of connection to the equipment may be the same size as the equipment connection.
    e. Valve Accessibility: All valves shall be located so that they are easily accessible. Valves located above ceilings shall be installed within 24" of the ceiling. For situations where this is not practical or where valves are greater than 10' above the floor, chain wheel operators shall be provided. Chain shall extend down to 7' above the floor. All such installations must have prior review by the Engineer.
4. Pipe Support:
    a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Side

beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction. Support individual pipes with pipe hanger. Copper piping systems which protrude through a surface for connection to a fixture stop or other outlet shall be secured with a drop ell, Nibco 707-3-5, to a Holdrite Model #SB1 bracket; nipple through surface shall be threaded brass.

(1) Pressure Pipe:

Pipe Size (Inches)	Maximum Spacing* Between Supports (ft.)		
	Copper	Sch. 40 steel	Plastic
1/2	6	6	4
3/4	6	8	4
1	6	8	4
1-1/4	6	10	4
1-1/2	6	10	4
2	10	10	4
2-1/2	10	10	4
3	10	10	4
4	10	10	4
6	10	10	4
8	10	10	4

*Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings. Seismic requirements may reduce maximum spacing.

(2) Gravity Drain Pipe: Piping shall be supported at each length of pipe or fitting, but in no case at greater spacing than indicated above for pressure pipe.

b. Hot and Cold Water Piping: All hot and cold water piping shall have isolating shield; no portion of this piping shall touch the structure without an isolating shield except at anchor points for fixture rough-in.

c. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.

5. Miscellaneous:

a. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings, or floors in finished areas.

b. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and smaller, otherwise 2" annular clearance. Piping through walls or footings below grade shall be sealed with Link Seal. Pipes passing through floors shall have Holdrite HydroFlame water/firestop sleeves, UL listed.

c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of 2019 CBC Section 714. Pipes passing through fire rated floors shall have Holdrite HydroFlame water/firestop sleeves, UL listed.

d. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.

e. Thermometer Tap: Provide tee for instrument well. Minimum size of pipe surrounding well shall be 1-1/2". Mount on side of pipe.

B. Sanitary Sewer Piping:

1. General: Where inverts are not indicated, piping shall be installed at 1/4" per foot pitch. Piping 4" and larger may be installed at 1/8" per foot pitch where structural or other limitations prevent installation at a greater pitch. Bell and spigot piping shall be installed with barrel on sand bed; excavate hole for bell.
2. Cleanouts: Install cleanouts at ends of lines, at changes of direction greater than 45 degrees, and at not greater than 100 foot intervals. Locate interior cleanouts in accessible locations and bring flush to finished surface.
3. Vents: Vents shall terminate not less than 6" above the roof nor less than 12" from any vertical surface nor within 10' of any outside air intake. Install horizontal vent lines at 1/4" per foot pitch. Offset vents 2' minimum from gutters, parapets, ridges and roof flashing.

C. Storm Drain (Including Rain Water Leader, RWL): Similar to Sanitary Sewer. Piping with less than 24" of cover outside building walls shall be cast iron.

D. Water Piping: Connections to branches and risers shall be made from top of main. Supply header in fixture battery shall be full size to last fixture, reducing in size only on individual connections to each fixture in battery. Minimum pipe size shall be 1/2", unless otherwise noted. Exposed fixture stops and flush valves shall be installed with brass nipples for copper piping and galvanized nipples for galvanized piping. Nipples are to extend from outside of wall to fitting at header or drop behind finish wall surfaces. Pipe nipples shall be same size as stop or flush valve. Provide shut off for each building and each connection to equipment. Shock absorbers shall be installed in a vertical position as indicated on drawings. Only equipment mounted on vibration isolators shall be connected with flexible connections. Underground hot water and cold water piping which run parallel to each other shall be installed a minimum of 3 feet apart. The manufacturer of the pre-insulated underground hot water piping system shall instruct the installer regarding the manufacturer's required installation procedures. The manufacturer shall also provide sufficient job site inspection to ensure that the work is being accomplished in accordance with the plans, specifications and manufacturer's requirements. Upon completion of the installation, a certificate shall be furnished to the Architect by the manufacturer of the system, certifying the installation was made in accordance with his requirements and in compliance with the plans and specifications.

E. Gas Piping: Installation shall comply with CPC and NFPA 54 (National Fuel Gas Code). Shall be pitched to drain to drip legs at low points where other than dry gas conditions exist. No unions shall be installed except at connections to equipment. Provide shutoff and dirt leg (sediment trap) at each equipment connection. Only equipment mounted on vibration isolators shall be connected with flexible connectors. Under floor piping shall be sleeved and vented. Plastic pipe and fittings shall be joined in accordance with manufacturer's recommendations. Metal to plastic transition fittings shall be installed at all transitions. Provide 14-gage insulated tracer wire secured to pipe at 10' intervals with nylon ties. Terminate tracer 6" above grade at both ends.

Odor Fade Warning – The odorant in propane (LP) and natural gas is colorless and the intensity of its odor can fade under some circumstances. Contact the utility company for more information.
Submit installer training certification from polyethylene piping manufacturer certified trainer, include copy of trainer's certification. Training shall have been completed no more than 6 months prior to starting work.

F. Drain Piping (Including Condensate): Install with constant pitch to receptacle, 1/4" per foot where possible, otherwise 1/8" per foot minimum. Provide TEE with clean-out plug at all changes of direction. Provide trap at each air handling unit to prevent air leakage. Only equipment mounted on vibration isolators shall be connected with flexible connection. Piping not concealed in wall structure, above ceilings or below floors shall be chrome plated brass, except in equipment rooms, piping shall be galvanized steel. P&T relief and water heater drain piping shall be galvanized steel. Provide secondary drain piping where required.

G. Plastic Piping: Shall be cut square and assembled prior to solvent weld. Apply primer per manufacturer's recommendations. Coat male joint fully with solvent, make joint before solvent dries and wipe exterior clean.

3.2 PIPING INSULATION INSTALLATION:

A. Domestic Hot Water:
1. General: All domestic hot water piping, fittings and accessories shall be insulated.
2. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied pressure sealing tape.
3. Fittings and Valves:
   a. Wrap all fittings and valves with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket in accordance with manufacturer's recommendations. Solvent weld. Seal all joints with factory supplied pressure sealing vapor barrier tape with 1-1/2" (min.) overlap on both sides of joint. Insulate valves to stem. Do not insulate unions, flanges or valves unless water temperature exceeds 140F or the piping is exposed to weather.
   b. For miscellaneous fittings and accessories for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the fiberglass blanket with stretchable glass fabric, one coat of lagging adhesive and a final coat of vapor barrier coating. All exposed ends of insulation shall be adequately sealed.
4. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of PVC jackets.

B. Cold Water Piping-Freeze Protection: All cold water piping exposed to weather or other areas subject to freezing (i.e. ventilated attics, uninsulated exterior soffits, etc.) shall be insulated same as hot water piping. Cover with PVC jacketing where exposed to view, aluminum jacketing where exposed to weather.

C. Piping Insulation Under Accessible Lavatories and Sinks: Water piping, water stops and drain piping under accessible lavatories and sinks shall be insulated with 1/8" thick molded closed cell vinyl. Installation shall be in accordance with manufacturer's instructions.

3.3 FIXTURE INSTALLATION:

A. Fixture Height: Shall be as indicated on Architectural drawings.

B. Floor Drains or Floor Sinks: Shall be placed parallel to room surfaces, set level, flush with floor, and adjusted to proper height to drain. Cover openings during construction to keep all foreign matter out of drain line.

C. Wall Hung Fixtures: Shall be provided with proper backing and hanger plates secured to wall. Fixtures mounted on carriers shall bear against stop nuts, clear of wall surface. Caulk fixtures against walls with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).

D. Floor Mounted Fixtures: Shall be provided with proper support plates. Caulk floor mounted fixtures with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).

E. Other Connections: Rough-in and connection for trim or fixtures supplied by others shall be included in this specification section.

3.4 EQUIPMENT INSTALLATION:

A. General: It shall be the responsibility of the equipment installer to insure that no work done under other specification sections shall in any way block, or otherwise hinder the equipment. All equipment shall be securely anchored in place.

B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

3.5 TESTS AND ADJUSTMENTS:

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested. Tests may be made in sections, however, all connections between sections previously tested and new section shall be included in the new test.

B. Gravity Systems:
   1. Sanitary Sewer: All ends of the sanitary sewer system shall be capped and lines filled with water to the top of the highest vent, 10' above grade minimum. This test shall be made before any fixtures are installed. Test shall be maintained until all joints have been inspected, but no less than 2 hours.
   2. Drains (Including Condensate): Similar to Sanitary Sewer.

3. Storm Drain: Similar to Sanitary Sewer.

C. Pressure Systems:
1. General: There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made.
2. Domestic Hot and Cold Water Piping: Maintain 100 psig water pressure for 4 hours.
3. Gas Piping: Maintain 100 psig air pressure for 4 hours.
4. Backflow Preventer: All backflow preventers shall be tested according to manufacturer's recommendations and the USC Cross Connection Control and Hydraulic Research Manual (8th Edition). Testing shall be performed by an AWWA Certified Backflow Prevention Assembly Tester. Contractor shall certify in writing to the Architect the date which backflow preventers were tested and by whom test was witnessed.

D. Fixtures: Provide torque testing of water closet carrier anchor bolts in presence of Inspector. If Inspector is not available, a testing agency shall handle the inspection.

3.6 DISINFECTION:

A. Disinfect all domestic water piping in accordance with 2019 CPC Section 609.9, and in accordance with administrative authority. Disinfection process shall be performed in cooperation with health department having jurisdiction and witnessed by a representative of the Architect. During procedure signs shall be posted at each water outlet stating, "Chlorination - Do Not Drink". After disinfection, one set of water samples shall be collected by Contractor for bacteriological analysis in presence of Inspector. If the water fails the bacteriological test, Contractor shall disinfect the piping again and pay for any retesting required, at no additional cost to owner. Bacteriological testing results shall be obtained by Contractor and delivered to the Owner through the Architect before project completion. Contractor shall include copy of Bacteriological Test Results at closeout with operation and maintenance manuals.

END OF SECTION

SECTION 23 00 00 - GENERAL MECHANICAL PROVISIONS

PART 1: - GENERAL

1.1 GENERAL CONDITIONS:

A. The preceding General and Special Conditions and Divisions 00 and 01 requirements shall form a part of this Section with the same force and effect as though repeated here. The provisions of this Section shall apply to all of the Sections of Divisions 21, 22 and 23 of these Specifications and shall be considered a part of these sections.

1.2 CODES AND REGULATIONS:

A. All work and materials shall be in full accordance with current rules and regulations of all applicable codes. Nothing in these Drawings or Specifications is to be construed to permit work not conforming to these codes. Should the Drawings or Specifications call for material or methods of construction of a higher quality or standard than required by these codes, the Drawings and Specifications shall govern. Applicable codes and regulations include, but are not necessarily limited to, the following:

1. California Code of Regulations (CCR):
   a. Title 8, Industrial Relations
   b. Title 24, Part 1, Administrative Regulations
   c. Title 24, Part 6, California Energy Code, 2019 Edition
   d. Title 24, Part 11, California Green Building Code, 2019 Edition
2. California Building Code - CBC - 2019
3. California Mechanical Code - CMC - 2019
4. California Plumbing Code - CPC - 2019
5. California Fire Code - CFC - 2019
6. California Electrical Code - CEC - 2019
7. Air Diffusion Council - ADC
8. American Gas Association - AGA
9. Air Movement and Control Association - AMCA
10. American National Standards Institute - ANSI
11. Air Conditioning and Refrigeration Institute - ARI
12. American Society of Heating, Refrigerating, and Air Conditioning Engineers - ASHRAE
13. American Society of Mechanical Engineers - ASME
14. American Society for Testing and Materials - ASTM
15. American Water Works Association - AWWA
16. Cast Iron Soil Pipe Institute - CISPI
17. National Electrical Manufacturers Association - NEMA
18. National Fire Protection Association - NFPA
19. National Sanitation Foundation - NSF
20. Occupational Safety and Health Act - OSHA
21. Plumbing and Drainage Institute - PDI
22. Sheet Metal and Air Conditioning Contractors National Association - SMACNA
23. Underwriters' Laboratory - UL

1.3 PERMITS AND FEES:

A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required. All charges are to be included in the work. Permits for equipment connected to a particular system are to be considered as part of the work included under each system. All charges or fees for service connections, meters, etc. shall be included in the work.

1.4 COORDINATION OF WORK:

A. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. Some work may be shown offset for clarity. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc. shall be carefully planned prior to installation of any work in order to avoid all interference with each other, or with structural, electrical, architectural or other elements. Verify the proper voltage and phase of all equipment with the electrical plans. If discrepancies are discovered between drawing and specification requirements, the more stringent requirement shall apply. All conflicts shall be called to the attention of the Architect and the Engineer prior to the installation of any work or the ordering of any equipment. No work shall be prefabricated or installed prior to this coordination. No costs will be allowed to the Contractor for any prefabrication or installation performed prior to this coordination.

B. Mandatory Coordination and Shop Drawings:

1. Prepare or have prepared high level detailed Shop Drawings in plan view, with cross-sections as necessary, indicating the proposed installation plan for all HVAC, mechanical, fire sprinkler, and plumbing installations for the project. These Drawings should depict actual elevations and linear dimensions, as well as all routing changes, transitions, major offsets, deck and structural attachments deemed necessary to accomplish the installation. Individual Shop Drawings may be prepared for each trade working within the designated space or area; however, the coordination of the consolidated installation shall remain the responsibility of the Contractor. These Shop Drawings shall be provided to each Subcontractor having Work in each area for coordination. Any fittings, offsets or other changes due to coordination shall be at no additional cost to Owner.
2. Whereas the Drawings are diagrammatic, showing only the general arrangement of the systems, Contractor shall have responsibility for the fitting of materials and equipment to other parts of the equipment and structure, and to make adjustments as necessary or required to resolve space problems, preserve service room, and avoid architectural and structural elements and the Work of other trades. Contractor may be required to identify certain areas to relocate installations within the spaces depicted on the Drawings, e.g., ductwork and/or piping may be shifted within the space shown to accommodate other systems. Such functional relocations shall not be deemed a change to the requirements of the Contract. In the event a major re-routing of a system appears necessary, Contractor shall prepare and submit for approval, Shop Drawings of the proposed rearrangement.
3. Because of the diagrammatic nature and small scale of the Drawings, all necessary offsets, adjustments, and transitions required for the complete installation are not shown. Contractor shall carefully investigate the conditions affecting all the Work and shall arrange such Work accordingly, furnishing such fittings, equipment, valves, accessories, offsets, etc., as may be required, regardless of size or cost, to meet such conditions, at no additional cost to the Owner.

4. Coordination changes are not design changes and shall be provided at no additional cost to Owner. Any guidance, drawing or clarification issued by the Architect or Engineer to assist the Contractor or their sub-contractors in their coordination during construction are not design changes and shall be provided at no additional cost to Owner.
5. Resolve differences or disputes between subcontractors and materials suppliers concerning coordination, interference, or extent of work between sections. The Contractor's decisions, if consistent with the Contract Documents, shall be final. The Architect and their Consultants are not required to coordinate work between sections and will not do so. Any changes required that affect the design intent shall be presented to and approved by the Architect and Engineer of Record.
6. The coordinated Shop Drawings must be signed off by HVAC, Plumbing, Fire Sprinkler, Electrical, Framing, Ceiling Installation, and Data and Low Voltage Subcontractors.
7. The signed off Shop Drawings shall be submitted to the Owner's Representative for review and approval prior to commencement of installation.
8. Provide reviewed Shop Drawings to each Subcontractor having Work in each area.

1.5 GUARANTEE:

A. Guarantee shall be in accordance with the General Conditions. These Specifications may extend the period of the guarantee for certain items. Where such extensions are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the certificate of guarantee shall be furnished to the Owner through the Architect. Equipment that is started and operated prior to acceptance shall have the guarantee extended to cover that period. Owner guarantee shall start at acceptance.

1.6 QUIETNESS:

A. Piping, ductwork and equipment shall be arranged and supported so that vibration is a minimum and is not transmitted to the structure.

1.7 DAMAGES BY LEAKS:

A. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping systems prior to completion of work and during the period of the guarantee, and for damages caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

1.8 EXAMINATION OF SITE:

A. The Contractor shall examine the site, compare it with Plans and Specifications, and shall have satisfied himself as to the conditions under which the work is to be performed. No allowance shall subsequently be made in his behalf for any extra expense to which he may be put due to failure or neglect on his part to make such an examination.

1.9 COMPATIBILITY WITH EXISTING SYSTEMS:

A. Any work which is done as an addition, expansion or remodel of an existing system shall be compatible with that system.

1.10 MATERIALS AND EQUIPMENT:

A. Materials and equipment shall be new unless otherwise noted. Materials and equipment of a given type shall be by the same manufacturer. Materials and equipment shall be free of dents, scratches, marks, shipping tags and all defacing features at time of project acceptance. Materials and equipment shall be covered or otherwise protected during construction as required to maintain the material and equipment in new factory condition until project acceptance.

1.11 SUBMITTALS:

A. Shop Drawings: Within 30 days of contract award, the Contractor shall submit six copies of shop drawings for all materials, equipment, etc. proposed for use on this project (this includes deferred approval items). Material or equipment shall not be ordered or installed until written review is processed by the Engineer. Any item omitted from the submittal shall be provided as specified without substitution.
All shop drawings must comply with the following:

1. Shop drawings are required for all material and equipment items and shall include manufacturer's name and catalog numbers, dimensions, capacities, performance curves, and all other characteristics and accessories as listed in the specifications or on the drawings. Descriptive literature shall be current factory brochures and submittal sheets. Capacities shall be certified by the factory. FAX submittals are not acceptable.
2. All shop drawings shall be submitted at one time in a neat and orderly fashion in a suitable binder with title sheet including Project, Engineer and Contractor, table of contents, and indexed tabs dividing each group of materials or item of equipment. All items shall be identified by the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on drawings.
3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be high-lighted, circled or underlined on the shop drawings. Calculations and other detailed data indicating how the item was selected shall be included for items that are not scheduled. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled or detailed.
4. Drawings shall be submitted in both hard copy and electronic form, electronic files shall be in their native format (i.e. DWG for AutoCAD, RVT for Revit, etc).
5. Electronic Submittals: Where allowed by Division 01, electronic submittals are acceptable providing the following requirements are met. Electronic submittals which do not comply with these requirements will be rejected.
   a. Submittal shall be a single file in PDF format, with bookmarks for table of contents and each tab, and sub-bookmarks for each item.
   b. All text shall be searchable (except text that is part of a graphic).
   c. Submittal shall include all items noted in 1 through 3 above, except a binder is not required.
   d. Electronic submittals shall be processed through normal channels. Do not submit directly to the Engineer unless the Engineer is the prime consultant for the project.

e. Contractor shall provide Owner and Owner's Representative with hard copies of the final submittal. Coordinate exact number required with Owner through Architect/Engineer.

B. Substitutions:

1. Manufacturers and model numbers listed in the specifications or on the drawings establish the size, standard of quality, features and function selected by the Engineer for this Project. Alternate manufacturers may be submitted for review by the Engineer as allowed by Section 01 33 00 "Submittal Procedures" or Section 01 25 00 "Substitution Procedures", as applicable. If the alternate manufacturers are not approved, then the Contractor shall submit product specified. Calculations and other detailed data indicating how the item was selected shall be included.
2. Due to the complexity of mechanical equipment, features and functions, where equipment is scheduled on the drawings, any equipment submitted other than scheduled equipment is considered a substitution, and shall comply with the requirements of Section 01 25 00 "Substitution Procedures". It is understood that because of this complexity, subsequent reviews of Substitution Requests may be unavoidable. The Mechanical Engineer waives the fees identified in Section 01 25 00, for the initial and first subsequent review of a Substitution Request for mechanical equipment scheduled on the Drawings.
3. The Contractor shall assume full responsibility that substituted items or procedures will meet the specifications and job requirements and shall be responsible for the cost of redesign and modifications to the work caused by these items. At the Engineer's request, furnish locations where equipment similar to the substituted equipment is installed and operating along with the user's phone numbers and contact person. Satisfactory operation and service history will be considered in the acceptance or rejection of the proposed substitution.

C. Review: Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of the Contractor to provide all materials, equipment and installation in accordance with the drawings and specifications. The Contractor shall agree that shop drawing submittals processed by the Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall agree that if deviations, discrepancies or conflicts between shop drawings and design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed. If a resubmittal is required, submit a complete copy of the Engineer's review letter requiring such with the resubmittal.

1.12 MANUFACTURER'S RECOMMENDATIONS:

A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of the particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance.

Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

1.13 SCHEDULING OF WORK:

A. All work shall be scheduled subject to the review of the Architect, Engineer and the Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work contracted for as rapidly as possible consistent with good work, and shall cause no delay to other Contractors engaged upon this project or to the Owner.

1.14 OPENINGS, CUTTING AND PATCHING:

A. The locations and dimensions for openings through walls, floors, ceilings, foundations, footings, etc. required to accomplish the work under this Specification Division shall be provided under this Division. Except as noted below, the actual openings and the required cutting and patching shall be provided by other Divisions. Coring through existing concrete or masonry walls, floors, ceilings, foundations, footings, etc., and saw cutting of concrete floors or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Patching of these surfaces shall be provided by other Divisions. Cutting or coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Architect.

1.15 EXCAVATION AND BACKFILL:

A. General: Barrel of pipe shall have uniform support on sand bed. Sand shall be free from clay or organic material, suitable for the purpose intended and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve. Unless otherwise noted, minimum earth cover above top of pipe or tubing outside building walls shall be 24", not including base and paving in paved areas.

B. Excavation: Width of trenches at top of pipe shall be minimum of 16", plus the outside diameter of the pipe. Provide all shoring required by site conditions. Where over excavation occurs, provide compacted sand backfill to pipe bottom. Where groundwater is encountered, remove to keep excavation dry, using well points and pumps as required.

C. Backfill:
1. 6" Below, Around, and to 12" Above Pipe: Material shall be sand. Place carefully around and on top of pipe, taking care not to disturb piping, consolidate with vibrator. Native soil may be used where allowed by Geotechnical (Soils) Report. Where native soil is used, trenching for gravity drain pipe shall be done using a laser-level and trencher.
2. One Foot Above Pipe to Grade: Material shall be sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed to proper moisture and compacted to required density. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to review by Engineer.

D. Compaction: Compact to density of 95% within building and under walkways, driveways, traffic areas, paved areas, etc. and to 90% elsewhere. Demonstrate proper compaction by testing at top, bottom and one-half of the trench depth. Perform these tests at three locations per 100' of trench.

1.16 PROTECTIVE COATING FOR UNDERGROUND PIPING:

A. All metal pipe below grade shall have a factory applied protective coating of extruded high density polyethylene, 35 to 70 mils total thickness, X-Tru-Coat, Scotchkote. All fittings and areas of damaged coating shall be covered with two layer double wrap of 10 mil polyvinyl tape to total thickness of 40 mils. Johns-Manville. Protective coating shall be extended 6" above surrounding grade.

1.17 ACCESS DOORS:

A. Provide access doors as required where equipment, piping, valves, ductwork, etc. are not otherwise accessible. Access doors shall match the wall or ceiling finish and fire rating as indicated on the Architectural drawings. 16-gage steel frame and 14-gage steel door with paintable finish, except in ceramic tile, where door shall be 16-gage stainless steel with satin finish. Continuous hinge. Key and cylinder lock (except quick-opening type for Emergency Gas Shutoff Valve). Deliver doors to the General Contractor for installation. Milcor. Unless otherwise noted, the minimum sizes shall be as follows:

1 valve up to 1-1/2"	12" x 12"
1 valve up to 3"	16" x 16"
Fire/smoke damper, VAV box, coil	20" x 24"

1.18 HOUSEKEEPING PAD:

A. Housekeeping pads shall be 6" high concrete, 3000 PSI strength, unless otherwise noted. Pad shall extend 6" beyond the largest dimensions of the equipment, unless otherwise noted. The top edge of the pad shall have a 3/4" chamfer. The pad shall have #4 reinforcing bars at 12" on center, each way, located at the mid-depth of the pad. If not poured at the same time as the floor slab with pad rebar tied to floor rebar, the pad shall be anchored as follows: Drill 1" diameter, 4" deep hole in floor. Fill hole with "Por-Rok", then insert 8" long, #4 rebar into hole. Provide a minimum of 4 of these anchors per pad, but no more than 4 feet apart in either direction. Anchor points shall be 12" from the edge of the pad.

1.19 CONCRETE ANCHORS:

A. Steel bolt with expansion anchor requiring a drilled hole - powder driven anchors, adhesive anchors and concrete screws are not acceptable. Re-use of screw anchor holes shall not be permitted. Minimum concrete embedment shall be 4-1/2 diameters. Minimum spacing shall be 12 diameters center to center and 6 diameters center to edge of concrete. Post-installed anchors in concrete used for component anchorage shall be pre-qualified for seismic application in accordance with ACI 355.2 and ICC-ES AC193. Post-installed anchors in masonry used for component anchorage shall be pre-qualified for seismic applications in accordance with ICC-ES AC01. Maximum allowable loads for tension and shear shall be as determined by Calculation in compliance with ACI 318-14, Chapter 17, and the anchor’s ICC or IAPMO evaluation report. Hilti, Powers, Red Head.

1.20 EQUIPMENT ANCHORING:

A. All equipment shall be securely anchored in accordance with ASCE 07-16, Chapter 13, as amended by CBC Section 1617A.1. All equipment mounted on concrete shall be secured with a concrete anchor as shown on drawings at each mounting point.

1.21 SEISMIC SUPPORT AND RESTRAINT DESIGN SERVICE:

A. All mechanical systems (equipment, ductwork, piping, etc.) shall be provided with supports and seismic restraints in accordance with the "Seismic Restraint Components for Suspended Utilities", 2020 Edition, as published by Mason West Inc., OPM-0043-13, or other HCAI pre-approved system, and in accordance with ASCE 07-16, Chapter 13, as amended by CBC Section 1617A.1. Brace spacing shall be reduced by 50% for cast iron, plastic, no-hub, or other non-ductile piping. A copy of this manual shall be kept on site at all times during construction.

B. Contractor shall obtain the services of a Seismic Design service to provide engineered seismic supports and restraints for the project. Mason Industries, or pre-approved equal. .
Note: Use of the "12 inch rule" does not exempt Contractor from this requirement.

1. All seismic designs, including designs using HCAI pre-approvals, shall be submitted as project specific engineered designs sealed and signed by a licensed California structural engineer. All seismic designs shall include project / application specific seismic design demand calculations. Said seismic design demand calculations shall account for seismic forces in all applicable direction including axial, lateral, vertical tension, vertical compression, etc. Designs shall account for prying, eccentricity, uneven loading, weak axis bending, etc.
2. Seismic restraint layouts for piping, ductwork and electrical raceways shall be furnished on shop drawings or added to the contractor's shop drawings and shall include:
   a. The number, size and location of seismic braces.
   b. Maximum support loads and seismic loads at the seismic brace locations.
   c. Reference to specific details or pages from the HCAI pre-approved system (OPM).
   d. **If use of the "12 inch rule" is intended by Contractor, design service shall verify locations where it is intended to be used is feasible and specifically identify these locations on the shop drawings, along with appropriate hanger details.**
3. Installations not addressed by the OPM approval must be designed, detailed and submitted along with the shop drawings.
4 Submit seismic restraint layout drawings and special details for approval of the project structural engineer per the requirements listed in the HCAI pre-approval (OPM).
5. Seismic restraint layout drawings shall bear the stamp and signature of the registered professional structural engineer licensed in the state of California who designed the layout of the braces.

1.22 ASBESTOS CONTAINING MATERIALS AND ASBESTOS REMOVAL:

A. No materials or material coatings containing asbestos shall be allowed on this project.

B. All asbestos removal shall be by Owner. Asbestos is to be removed before the work is started. If the Contractor discovers asbestos which has not been removed, the Contractor shall immediately cease work in that area and promptly notify the Owner.

1.23 SYSTEM IDENTIFICATION:

A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by pre-printed markers or stenciled marking, and include arrows to show direction of flow. Pre-printed markers shall be the type that wrap completely around the pipe, requiring no other means of fastening such as tape, adhesive, etc. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floors, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portions of lines. Marking of short branches and repetitive branches for equipment connections is not required.

B. Below Grade Piping: Bury a continuous, pre-printed, bright-colored, metallic ribbon marker capable of being located with a metal detector with each underground pipe. Locate directly over buried pipe, 6" to 8" below finished grade.

C. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-4) and identifies the area or space served by the equipment. Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the exterior of the unit.

D. Valves: Provide stamped brass valve tags with brass hooks or chains on all valves of each piping system, excluding check valves, valves within equipment, faucets, stops and shut-off valves at fixtures and other repetitive terminal units. Prepare and submit a tagged-valve schedule, listing each valve by tag number, location and piping service. Deliver to Owner through Architect.

1.24 CLEANING:

A. Progressively and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work. This includes but is not limited to building surfaces, piping, equipment and ductwork, inside and out. Surfaces shall be free of dirt, grease, labels, tags, tape, rust, and all foreign material.

B. At the end of each work day, the Contractor shall cover all open ends of piping and ductwork with protective plastic.

1.25 ACCEPTANCE TESTING:

A. All acceptance testing as required by California Code of Regulations, Title 24, and as noted on the Certificate of Compliance form, (where applicable), shall be performed and documented by an Acceptance Test Technician (ATT). These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP). The Contractor shall submit a copy of the

documentation to the Engineer for review (hardcopy or electronic), prior to submitting to Administrative Authority.

1.26 OPERATION AND MAINTENANCE INSTRUCTIONS:

A. Printed: Three copies of Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts list for all faucets, trim, valves, etc. shall be submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. AC-3). All Wiring Diagrams shall agree with reviewed Shop Drawings and indicate the exact field installation. All instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. Pumps, Fans, Motors, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included. Electronic O & M's shall comply with the Electronic submittal requirements in this Section.

B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The controls contractor shall present that portion of the instructions that apply to the control system. The Engineer's office shall be notified 48 hours prior to this meeting.

1.27 RECORD DRAWINGS:

A. The Contractor shall obtain one set of blue line prints for the project, upon which a record of all construction changes shall be made. As the work progresses, the Contractor shall maintain a record of all deviations in the work from that indicated on the drawings. Final location of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, i.e. building, curbs, walks. In addition, the water, gas, sewer, underfloor duct, etc. within the building shall be recorded by offset distances from building walls. As part of the Contractor's overhead expense, request a full set of reproducible drawings to transfer the changes, notations, etc. from the marked-up prints to the reproducible drawings. The record drawings (marked-up prints and reproducibles) shall be submitted to the Engineer for review.

PART 2: - PRODUCTS (not used)

PART 3: - EXECUTION (not used)

END OF SECTION

AD5-SP08 Refer to Specification Section 230000 – GENERAL MECHANICAL PROVISIONS

1. Refer to Article 2.1, A, 1, a:
2. Add the following:

Quick Vic (Grooved) Rigid Couplings with EPDM gaskets are acceptable. Quick Vic SD Installation Ready couplings not acceptable. Type L hard temper copper piping, ASTM B88, is also acceptable. Soldered joints for 1-1/4" and smaller (95-5 tin-antimony solder), brazed joints (1100F min.) for 1-1/2" and larger.

SECTION 23 00 01 - HEATING, VENTILATING AND AIR CONDITIONING

PART 1: - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions, Section 23 00 00, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
1. Air distribution system.
2. All equipment as shown or noted on the drawings or as specified. Furnish motor starters except where motor control centers are used. Coordinate with Division 26.
3. Circulating water system.
4. Refrigeration system.
5. System energy balance.
6. Coordinate with Section 23 09 23 (Direct Digital Control and Energy Management System) regarding location and installation of system sensors and to provide simultaneous start-up.
7. Coordinate and cooperate with commission agent as required by Section 01 91 13.
8. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, ductwork, braces, supports, housekeeping pads, temperature controls and related items no longer required.

B. Work Specified Elsewhere:
1. Line voltage power wiring, motor starters in motor control centers, disconnect switches and installation of all starters are included in the Electrical Section, unless otherwise noted.
2. Connection of gas, condensate drains and domestic water to equipment.
3. Concrete and reinforcing steel unless specifically called for in the drawings or specifications.
4. Painting unless specifically called for in the drawings or specifications.
5. Carpentry.
6. Direct Digital Control and Energy Management System (DDC/EMS).

PART 2: - PRODUCTS

2.1 PIPING MATERIALS:

A. Hot or Chilled Water Piping:
1. Above Grade:
a. 2" and Smaller: Schedule 40 black steel pipe, ASTM A53. 150 psi black malleable iron screwed fittings, ANSI B16.3.

b. 2-1/2" Through 4": Screwed pipe as above -OR- welded or grooved pipe as below.

c. 6" and Larger: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9. Joints may be grooved pipe unions, EPDM gaskets. Grinnell, Gruvlok, Victaulic.

2. Underground Chilled Water Piping: Pre-insulated. Schedule 40 PVC core. 1” (min) foamed polyurethane insulation. HDPE jacket. Sealed ends. Fittings shall be Schedule 80 PVC, solvent welded. Field joints shall be field insulated with foamed polyurethane, applied using factory mold. Use pressure sensitive tape for closures. PVC fittings shall be bare and thrust blocked.

3. Underground Hot Water Piping:

a. General: Underground hot water lines shall be Ferro-Therm, as manufactured by Thermacor Process. All straight sections, fittings and other accessories shall be factory-fabricated to job dimensions. Each system layout shall be computer-analyzed by the piping system manufacturer to determine stress on the carrier pipe and anticipated thermal movement of the service pipe. The system design shall be in conformance with ANSI B31.1. Provide manufacturer’s shop drawings with dimensioned piping layout and details of all expansion fittings, elbows, building entry points and all other pertinent information needed to verify that the type of materials being offered is in accordance with the specifications.

b. Jacket: Seamless high density polyethylene (HDPE) in accordance with ASTM D1248, Type 3, Class C. Minimum jacket thickness shall be 125 mils.

c. Carrier Pipe: ASTM A-53, Grade B, electric-resistance welded black steel with beveled ends for field welded joints. Schedule 40. Butt welding fittings shall conform to ANSI Standard B16.9.

d. Insulation: Polyurethane foam completely filling the annular space between the carrier pipe and the outer jacket to a minimum thickness of 1.38 inch. The in-place density shall be 2 pounds per cubic foot; the thermal conductivity factor shall be 0.15 BTU/(Hr.)(Sq. Ft.)(°F/In.); and shall have a closed cell content of 90%. Exposed insulation at unit ends shall be sealed with factory applied high temperature elastomer vapor barrier sealant.

e. Fittings: Fittings shall be factory fabricated and preinsulated with polyurethane foam insulation. The insulation shall be protected with a 1-piece, seamless, molded HDPE jacket of the same type, thickness and quality as that of the straight units of preinsulated pipe. Field fabrication, alteration or insulation of fittings is not permitted.

f. Expansion Fittings and Elbows: Prefabricated expansion fittings, elbows

and tees shall be furnished and installed where shown. Preinsulated fittings that must provide compensation for pipe expansion and/or contraction shall be externally insulated with flexible polyurethane foam insulation. The straight units adjoining expansion fittings shall also be insulated with flexible polyurethane foam insulation to the extent shown on the drawings. Expansion fittings and elbows shall be properly designed in accordance with stress limits indicated by ANSI B31.1 Code for Pressure Piping. The pipe manufacturer shall furnish pipe stress calculations and expansion details stamped by a registered professional engineer showing that the piping design meets this code.

4. Valves and Specialties:
   a. Valves:
      (1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Milwaukee, Nibco, Stockham, Walworth, as well as Grinnell, Gruvlok and Victaulic for grooved joint systems, are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer. Butterfly valves may be substituted for 2-1/2" and larger gate valves above grade; see specification below.
      (2) Gate Valve: Provide 2" extension necks at insulated pipes, where required. 2" and Smaller: All bronze. Rising stem. Union bonnet. Wedge disk. Screwed connection. Malleable iron handwheel. Class 125. Nibco T-124. 2-1/2" and Larger: Iron body, bronze mounted. Non-rising stem. Resilient wedge. Class 125. Flanged or AWWA hub end as applicable. Nibco F-619-RWS. Underground valves shall have square operating nut. Provide one operating "T" handle for underground valves.
      (3) Butterfly Valve: Iron threaded lug body. Aluminum bronze disk. O-ring seals. Resilient, removable seat. 416 stainless steel shaft. 6" and smaller valves shall have multi-position lever handle. 8" and larger valves shall have gear operator. Provide 2" extension neck at insulated pipes. Demco Series NE, Grinnell, Stockham.
      (4) Plug Valve: Eccentric bronze or nickel plated semi-steel plug, semi-steel body, bronze bushings, Buna-N-rings. 175 psi WOG. KeyPort Valve Series 400.
      (5) Check Valve: Non-slam, lift type. Replaceable bronze seat, disk and bushings. Stainless steel helical spring. Disk guided at top and bottom. Flow area through valve shall exceed cross sectional area of pipe. 150 psi WOG. CPV, Mueller Steam Specialty. 2" and Smaller: Shall be screwed brass with hand lapped bronze disk. 2-1/2" and Larger: Shall be iron body, wafer or flanged with resilient Buna-N or TFE facing on seat.
      (6) Ball Valve: Full port. Bronze body, cap, stem, disk and ball. Screwed connection. Lever handle. TFE seat. O-ring seals. 300 psi WOG. Apollo, Nibco, Jomar.
      (7) Globe Valve: All bronze. Renewable TFE disk. Screwed connection. Malleable iron handwheel. Union bonnet. Class 150. Stockham B-22.

(8) Valve Box: Pre-cast reinforced concrete. Cast iron lid marked for services. Christy F22 in foot traffic areas; G5 in roadways.

b. Instruments:

(1) Pressure Gage: Phosphor bronze tube. Bronze bushed. 1% accuracy. Cast aluminum case. 3-1/2" white dial. Adjustable pointer. Operating pressure at midscale. 1/4" NPT brass socket. Provide brass porous core pressure snubber and gage cock. Trerice, Weksler, Winters.

(2) Thermometer: 3" dial. Stainless steel case. Back or bottom connected as required. 1/2" NPT. 20-240ºF, 2ºF divisions for hot water, 25-125ºF, 2ºF divisions for chilled water. 2" insertion length. Allowance to be made for insulation thickness. Marshalltown, Moeller, Taylor, Tel Tru, Winters.

(3) Thermometer Well: Brass well. Suitable for 3" dial thermometer above. Provide 2" extension at insulated pipes.

(4) Gage Cock: Lever handle brass cock. 1/4" NPT connections. Provide 2" extension at insulated pipes.

(5) Instrument Well: Suitable for temperature sensing element. Coordinate with supplier of temperature controls.

(6) Flow Switch: Paddle type. McDonnell No. FS4-3.

c. Miscellaneous Specialties:

(1) Pressure Relief Valve: ASME rated fully automatic, reseating pressure relief valve sized in accordance with energy input. Watts.

(2) Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi. Grinnell. Size 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. Victaulic Style 77, type "E" gasket, Grinnell.

(3) Combination Reducing/Relief Valve: Iron body. Diaphragm operated. Brass internal parts. Reducing valve shall have a built-in strainer and check valve and have a field adjustable range of 10-25 psi and a 125 psi maximum working pressure. Relief valve shall be set at 30 psi. Bell and Gossett No. F-3.

(4) Balancing Cock: Calibrated all bronze balancing/shutoff valve or cock. Screwed connections. Memory stop. Position indicator. Drain connection. Taps for differential pressure gage, with check valves or shutoffs. 125 psi working pressure. Internal seals. Preformed insulation block. Armstrong, FlowSet by Flow Design, Inc., Grinnell, Tour and Andersson, Victaulic.

(5) Strainer: "Y" type, 125 psi. Machined seats. Stainless steel screens. Provide gate valve blowoff with hose threads. Bailey, Mueller Steam Specialty.
2" and Smaller: Screwed bronze body. Perforation size 0.057".
2-1/2" and Larger: Flanged iron body, perforation size as follows:

Pipe Size	Perforation Dia.
2-1/2" - 3"	1/16"
4" - 6"	3/32"
8" and Larger	1/8"

(6) Dielectric Coupling: Insulating union, flange or waterway fitting rated for 250 psig. EPCO, Clearflow.

(7) Suction Diffuser: Cast iron angle type body with inlet vanes and combination diffuser/strainer/orifice cylinder with 3/16" openings. Provide fine mesh start-up strainer (to be removed after 30 days of operation). Strainer free area to be not less than five times the sectional area of pump connection. Adjustable support foot, drain tapping and gage tapping. Bell and Gossett, Taco, Thrush.

(8) Expansion Tank: Pressurized diaphragm type or bladder type, as shown on drawings. Welded steel, ASME code construction with ASME stamp and certification, 125 psi, 240ºF. Sealed elastomer diaphragm or heavy duty butyl bladder. Pre-charged with air to initial fill pressure of system. Base or saddle as required for mounting. Removable access cover for bladder type. Sight glass for diaphragm type (hot water service only). Amtrol, Taco.

(9) Flexible Connection: 2" and Smaller: Screwed connection. Corrugated bronze core covered with high tensile bronze tubular braid. 150 psi working pressure. Flexonics, Keflex. 2-1/2" and Larger: Contoured, molded Teflon bellows. Minimum of three convolutions. Monel reinforcing rings. Limit bolts. Flanged connection. 100 psi working pressure. Belmont, Resistoflex. -Or- Multiple laminations of 321 stainless steel. 150 psi working pressure. Limit bolts. Flanged connection. Hyspan Series 5500.

(10) Air/Dirt Separator: Full flow coalescing type combination air eliminator and dirt separator. Separator shall be fabricated steel, rated for 150 psig working pressure, stamped and registered in accordance with ASME Section VIII, Division 1 for unfired pressure vessels, and include two equal chambers above and below the inlet / outlet nozzles. Unit shall include internal elements filling the entire vessel to suppress turbulence and provide air elimination efficiency of 100% free air, 100% entrained air, and 99.6% dissolved air at the installed location. The elements must consist of a copper core tube with continuous wound copper medium permanently affixed to the core. Internal coalescing elements consisting of plastic, perforated steel plate/tubes or loosely filled steel rings will not be accepted. Dirt separation efficiency shall be a minimum of 80% of all particles 30 micron and larger within 100 passes. Basis of design for the air eliminator / dirt separator shall be the Spirovent® Series VDT or VHT as manufactured by Spirotherm, Inc., Glendale Heights, Illinois or approved equal as noted*. Optional Series VDN or VHN by Spirotherm, Inc. shall include removable lower head for internal inspection if so noted on the drawings and schedule.

B. Condenser Water Piping:

1. 4" and Smaller: Schedule 40 galvanized steel pipe, ASTM A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3.
2. 6" and Larger: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9. Joints above grade may be grooved pipe unions, EPDM gaskets. Grinnell, Victaulic.
3. Valves and Specialties: Same as for chilled water piping.

C. Refrigerant Piping: Hard drawn Type ACR copper, dried and capped, ASTM B280. Wrought copper fittings, silver alloy brazed, 1100ºF, Silfos.

D. Flue Piping:
1. Gas Flue Piping: AL29-4C alloyed stainless steel, double wall metal flue pipe. Factory fittings. UL listed to UL 1738. Heat Fab model Saf-T CI.
2. Flue Cap: Designed to properly ventilate flue regardless of wind direction. Storm proof, bird proof. Heat Fab.

E. Miscellaneous Piping Items:
1. Pipe Support:
a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendations. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Anvil, Unistrut.
b. Insulation Support: Calcium silicate insulation, 100 psi, or heavy density fiberglass, 100 psi. Insulation thickness equal to adjoining pipe insulation. Steel support shield or saddle. Provide vapor barrier for chilled water piping. Insulation and/or vapor barrier shall extend 1" beyond steel support. Pipe hanger in accordance with paragraph 1 above. Increase hanger size per manufacturer's recommendation. B-Line, Pipe Shields, Inc., Uni-Grip.
c. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco.
d. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.
2. Flashing: Flashing for piping through roof shall be prefabricated galvanized steel roof jacks with 16" square flange around pipe. Provide clamp-on storm collar and seal water tight with mastic. Maintain dielectric separation between copper and galvanized materials. For cold process built-up roof, material shall be 4 lb/ft2 lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer’s recommended flashing material.

2.2 PIPING INSULATION MATERIALS:

A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Pre-Molded Fiberglass: Heavy density sectional pre-molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-ºF at a mean temperature of 50ºF. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. 1" thickness for chilled water piping. For hot water piping 140ºF and less, thickness shall be 1" for pipe sizes less than 1”, 1-1/2" thickness

for pipe sizes 1" and larger. For hot water piping over 140ºF, thickness shall be 1-1/2" for pipe sizes less than 1-1/2", 2" thickness for pipe sizes 1-1/2" and larger. CSG Insulation Corp., Knauf, Johns-Manville, Owens-Corning. See Title 24, Part 6 "California Energy Code" for temperatures above 250ºF.

C. Fiberglass Blanket: Unfaced, 1-1/2" thick. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-ºF at a mean temperature of 50ºF. Knauf, Johns-Manville, Owens-Corning.

D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.

E. Reinforcing Mesh: 10 x 10 strands per square inch. Polyester or fiberglass. Mast-a-Fab, Vimasco Elastafab or Childers Chil Glas #10.

F. Vapor Barrier Coating: Childers CP-34, Foster 30-65. Permeance shall be 0.08 perms or less at 45 mils dry as tested by ASTM F1249.

G. Lagging Adhesive: Childers CP-50A MV1, Foster 30-36.

H. Aluminum Jacketing: Aluminum pipe and fitting jacketing, 0.016" thickness for straight pipe. 0.024" thickness for fittings. Integral moisture barrier. Stucco-Embossed finish. Provide pre-fabricated aluminum strapping and seals by same manufacturer. ITW or RPR.

I. Outdoor Weather Barrier Mastic: Childers CP-10/11, Foster 46-50.

J. Metal Jacketing/Flashing Sealant: Childers CP-76, Foster 95-44.

K. Insulating Tape: Ground virgin cork and synthetic elastomeric. Black, odorless, and non-toxic. K factor 0.43 Btu-in/hr-ft2-ºF or less. Non-shrinking. For outdoor use, provide protective finish by same manufacturer. Halstead.

L. Foamed Plastic: Rubber based elastomeric preformed pipe insulation. Thermal conductivity shall not exceed 0.27 Btu-in/hr-ft2-ºF at a mean temperature of 70ºF. 1/2" thick. Provide adhesive by same manufacturer. Armacell Armaflex.

2.3 DUCTWORK MATERIALS:

A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50. Shall comply with 2019 CMC.

B. Metal Ductwork: Metal ductwork shall be galvanized sheet steel, lock forming quality, ASTM A-653, with gage and construction to match SMACNA Standard for pressure required (26 gage minimum).

1. Moisture Bearing Exhaust Ductwork: Exhaust ductwork bearing moisture such as exhaust ducts from showers, dishwashers, clothes driers, etc. shall be constructed of aluminum sheets (unless shown otherwise on drawings), with gage and construction to match SMACNA Standard for pressure required.

2. Grease Bearing Exhaust Ductwork: Exhaust ducts from Type I grease hoods shall be constructed in accordance with Chapter 5 of the California Mechanical Code with 16 gage galvanized steel or 18 gage stainless steel. All joints shall be made with a continuous weld. Exposed ducts shall be stainless steel.

C. Flexible Ductwork: Insulated flexible ductwork. One pound per cubic foot glass fiber insulation, 1-1/2" thick (R-6), 2" thick (R-8) where ductwork is outside the building thermal insulation envelope. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft^2-ºF at a mean temperature of 75ºF. Seamless metalized reinforced polyester vapor barrier jacket. Continuous internal liner bonded to galvanized steel wire helix. Duct shall be capable of continuous operation at 1-1/2" of positive water static pressure and 4,000 ft/min air velocity. Duct shall be capable of continuous operation at 1-1/2" of positive water static pressure and 4,000 ft/min air velocity. Steel connection collars. Duct shall comply with NFPA 90A. JP Lamborn.

D. Duct Sealants: All Joints Exposed to Weather: Sealant shall be G.E. "Silglaze II" or Silimax Multipurpose Silicone Sealant, without substitution. Joints Not Exposed to Weather: Fiber reinforced. White in color. Design Polymerics DP1030, Hardcast Versa-Grip 181, Hardcast CCWI-181. Joints Not Exposed to Weather and Exposed to View in Finished Areas: Non fibrated. Gray in color. Foster 32-19, Childers CP-146, Design Polymerics DP 1010, or United Duct Sealer WB.

E. Spiral Wound Metal Ductwork: Spiral wound factory fabricated galvanized steel, gages in accordance with the CMC. All fittings shall be factory fabricated. Fittings exposed to view shall have all seams fully welded. Tees and laterals shall be conical type. Connections to plenums shall be with bell-mouth fittings. 12" and smaller ells shall be two piece die-stamped. Ells larger than 12" shall be five piece. McGill Airflow. Shop fabricated fittings are not acceptable.

F. Underground Duct: Ductwork shall be closed cell plastic material that is recyclable, does not emit volatile organic compounds, and conforms to ASTM-D2412. Ductwork shall be resistant to mildew, mold (UL 181B), and radon gas (BSS 7239-88). Ductwork shall not rust or crack under external stress or strain. Ductwork shall have integral R-10 equivalent thermal insulation value, without the use of external insulation, per NSF's P374 Protocol and verified by a NSF Thermal Testing Report. Provide elbows, duct, diffusers, plenum, clamp & gasket, boots, saddle registers and caulk as required by drawings for underground installation. All joints shall be sealed via gasket or bolts and sealant. Clamps and gaskets shall be used on ductwork without flanges. Clamps shall be polyethylene with stainless steel plates and stainless steel screws. Gaskets shall comprise of ¼" thick butyl rubber sealant tape that is water and UV resistant and shall not stain. Gaskets shall comply with ASTM-E84 for flame and smoke spread. Flanged joints and duct branches shall use a co-polymer adhesive caulking sealant that is water and UV resistant. Flanges shall be connected with stainless steel bolts. Duct system performance shall exceed SMACNA's Leakage Class 3 requirements at the system design static pressure. Complete duct system (including: plenums, round duct, run-outs, diffuser boots, etc.) must be from one manufacturer and be of the same material, construction and connection method throughout. Field made duct components are NOT acceptable. Include the complete underground duct system including plenums and diffuser boots. Unless otherwise noted, all duct and fittings shall be constructed per SMACNA's Duct Construction Standards

(+10 w.g.). Duct system shall carry a 10 year Limited Warranty. Duct system shall be installed by an AQC Industries' trained installer. BlueDuct® by AQC Industries.

2.4 AIR TERMINALS AND DUCT FITTINGS:

A. Grilles: (Grilles, Registers, Diffusers and Louvers)
1. Information on Drawings: Refer to Grille Schedule on the drawings for the list of grilles. Manufacturer's model numbers are listed to complete the description Titus. Equivalent models of Anemostat or Krueger are acceptable. Refer to the floor plans for neck size, CFM, air diffusion pattern and fire damper, if required.
2. Performance: Submit complete performance data (throw, pressure drop, noise level, etc.) for all grilles proposed, other than those scheduled. Testing shall be in accordance with ANSI/ASHRAE 70-1991. If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactorily, the units shall be reselected by the Contractor for the proper diffusion, spread, pressure drop, throw and noise level.
3. Frame and Accessories: All supply, return, and exhaust grilles shall not have an opposed blade volume control damper unless otherwise noted. All surface mounted grilles shall have a perimeter gasket and flanged edge. All grilles shall have frames suitable for mounting in the surfaces designated by the architectural drawings. Key or screwdriver operated, no slide bars.
4. Finish: All ceiling and wall grilles and all louvers shall have a paintable white finish unless otherwise noted. Interior components (everything behind the face plate) shall be flat black. Floor grilles shall have an anodized aluminum finish unless otherwise noted.

B. Branch Duct Volume Damper: Volume control damper (VCD) in rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16-gage blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gage channel frame, actuating rod and linkage out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1" less than branch width. All branch dampers shall have regulator with stamped steel handle, spring loaded shaft nut, cast body and serrated self-locking die cast core. Regulator for horizontal ducts overhead shall be mounted on sides or bottom of ducts. Secure a 12" length of brightly colored plastic ribbon to handle for ease of location. Where rectangular or round ductwork is insulated, slit insulation to allow handle to protrude. Ventlok 641 (with 607 end bearing for round ducts).

C. Extractor: Curved blade turns in adjustable position rigid frame. Tuttle and Bailey Deflectrol.

D. Turning Vanes: Double wall, hollow metal, air foil shape. Spacing in accordance with manufacturer's recommendations. Aero Dyne HEP.

E. Flexible Connection: UL listed neoprene coated 30 ounce fiberglass cloth. 3" metal, 3" fabric, 3" metal. Ventglas.

F. Fire/Smoke Damper: California State Fire Marshal approved. UL listed and labeled indicating fire rating. Hour rating as required by the rating of the wall, ceiling, floor, etc.

in which it is installed. Combination fire/smoke dampers shall have normally-closed, non-stall factory electric actuator rated for 250ºF (min.) and shall be Leakage Class II.

G. Duct Access Door:
1. Rectangular: Insulated double wall door. Full piano hinge. Cam latch. Pressure rating to match application. Air Balance, Ductmate.
2. Round: Three layers of stamped steel. Inside panel shall consist of two layers of metal which are spotwelded together along the rim, encapsulating high density fiberglass insulation (25/50 rated). Closed cell neoprene gasket bonded to the inside of the door. Zinc plated conical springs installed between the inner and outer door. Polypropylene molded knobs with threaded metal inserts. Knobs shall be easily turned by hand and shall be UL94HB listed. Zinc plated carriage bolts, clinched and sealed to the inner door. Provide self adhesive template for the exact size of duct opening. Pressure rating to match application. Ductmate.

H. Variable Air Volume Terminal (VAV/VVH):
1. General: Pressure independent, single-duct electric powered variable volume terminal. Scheduled pressure drop is maximum allowable at inlet static at design conditions. Provide integral flow taps and calibration chart on each unit. Performance testing shall be in accordance with ARI Standards. Enviro-Tec, Titus.
2. Casing: Welded 24-gage galvanized steel. Provide hanger holes on four corners. Interior insulation shall be 1/2" thick, 1-1/2 lb. density glass fiber with high density facing. Insulation shall be UL listed and in compliance with NFPA 90A. Maximum allowable leak rate 2% at 3" WC.
3. Controls: Provide integral cross flow velocity sensor furnished and installed at the factory.
4. Coils: Units specified with hot water coils shall have factory installed access panel upstream of the coil and shall have coil with 1/2" O.D. seamless copper tube with 0.017" tube wall. Fin tube expanded into fin collar for permanent bond. Leak tested at 300 psig.
5. Sound Performance Data: Discharge sound and radiated sound levels shall not exceed the published sound levels of the terminals which were used as the basis of design. The manufacturer shall submit discharge sound and radiated sound data in both sound power level (ref: 10-12 watts) in octave bands and noise criteria (NC) ratings. Testing shall be in accordance with ARI Standards.

I. Sound Trap:
1. General: Dimensions as shown on plans. 22-gage galvanized steel construction suitable for a differential air pressure of 8" of water. Filler material shall be in accordance with NFPA 90A. Maximum pressure drop as scheduled. Air flow measurements shall be made in accordance with applicable portions of ADC, AMCA and ASME airflow test codes. Buensod-Agitair, Environmental Elements Corp., Industrial Acoustics Company, Vibro-Acoustics.
2. Sound Performance Data: The dynamic insertion loss and self-generated noise levels shall meet or better the published sound data of the sound traps which were used as the basis of design. Acoustic ratings shall be determined in a test facility which provides for airflow in both directions. The test set-up and procedure shall be such that all effects due to end reflection, directivity, flanking transmission, standing waves and test chamber sound absorption are eliminated. Acoustic

ratings shall include dynamic insertion loss and self-generated noise levels for each octave band both for forward flow (air and noise in same direction) and reverse flow (air and noise in opposite directions) with air flow of at least 2000 fpm entering face velocity. Ratings shall be certified by an independent testing laboratory.

2.5 DUCTWORK INSULATION MATERIALS:

A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Fiberglass Blanket: **Installed** thermal resistance at a mean temperature of 75ºF shall not exceed indicated value. 3/4 lb/ft^3 or 1 lb/ft^3, **R-6** where ductwork is within the building thermal insulation envelope. 3/4 lb/ft^3 **R-8** where ductwork is outside the building thermal insulation envelope and/or above the roof. Faced with glass reinforced foil laminated to Kraft paper. Certainteed, Knauf, Johns-Manville, Owens-Corning.

C. Acoustic Lining: Glass fiber. **Installed** thermal resistance at a mean temperature of 75ºF shall meet or exceed indicated value. One side coated to prevent fiber erosion up to 6000 ft/min. Average noise reduction coefficient of 0.80. 1.5 lb/ft3 density. 1" thick (**R-4.2**) where ductwork is within the building thermal insulation envelope. 2" thick (**R-8**) where ductwork is outside the building thermal insulation envelope and/or above the roof. Certainteed, Knauf, Johns-Manville, Owens-Corning.

D. Bonding Adhesive: Design Polymerics DP2501, Foster 85-60.

E. Fire Resistive Duct Wrap: Nominal 1-1/2” thick, 6 lb/ft3 high-temperature fiber blanket thermal insulation encapsulated in a fiberglass-reinforced aluminized polyester foil. Grease Duct Listing Standards (Double Wrap) ASTM E 2336 / ICC-ES AC101. Ventilation Duct Listing Standard (Single Wrap) – ISO 6944. 3M Fire Barrier Duct Wrap 615+.

2.6 EQUIPMENT:

A. General Requirements:
1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where Architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
3. Ratings:
a. Gas: Gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be CSA (US) certified, except that boilers shall be CSA (US) certified or UL listed.

b. Electrical: Electrical equipment shall be in accordance with NEMA Standards and UL or ETL listed where applicable standards have been established.

4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.

5. Electrical:

a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be manual reset, shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.

b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.

c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip proof, NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction unless otherwise noted. Design shall limit starting inrush current and running current to values shown on drawings. Motors 1 horsepower and larger shall be the premium efficiency type, tested according to IEEE Standard 112, Method B. Motors exposed to weather shall be TEFC. Motors in a fan air stream shall be TEFC or TEAO. Vertical motors outdoors shall be ODP or TEFC and shall have rain caps.

d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.

e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.

f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.

6. Fan Selection - Static Pressure: Unless otherwise noted, pressure scheduled as external static pressure (ESP) includes all ductwork and accessory losses external to the unit housing. Unless otherwise noted, pressure scheduled as total static pressure includes all ductwork, filter, coil, cabinet, damper and other accessory losses. Unless otherwise noted, pressure scheduled as duct static pressure includes all supply and return ductwork and accessory losses external to the unit

housing and plenum (as applicable). The allowance for filter losses is 0.3" WC, unless otherwise noted. Submit itemized static pressure losses for all components.

7. Filters:
   a. General: Tested and rated in accordance with ASHRAE Standard 52.2 and Title 24, C.C.R. Furnish and install one complete change of all filters after air balance is completed and prior to acceptance.
   b. Filter Media: 2" media. MERV-13. Clean filter resistance 0.41" water at 500 fpm. Throw away frame. Class 2. Camfil AP-Thirteen.
8. Screens: All duct or louver openings to the outside shall be covered with 1/2", 16-gage, galvanized wire mesh screen.
9. Mixing Dampers: Opposed blade, 16-gage. Six-inch maximum blade width, 48" maximum length. Nylon or oil impregnated bronze bearings. One-half inch diameter pin shaft. 16-gage channel frame. One percent maximum leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod out of air stream. Arrow.
10. Sound Ratings: Shall be in accordance with ASHRAE 36 - 72. Sound ratings shall not exceed scheduled values.
11. Drives: Unless noted as direct connected, drives shall be V-belt, rated at 150% of motor horsepower. Multiple drive belts shall be matched set. Drive sheaves shall be dynamically balanced, adjustable, range +/- 10%, selected at mid range. Adjustable relative movement shall be lockable to shaft. Belts shall be aligned within 1-1/2 degrees at all times. Open drives shall be provided with OSHA approved open mesh belt guards. Belt guards exposed to weather shall be weatherproof enclosure with louvered face for adequate ventilation. Driving motor shall be mounted on adjustable rails. T.B. Woods, Browning. Submit RPM range of driven machine with drive selection.
12. Coils:
   a. Construction: Copper tube. Copper or aluminum 0.0075" min. thickness fins hydraulically or mechanically bonded to tube. 16-gage galvanized steel rigid channel coil casing. Rated working pressure 200 psig min. All coils shall have connections at the same end. Wherever two or more coils are being controlled by a single control valve, each coil shall be installed with a separate balancing cock and a Pete's Plug at each outlet.
   b. Capacity: Ratings certified by ARI in accordance with ARI Standard 410. Cooling coil face velocity shall not exceed manufacturer's published ratings or 600 fpm. Heating coil face velocity shall not exceed 1000 fpm. Include coil selection calculations in shop drawings.
   c. Hot or Chilled Water Coils: Copper or cast iron headers, brazed or spun to tube. Tube wall minimum thickness 0.024". 10 fins/inch maximum.
   d. Direct Expansion Coils: Copper suction header silver brazed to tubes, distributing tubes and expansion valve. Working pressure 250 psig minimum. 10 fins/inch maximum.

B. Air Cooled Chiller (WC-1A, 1B, 1C):
1. General: Refer to paragraph 2.6A for general requirements. The contractor shall furnish and install water chiller(s) as shown and scheduled in the plans and specifications. Units are leak tested, pressure tested, then evacuated and charged. All chillers are factory tested prior to shipment. Units ship with a full operating charge of oil and refrigerant as standard. Units can also be shipped with a

nitrogen charge if required. Unit panels, structural elements and control boxes are constructed of galvanized steel and mounted on a bolted galvanized steel base. Unit panels, control boxes and the structural base are finished with a baked-on powder paint. Trane ACX.

2. Certified AHRI Performance Trane air-cooled chillers are rated within the scope of the Air-Conditioning, Heating & Refrigeration Institute (AHRI) Certification Program and display the AHRI Certified® mark as a visual confirmation of conformance to the certification sections of AHRI Standard 550/590 (I-P) and ANSI/AHRI Standard 551/591 (SI).
3. Refrigeration Circuits All chiller sizes are designed with two refrigerant circuits. Each refrigeration circuit includes two or three scroll compressors, a compressor suction and discharge service valve, liquid line shutoff valve, removable core filter, liquid line sight glass with moisture indicator, charging port and an electronic expansion valve.
4. Evaporator Braze plate heat exchanger is made of stainless steel with copper as the braze material. It is designed to withstand a refrigerant side working pressure of 460 psig and a waterside working pressure of 150 psig. Evaporator is tested at 1.1 times maximum allowable refrigerant side working pressure and 1.5 times maximum allowable water side working pressure. Immersion heaters protect the evaporator to an ambient of -20°F (-29°C). The evaporator is covered with factory-installed 0.75 inch (19.05 mm)Armaflex II or equal (k=0.28) insulation. Foam insulation is used on the suction line.
5. Condenser and Fans For ACSA units, the air-cooled microchannel condenser coils are used with all aluminum brazed fin construction. For ACXA units, the round tube plate fin (RTPF) coils are used with aluminum fin constructions. The condenser coil has an integral subcooling circuit. The maximum allowable working pressure of the condenser is 650 psig. Condensers are factory proof and leak tested at 1.1 times maximum allowable refrigerant side working pressure. Coils can be cleaned with high pressure water. Direct-drive vertical-discharge airfoil condenser fans are dynamically balanced. The condenser fan motors are permanent magnet motors with integrated drive to provide variable speed fan control for all fans. Chillers are equipped with EC condenser fan motors with permanently lubricated ball bearings and internal thermal and overload protection.
6. Compressor The unit is equipped with two or more hermetic, direct-drive, 3600 rpm 60 Hz (3000 rpm 50 Hz) suction gas-cooled scroll compressors with intermediate discharge valve to increase seasonal efficiency. Overload protection is included. The compressor includes: centrifugal oil pump, oil level sight glass and oil charging valve. Each compressor will have compressor heaters installed and properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles.
7. Unit Controls All unit controls are housed in an outdoor rated weather tight enclosure with removable plates to allow for customer connection of power wiring and remote interlocks. All controls, including sensors, are factory mounted and tested prior to shipment. Microcomputer controls provide all control functions including startup and shut down, leaving chilled water temperature control, evaporator flow proving, compressor staging, electronic expansion valve modulation, condenser fan sequencing and speed control, anti-recycle logic, automatic lead/lag compressor starting, and load limiting.

8. Symbio™ 800 The Symbio™ 800 unit control module, utilizing Adaptive Control™ microprocessor, automatically takes action to avoid unit shut-down due to abnormal operating conditions associated with low refrigerant pressure, high condensing pressure, low oil return or low suction superheat, and high compressor discharge temperature. Should the abnormal operating condition continue until a protective limit is violated, the unit will be shut down. Unit protective functions of the Symbio™ 800 include: loss of chilled water flow, evaporator freezing, loss of refrigerant, low refrigerant pressure, high refrigerant pressure, high compressor motor temperature, and loss of oil to the compressor.
9. AdaptiView TD7 Display A full color AdaptiView™ TD7 touch screen display indicates all important unit and circuit parameters, in logical groupings on various screens. The parameters including chilled water set point, leaving chilled water temperature, demand limit set point, evaporator and condenser refrigerant temperatures and pressures, compressor and fan speeds, and all pertinent electrical information. The display also provides “on screen” trending graphs of predefined parameters as well as customizable trend graphs based on user defined parameters from a list of all available parameters. The display also provides indication of the chiller and circuits’ top level operating modes with detailed sub-mode reports available with a single key press, as well as diagnostics annunciation and date and time stamped diagnostic history. The color display is fully outdoor rated, and, can be viewed in full daylight without opening any control panel doors.
10. Standard power connections include main three phase power to the compressors, condenser fans and control power transformer and optional connections are available for the 115 volt/60 Hz single phase power for the thermostatically controlled evaporator heaters for freeze protection.
    - Outdoor capable: – Removable Cover – UV Resistant Touchscreen – -40°C to 70°C Operating Temperature – IP56 rated (Power Jets of Water from all directions)
    - RoHS Compliant
    - UL 916 Listed
    - CE Certification
    - Emissions: EN55011 (Class B)
    - Immunity: EN61000 (Industrial)
    - Display: Mechanical Specifications AC-PRC002E-EN 37 – 7 inch diagonal – 800x480 pixels – TFT LCD @ 600 nits brightness – 16 bit color graphic display
    - Display Features: – Alarms – Reports – Unit Settings – Display Settings
    - Graphing
    - Global Application with Support for 27 Languages
11. Chilled Water Reset Control logic and factory installed sensors are provided to reset leaving chilled water temperature. The set point can be reset based on ambient temperature or return evaporator water temperature.
12. Factory Mounted Flow Proving and Flow Control The factory installed evaporator water flow switch is provided with the control logic and relays to turn the chilled water flow on and off as the chiller requires for operation and protection. This function is a requirement on the chiller.
13. Pump Package The pump package contains a single pump or dual pumps (one redundant), drain valves, service isolation valves, pressure ports, pressure relief, and fluid strainer. Pump package applications include short water loops,

decoupled systems and service for an entire loop volume. Because the fluid distribution system beyond the chiller is unknown, Trane Select Assist reports Available Head as the head leaving the brazed plate evaporator. Head leaving the evaporator includes the evaporator head loss, pump package piping frictional effects head losses, valve head losses, and strainer head loss summation. The pump package should not be operated at NPSHR. Operartion at this suction head will cause cavitation. NPSHA should be at least 1.5 to 2.5 times NPSHR. Ambient freeze protection down to -4°F (-20° C) for water is included. Dependent on the freeze inhibitor solution, the freeze protection ambient temperature decreases accordingly. The pump skid contains an independent pump motor starter panel. The pump starter panel's power supply is prewired into the chiller's control panel assembly, an independent pump motor power supply is not required. Variable pump speed command is integrated with the chiller controller allowing variable flow functionality.

14. BACnet Communications Interface Allows the user to easily interface with BACnet® via a single twisted pair or Ethernet wiring to a factory-installed Symbio™ 800 controller.
15. Isolators — Elastomeric Elastomeric Isolators provide isolation between chiller and structure to help eliminate vibration transmission.
16. Manufacturer's Field Services:
    a. All Startup, maintenance and monitoring functions shall be performed by a manufacturer's commercial agent to confirm, (in writing), that equipment has been correctly installed and passes specification checklist prior to equipment becoming operational and covered under OEM warranty.
    b. Applied chiller manufacturers shall maintain service capabilities no more than 100 miles from the job site.
    c. The manufacturer shall furnish complete submittal wiring diagrams of the chiller(s) starter(s) and associated components like cooling towers, pumps, interlocks, etc. as applicable for field maintenance and service.
17. Warranty: Chiller manufacturer shall provide a whole unit parts, labor and refrigerant warranty for a period of 10 years from start-up. The warranty must be provided by the manufacturer; third party insurance/warranty coverage is not acceptable. The chiller manufacturer shall provide an original factory warranty certificate for each chiller listing as a minimum chiller model, serial number, and warranty information as specified.
18. Maintenance Services:
    a. All inspections and service of units shall be accomplished by factory trained and authorized servicing technicians.
    b. All labor for leak checking the chiller according to the manufacturer's IOM and documentation must be included.
    c. In conjunction with and supporting Factory warranty OEM shall furnish complete factory authorized service and maintenance for applied chillers for 5 year from the Date of Substantial Completion. All work shall be done by factory service department.
    d. OEM shall provide and report quarterly, semiannual, and annual maintenance in compliance with or better than ASHRAE Standard 180-2008.

e. Submit copy of service call work orders and summary report to the owner, including description of work performed, operating performance status and noted exceptions.

C. Air Cooled Chiller (WC-2A, 2B):

1. General: Refer to paragraph 2.6A for general requirements. The contractor shall furnish and install water chiller(s) as shown and scheduled in the plans and specifications. Units are leak tested, pressure tested, then evacuated and charged. The air-cooled modular chiller system shall consist of individual chiller modules that are assembled on site. Each chiller module shall be completely factory wired and tested prior to shipment. Each module shall include a compressor, evaporator, air cooled condenser, and controls. Controls shall be designed on a distributed primary control system that allows the primary microprocessor to operate remaining secondary modules in the event of a malfunction of any secondary controller. The controls shall also be designed to allow each individual secondary microprocessor to operate on its own temperature sensor if there is a failure of the primary microprocessor.
2. Certified AHRI Performance: Trane air-cooled chillers are rated within the scope of the Air-Conditioning, Heating and Refrigeration Institute (AHRI) Certification Program and display the AHRI Certified® mark as a visual confirmation of conformance to the certification sections of AHRI Standard 550/590 (I-P) and ANSI/AHRI Standard 551/591 (SI).
3. Refrigeration Circuits: The Manhattan Gen II Chiller uses dual independent refrigeration circuits in each module using hermetically sealed scroll compressors each with Rotalock connections, oil level sight glass, suction gas-cooled motor with solid-state sensors in the windings for overload protection, and circuit breaker protection. There shall be two independent compressors and refrigerant circuits per module. Compressors shall be mounted to the formed sheet metal frame with rubber-in-shear vibration isolators. The SuperMod Chiller uses a hermetically sealed tandem scroll compressor set with a true variable speed lead compressor motor and a fixed speed lag compressor. The tandem set shall include an oil level sight glass, suction gas-cooled motor with solid-state sensors in the windings for overload protection, and in-line circuit breaker protection. There shall be two compressors per tandem set and one refrigerant circuit per module. Compressors shall be mounted to the formed sheet metal frame with rubber-in-shear vibration isolators.
4. Evaporator: The Manhattan Gen II chiller uses a dual circuit, brazed plate evaporator on each module constructed of 316 stainless steel plates and copper brazing. The supply and return fluid piping connections to each evaporator shall include an electronic and a manual isolation valve to allow servicing of each module individually while the remaining modules continue to operate, and to allow for variable flow. The fluid connections to each evaporator shall use roll grooved couplings for service convenience and ease of installation. Each evaporator shall be insulated with ¾ inch closed cell insulation. The maximum working pressure shall be 650 psi. Evaporator piping fluid velocity shall not exceed 10 fps at any point in the system. The SuperMod chiller uses a brazed plate, single circuit evaporator in each module constructed of 316 stainless steel plates and copper brazing. The supply and return fluid piping connections to each of the evaporator shall include an electronic and a manual isolation valve to

allow servicing of each module individually while the remaining modules continue to operate, and to allow for variable flow. The fluid connections to each evaporator shall use roll grooved couplings for service convenience and ease of installation. Evaporators shall be insulated with ¾ inch closed cell insulation.

5. Condenser and Fans: The air-cooled condenser coils have aluminum fins mechanically bonded to copper tubes with integral subcooling circuits. The coils shall be sized to provide full heat of rejection at a maximum 25°F temperature difference between the condensing temperature and ambient air ARTC-PRC001A-EN 33 temperature at jobsite elevation above sea level. The coils shall be factory tested to a minimum of 600 psig. The condenser fan motors shall be maintenance free, high efficient Electronically Commutated Motors (ECM) with energy reduction capabilities of up to 35%. The fan motors shall vary speed to maintain the refrigeration head pressure.
6. Compressor: The Manhattan Gen II chiller uses a hermetically sealed, scroll compressor on each refrigeration circuit. The Copeland scroll compressor is a state-of-the-art compressor with relay and overload monitoring capabilities designed to accommodate liquids (both oil and refrigerant) without causing compressor damage. The SuperMod chiller uses a tandem set of fixed speed and variable speed compressors by Copeland. The variable speed compressor is the latest development by Copeland using brushless permanent magnet motors. The Copeland compressor uses CoreSense technology as a sensor to unlock advanced capabilities such as protection, diagnostics, communication, and verification. Technicians can make faster, more accurate decisions resulting in improved compressor performance and reliability.
7. Variable Speed Drive (SuperMod): SuperMod’s tandem variable speed compressors also include the Emerson Copeland Scroll EVC1150B/1185B Variable Frequency Drive (VFD) which delivers maximum machine performance with sensorless permanent magnet motor control, for dynamic and efficient machine operation. The drive is designed to control a compressor in one of two modes. The analog / digital control mode and the Modbus control mode.
8. Unit Controls: The primary chiller module shall incorporate the primary microprocessor controller. The primary microprocessor shall communicate with the remaining secondary microprocessors in each module via a local network communications protocol. The primary microprocessor shall include a phase monitor to protect against low voltage, phase unbalance, phase loss, and phase reversal conditions. The primary controller shall read all analog and fault port values from all secondary module controllers and shall pass these values to the Building Automation System via BACnet®, Modbus™ or LONWORKS® protocols. Each chiller control system shall include operational switches for each compressor; high- and low-pressure transmitters to provide indication of refrigeration pressures in each circuit; high and low refrigeration pressure alarms including shutting shut down the faulty compressor(s); anti-short cycling compressor timers; minimum compressor run timers; connection to Building Automation System (if required).
9. Carel c.pCO Controller: The chillers employ a Carel c.pCO all-digital data control system which is assigned to all primary and secondary modules to control and report key system settings and indicators. Key features include: Processes all communications, IOs, and executes programs in tens of milliseconds; Online

debugging for prompt programming code troubleshooting; Includes 3 serial ports, 2 ethernet ports and 1 USB port.

10. EXOR eSmart07 HMI: An operator 7–inch touch screen interface panel with graphical display shall be installed on the primary module to allow chiller operation monitoring, adjustment of user set points, and alarm monitoring. Key features include:
    - Resistive touchscreen
    - Remote monitoring and control with primary-secondary functionality Mechanical Specifications
    - Wide selection of communication drivers available with multiple-driver communication capability
    - Data display in numerical, text, bar graph, analog gauges, and graphic image formats.
11. Heat Recovery Operation: The modular heat recovery chiller system is equipped with a brazed plate condenser in each module each with, a thermal dispersion flow switch plus valves and controls for heat recovery operation.
12. Manufacturer's Field Services:
    a. All Startup, maintenance and monitoring functions shall be performed by a manufacturer's commercial agent to confirm, (in writing), that equipment has been correctly installed and passes specification checklist prior to equipment becoming operational and covered under OEM warranty.
    b. Applied chiller manufacturers shall maintain service capabilities no more than 100 miles from the job site.
    c. The manufacturer shall furnish complete submittal wiring diagrams of the chiller(s) starter(s) and associated components like cooling towers, pumps, interlocks, etc. as applicable for field maintenance and service.
13. Warranty: Chiller manufacturer shall provide a whole unit parts, labor and refrigerant warranty for a period of 10 years from start-up. The warranty must be provided by the manufacturer; third party insurance/warranty coverage is not acceptable. The chiller manufacturer shall provide an original factory warranty certificate for each chiller listing as a minimum chiller model, serial number, and warranty information as specified.
14. Maintenance Services:
    a. All inspections and service of units shall be accomplished by factory trained and authorized servicing technicians.
    b. All labor for leak checking the chiller according to the manufacturer's IOM and documentation must be included.
    c. In conjunction with and supporting Factory warranty OEM shall furnish complete factory authorized service and maintenance for applied chillers for 5 year from the Date of Substantial Completion. All work shall be done by factory service department.
    d. OEM shall provide and report quarterly, semiannual, and annual maintenance in compliance with or better than ASHRAE Standard 180-2008.

e. Submit copy of service call work orders and summary report to the owner, including description of work performed, operating performance status and noted exceptions.

D. Boiler:

1. General: Refer to paragraph 2.6A for general requirements. Each boiler size is designed for a Maximum Allowable Working Pressure (MAWP) of 125 psig (8.6 Bar), constructed in accordance with the ASME Code Section IV and bear the "H" stamp. The insulated boiler is mounted on a base and powder coated steel casing provided. A drain valve connection is provided at the front bottom for field piping of a boiler drain valve, which can be furnished as an option. Cleaver-Brooks.
2. Boiler Trim and Controls: The following items are furnished:
   a. Probe Type Low Water Cutoff control, manual reset.
   b. Excess Water Temperature Cutoff, manual reset.
   c. NTC (negative temp. coefficient) sensor for hot water supply temperature.
   d. NTC sensor for hot water return temperature.
   e. ASME Safety Relief Valve set @ 125 psig. (8.6 Bar)
   f. Combination Temperature/Pressure Gauge.
3. Burner Control: The CB Falcon is an integrated burner management and modulation control with a touch-screen display/operator interface. Its functions include the following:
   a. Two (2) heating loops with PID load control.
   b. Burner sequencing with safe start check, pre-purge, direct spark ignition, and post purge.
   c. Electronic ignition.
   d. Flame Supervision.
   e. Safety shutdown with time-stamped display of lockout condition.
   f. Variable speed control of the combustion fan.
   g. Supervision of low and high gas pressure, air proving, stack back pressure, high limit, and low water.
   h. First-out annunciator.
   i. Real-time data trending.
   j. (3) pump/auxiliary relay outputs.
   k. Modbus communication capability.
   l. Outdoor temperature reset.
   m. Remote firing rate or setpoint control
   n. Setback/time-of-day setpoint
   o. Lead/Lag for up to 8 boilers
4. Forced Draft Burner
   a. The burner is a "Pre-mix" design consisting of a unitized venturi, single body dual safety gas valve, blower, and burner head.
   b. Full modulation is accomplished with a variable speed fan for 5:1 turndown ratio.
   c. For near flameless combustion, the burner utilizes a Fecralloy-metal fiber head.
   d. Noise level at maximum firing is less than 70 dBA regardless of boiler size.

e. Operating on Natural Gas, NOx emissions will be less than 20 PPM regardless of boiler size and the boiler is certified for California and Texas for Low NOx emissions.
f. As an option, the burner is capable of direct vent combustion.
g. Ignition of the main flame is via direct spark, utilizing high voltage electrodes and a separate electrode for flame supervision.
h. To ensure adequate combustion air is present prior to ignition, and to ensure the fan is operating, a combustion air proving switch is furnished.
i. A High Air Pressure Switch is provided to ensure burner lockout if excessive back pressure due to a blocked stack occurs.
j. For ease of maintenance and inspection, the burner is furnished with hydraulic rods and easy opening lockdown nuts, which permit the burner to swing up (except 500 and 750, which are hinged only). This provides full access to the burner and electrodes, as well, to the tube sheet and tubes.

5. Burner Gas Train: The standard gas train is equipped in accordance with UL certification and complies with ASME CSD-1. Each burner gas train includes:
   a. Low Gas Pressure Interlock, manual reset.
   b. High Gas Pressure Interlock, manual reset.
   c. ASME CSD-1 Test Cocks.
   d. Downstream manual ball type shutoff cock.
   e. Single body dual safety shutoff gas valve.
6. Optional Equipment:
   a. Dual gas train for quick and easy fuel switchover.
   b. Reusable air filter.
   c. Condensate neutralization tank assembly - consists of neutralizing media, filter, and PVC condensate holding tank with integral drain trap.
   d. Outside air intake for direct vent combustion.
   e. Outdoor temperature sensor for indoor/outdoor control.
   f. Header temperature sensor for multiple boiler Lead/Lag operation.
   g. Auxiliary Low Water Control (shipped loose) for field piping by others into the system piping.
   h. Alarm Horn for safety shutdown.
   i. Relays for output signal for burner on, fuel valve open.
   j. Stack Thermometer.
   k. Stack temperature limit-sensor.
   l. Auto air vent.
   m. Boiler drain valve.
7. Manufacturer’s Field Services:
   a. General: The boiler supplier’s factory authorized service organization shall be responsible for performance of inspections, start up and testing of the package boiler, and accessory equipment and materials furnished under this Section. A detailed written record of the startup performance, including burner setting data over the entire load range shall be furnished to the engineer before final acceptance. All labor, equipment, and test apparatus shall be furnished by the authorized service organization. All equipment defects discovered by the tests shall be rectified either by the service organization or boiler manufacturer.
   b. Equipment Inspection: Boiler representative to provide jobsite assistance to inspect boilers and other equipment upon arrival, verifying

completeness of equipment supplied and potential damages. All shipped loose components, such as casing, to be mounted on boiler by boiler provider after contractor has set boiler in building.

c. Pre Start-up Walk Through: Boiler representative shall visit jobsite reviewing installation with mechanical contractor to be conducted approximately 1 week prior to startup.

d. Start-up shall be conducted by experienced and factory authorized technician in the regular employment of the authorized service organization, and shall include:

e. Demonstrate that boiler, burner, controls, and accessories comply with requirements of this Section as proposed by the boiler and accessories supplier. Pre-test all items prior to scheduling the final testing that will be witnessed by the test engineer.

f. Readings at different firing rates (20, 50, 75 and 100%) of load for the modulating burner shall be taken with a written report of the tests submitted to the engineer. The reports shall include readings for each firing rate tested and include stack temperatures, O2, CO, NOx, and overall boiler efficiency.

g. Auxiliary Equipment and Accessories: Observe and check all valves, draft fans, electric motors and other accessories and appurtenant equipment during the operational and capacity tests for leakage, malfunctioning, defects, and non compliance with referenced standards or overloading as applicable.

h. Commissioning Requirements:
   1) Fireside inspection
   2) Set up fuel train and combustion air system
   3) Set up operating set points
   4) Check all safeties, including Flame safeguard, LWCO, Airflow, Fuel pressures, High limits.
   5) Set up and verify efficiencies at 20%, 50%, 75%, and 100%
   6) Set up and verify burner turndown.

i. Training to include all safety procedures, maintenance procedures, control operations, and diagnostic procedures. Training to be provided in a single 8 hour (max) continuous session to accommodate operator's availability on site.

j. Source Test: Source test services shall be provided by manufacturer representative. Contractor shall be required to place full load on boilers for source testing throughout the firing range. Source testing shall be in accordance with SJVUAPCD protocol: three 30 minute test runs on each boiler, certified source test equipment, SJVUAPCD inspector on site during testing. All permits shall be by contractor.

8. Warranty Data:

a. The pressure vessel shall be guaranteed against thermal shock for 20 years when utilized in a closed loop hydronic heating system with a temperature differential of 120 °F or less. The boiler pressure vessel shall be guaranteed accordingly without a minimum flow rate or return water temperature requirement. The boiler shall not require the use of flow switches or other devices to ensure minimum flow.

b. The pressure vessel, tubes and tube sheets (heat exchanger) shall be guaranteed against flue gas corrosion and materials/workmanship for a

period of 10 years. The condensate collection box shall be guaranteed for 20 years. The burner cylinder shall be warranted for a period of 5 years.

c. All parts not covered by the above warranties shall carry a 1 year warranty from startup, or 18 months from shipment, whichever occurs first. This shall include all electrical components and burner components.

9. Field Testing:
   a. The manufacturer’s representative shall test all boiler and burner interlocks, actuators, valves, controllers, gauges, thermometers, pilot lights, switches, etc. Any malfunctioning component shall be replaced at the time of initial start-up if found to be inoperative.
   b. All adjustments to boiler, burner, and boiler control system shall be performed by the manufacturer’s authorized service representative.
10. Start-Up, Instruction and Warranty Service:
   a. The manufacturer’s representative shall provide start-up and instruction of each new boiler, including burner and boiler control system as specified herein. Start-up and instruction shall cover all components assembled and furnished by the manufacturer whether or not of his own manufacture.
   b. Warranty service shall be in accordance with the manufacturer's warranty statement unless other provisions have been agreed to during project bidding.

E. Pumps:
1. General: Refer to Paragraph 2.6A for general requirements. Pumps shall be selected to be non-overloading at any point on the pump curve. Contractor shall include all costs required to field trim or change pump impeller, if necessary, to match design conditions. All motors 1 horsepower and larger shall be the high efficiency type. Bell and Gossett, Grundfos, PACO, Peerless, Taco.
2. Materials and Components: Enclosed bronze impeller hydraulically and dynamically balanced on shaft. Renewable bronze wear rings. Mechanical seals unless otherwise noted. Stainless steel shaft or steel shaft with bronze sleeve. Gray iron casing. Suction and discharge connections shall be 125 psi flanges tapped for pressure readings.
3. In Line Centrifugal: In line single stage, end suction centrifugal pump close coupled to motor. Pipe supported or cast iron support stand as indicated on drawings.

F. Air Handling Unit:
1. General: Pressure classification, type, and accessories/options as indicated on schedules. Refer to Paragraph 2.6A for general requirements. All units will be shipped with an integral base frame designed with the necessary number of lift points for safe installation. The lift points will be designed to accept standard rigging devices and be removable after installation. Units shipped in sections will have a minimum of four points of lift. Sizes 3-30 will also be shipped with a shipping skid designed for forklift transport. Units will be shipped with a shipping skid designed for forklift transport and the integral base will be designed with the necessary number of lift points for safe installation. The lift points will be designed to accept standard rigging devices and removable after installation. Units shipped in sections will have a minimum of four points of lift. Per ASHRAE 62.1 recommendation, units will be shipped stretch-wrapped to

protect unit from intransit rain and debris. Unit shall be UL and C-UL Listed. Air-handling performance data shall be certified in accordance with AHRI Standard 430. Unit sound performance data shall be provided using AHRI Standard 260 test methods and reported as sound power. Coil performance shall be certified in accordance with AHRI Standard 410. Trane.

2. Unit Construction: All unit panels shall be 2-inch solid, double-wall construction to facilitate cleaning of unit interior. Unit panels shall be provided with a mid-span, no through metal, internal thermal break. Casing thermal performance shall be such that under 55°F supply air temperature and design conditions on the exterior of the unit of 81°F dry bulb and 73°F wet bulb, condensation shall not form on the casing exterior. All exterior and interior AHU panels will be made of G40 galvanized steel. Optionally, all interior AHU casing panels will be made of 201 stainless steel. The casing shall be able to withstand up to 8 inches w.g. positive or negative static pressure. The casing shall not exceed 0.0042 inch deflection per inch of panel span at 1.5 times design static pressure up to a maximum of +8 inches w.g. in all positive pressure sections and -8 inches w.g. in all negative pressure sections. The unit floor shall be of sufficient strength to support a 300-lb. load during maintenance activities and shall deflect no more than 0.0042 inch per inch of panel span. The casing air leakage shall not exceed leak class 9 (CL = 9) per ASHRAE 111 at 1.25 times maximum casing static pressure (P in inches w.g.), up to a maximum of +8 inches w.g. in all positive pressure sections and -8 inches w.g. in all negative pressure sections, where maximum casing leakage (cfm/100 ft2 of casing surface area) = CL x P0.65. Optionally, the casing air leakage shall not exceed leak class 6 (CL = 6) per ASHRAE 111 at 1.25 times maximum casing static pressure (P in inches w.g.), up to a maximum of +8 inches w.g. in all positive pressure sections and -8 inches w.g. in all negative pressure sections, where maximum casing leakage (cfm/100 ft2 of casing surface area) = CL x P0.65.
3. Insulation: Panel insulation shall provide a minimum thermal resistance (R) value of 13 ft^2•h•ºF/Btu throughout the entire unit. Insulation shall completely fill the panel cavities in all directions so that no voids exist and settling of insulation is prevented. Panel insulation shall comply with NFPA 90A.
4. Drain Pans: All cooling coil sections shall be provided with an insulated, double-wall, galvanized or stainless steel drain pan. To address indoor air quality (IAQ), the drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in two planes promoting positive drainage to eliminate stagnant water conditions. The outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition. All drain pan threaded connections shall be visible external to the unit. Drain connections shall be of the same material as the primary drain pan and shall extend a minimum of 2 1/2 inches beyond the base to ensure adequate room for field piping of condensate drain traps. Coil support members inside the drain pan shall be of the same material as the drain pan and coil casing. Heating coil, access, and mixing sections may be provided with an optional IAQ drain pan.
5. Access Doors: Access doors shall be 2-inch double-wall construction. Interior and exterior door panels shall be of the same construction as the interior and exterior wall panels, respectively. All doors downstream of cooling coils shall be provided with a thermal break construction of door panel and door frame. Gasketing shall be provided around the full perimeter of the doors to prevent air

leakage. Surface-mounted handles shall be provided to allow quick access to the interior of the functional section and to prevent through-cabinet penetrations that could likely weaken the casing leakage and thermal performance. Handle hardware shall be designed to prevent unintended closure. Access doors shall be hinged and removable for quick, easy access. Hinges shall be interchangeable with the door handle hardware to allow for alternating door swing in the field to minimize access interference due to unforeseen job site obstructions. Door handle hardware shall be adjustable and visually indicate locking position of door latch external to the section. All doors shall be a minimum of 60 inches high when sufficient height is available, or the maximum height allowed by the unit height. Door handles will be provided for each latching point of the door necessary to maintain the specified air leakage integrity of the unit. Optionally, a single-handle door shall be provided for all outward swinging doors linked to multiple latching points necessary to maintain the specified air leakage integrity of the unit. An optional shatterproof window for viewing, capable of withstanding unit operating pressures, shall be provided in the door.

6. Marine Lights: A factory-mounted, weather-resistant (enclosed and gasketed to prevent water and dust intrusion), light emitting diode (LED) fixture shall be provided in sections of the unit as specified for maintenance and service visibility. Fixture shall be complete with aluminum die cast housing, polycarbonate lens designed for maximum light output, and LEDs wired to a single switch within a factory-provided service module. LED lighting shall provide instant-on white light and have a minimum 50,000 hour life. Fixtures shall be designed for flexible positioning during maintenance and service activities for optimal location. All lights within the unit shall be wired to a single switch within the factory provided service module. The service module shall have an optional GFCI receptacle separate from the load side of the equipment. Electrical contractor shall be required to provide a 120V supply to the factory mounted service module for the marine light circuit (unless single-point power is provided) and always for the GFCI receptacle circuit per NEC. The service module shall be provided in the fan section, unless a controls section is provided. In which case, the service module will be provided in the controls section. The light switch is always on the supply fan.

7. Fans: The fan type shall be provided as required for stable operation and optimum energy efficiency. The fan shall be statically and dynamically balanced at the factory as a complete fan assembly (fan wheel, motor, drive, and belts). The fan shaft shall not exceed 75 percent of its first critical speed at any cataloged speed. Fan wheels shall be keyed to the fan shaft to prevent slipping. The fan shafts shall be solid steel. The fan section shall be provided with an access door on the drive side of the fan. The fan shall be a single-width, single-inlet plenum fan. The fan blades shall be aluminum backward-inclined airfoil. Plenum fan shall be direct-driven. Fan sections containing multiple fans shall be controlled using a common control signal, such as the duct static control signal, to modulate the fan speed. The fan and motor assembly (on sizes 10 to 120) shall be internally isolated from the unit casing with 2-inch (50.8-mm) deflection spring isolators, furnished and installed by the unit manufacturer. The isolation system shall be designed to resist loads produced by external forces, such as earthquakes, and conform to the current IBC seismic requirements. The motor shall be integrally mounted to an isolated fan assembly furnished by the unit manufacturer. The motor shall be mounted inside the unit casing on an adjustable

base to permit adjustment of drive-belt tension. The motor shall meet or exceed all NEMA Standards Publication MG1 requirements and comply with NEMA Premium efficiency levels when applicable. The motor shall have T-frame, squirrel cage with size, type, and electrical characteristics as shown on the equipment schedule. The motor shall be open and drip-proof, 460 volt, 3-phase, 60 Hz. The fan section shall have motor leads extended to a factory-installed external junction box to facilitate motor wiring and to maintain air leakage integrity of the casing. The fan motor wiring shall be factory-wired to the external motor junction box within flexible metal conduit of adequate length so that the fan vibration isolation will not be restricted. On units supplied with plenum fans, expanded metal door guard(s) shall be supplied on the access door(s) to the fan, and those downstream access door(s) where unintended access to the plenum fan could occur. Door guard in intended to deter unauthorized entry and incidental contact with rotating components. Refer to the Product Data section for fans with access door guard(s).

8. Coils: Refer to paragraph 2.6, A, 12.
9. Filters: Filter sections shall have filter racks, at least one access door for filter removal, and filter blockoffs to prevent air bypass around filters. The filter sections shall be supplied with 2-inch filters. The filters shall be 2-inch, made with 100 percent synthetic fibers that are continuously laminated to a supported steel-wire grid with water repellent adhesive. Filters shall be capable of operating up to 625-fpm face velocity without loss of filter efficiency and holding capacity. The filters shall have a MERV 13 rating when tested in accordance with the ANSI/ASHRAE Standard 52.2.
10. Mixing Section: A functional section shall be provided to support the damper assembly for outdoor, return, and/ or exhaust air. Dampers shall modulate the volume of outdoor, return, or exhaust air. The dampers shall be of double-skin airfoil design with metal, compressible jamb seals and extruded-vinyl blade-edge seals on all blades. The blades shall rotate on stainless-steel sleeve bearings. Airfoil dampers shall be rated for a maximum leakage rate of 3 cfm/ft² at 1 in. w.g. complying with ASHRAE 90.1 maximum damper leakage. All leakage testing and pressure ratings shall be based on AMCA Standard 500-D. Dampers may be arranged in a parallel or opposed-blade configuration.
11. Outdoor Unit Paint: External surface of unit casing shall be prepared and coated with a minimum 1.5 mil enamel finish or equal. Units supplied with casing exterior factory-painted shall be able to withstand a salt spray test in accordance with ASTM B117 for a minimum of 500 consecutive hours. Unit casing exterior will be provided with manufacturer’s standard color, or alternative color when required.
12. Outdoor Unit Roof: Trane engineered inner roofs incorporate mid-span, internal thermal breaks to eliminate thermal conduction paths from the interior of the air handler to the exterior (2-inch R13 foam-insulated). Inner/ Indoor/ roof will be installed in such a manner as to prevent air bypass between internal components. A single layer Outer/Outdoor roof is utilized above the inner roof and will be sloped at a minimum 0.125 inches per foot either from one side of unit to other, or from center to sides of the unit. Roof assembly will overhang all walls of units by a 1.5-inch minimum.
13. Access/Inspection Sections: A section shall be provided to allow additional access/inspection of unit components and space for field-installed components as needed. The section length shall be variable to accommodate specific access,

spacing, or dimensional requirements. An access door shall be provided for easy access. All access sections shall be complete with a double-wall, removable door downstream for inspection, cleaning, and maintenance. Interior and exterior door panels shall be of the same construction as the interior and exterior wall panels, respectively. All doors downstream of cooling coils shall be provided with a thermal break construction of door panel and door frame.

14. Controls: Field supplied VFD shall be mounted externally on the fan section in a NEMA Type 1 enclosure (unit sizes 3-120) or internally in a NEMA Type 4 equivalent unit casing (unit sizes 3-120) within a dedicated controls section or housed fan section. The internal enclosure shall be an integral part of the unit casing to allow for thermal venting to casing interior, but shall be accessible from unit exterior through access door. Internally mounted starters/VFDs shall have doors with the same construction as other doors on unit. An external disconnect shall be mounted through the access door to the starter or VFD to disconnect full power from starter/VFD, lights, or control power.
15. Start-up: Provide equipment startup by factory or factory trained technicians.

G. Exhaust Fan:
1. General: All exhaust fans shall be tested and rated in accordance with AMCA Standard 210. Fans exposed to weather shall have ventilated weatherproof housing over motor and drive assembly. Refer to Paragraph 2.6A for general requirements. All direct drive fans shall be provided with unit mounted speed controllers. All exhaust fans shall have a disconnect switch. All motors 1 horsepower and larger shall be the premium efficiency type.
2. Roof Fan (Direct, Downblast): Spun aluminum, roof mounted, direct driven, downblast centrifugal exhaust ventilator. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have continuously welded curb cap corners for maximum leak protection. Discharge baffle shall have a rolled bead for added strength. An integral conduit chase shall be provided through the curb cap and into the motor compartment to facilitate wiring connections. Motor shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. An aerodynamic aluminum inlet cone shall be provided for maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed bearings and furnished at the specified voltage, phase and enclosure. Backdraft damper. Greenheck.
3. Roof Fan (Belt, Downblast): Spun aluminum, roof mounted, belt driven, downblast centrifugal exhaust ventilator. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have continuously welded curb cap corners for maximum leak protection. Discharge baffle shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided through the curb cap and into the motor compartment to facilitate wiring connections. The

motor, bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators, and enclosed in a weather-tight compartment, separated from the exhaust airstream. Lifting lugs shall be provided to help prevent damage from improper lifting. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Bearings shall be heavy duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed. Belts shall be oil and heat resistant, non-static Type 4L. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150 percent of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM. Backdraft damper. Greenheck.

4. Rook Fan (Direct, Upblast): Spun aluminum, roof mounted, direct driven, upblast centrifugal exhaust ventilator. Fan shall be UL 705 listed. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have a one piece inlet spinning and continuously welded curb cap corners for maximum leak protection. Windband shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided into the motor compartment to facilitate wiring connections. The motor shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. An aerodynamic aluminum inlet cone shall be provided for maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Exhaust fan shall have roof curb and hinged base with lock hasp and galvanized aircraft cable supports. Weep hole. Greenheck.

   Kitchen Hood Fans shall be UL 762 listed and shall have grease trough.

5. Roof Fan (Belt, Upblast): Spun aluminum, roof mounted, belt driven, upblast centrifugal exhaust ventilator. Fan shall be UL 705 listed. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have a one piece inlet spinning and continuously welded curb cap corners for maximum leak protection. Windband shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided into the motor compartment to facilitate wiring connections. The motor, bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators, and shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Lifting lugs shall be provided to help prevent

damage from improper lifting. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Bearings shall be heavy duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed. Belts shall be oil and heat resistant, non-static Type 4L. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150 percent of the installed motor horsepower. Exhaust fan shall have roof curb and hinged base with lock hasp and galvanized aircraft cable supports. Weep hole. The variable pitch motor drive must be factory set to the specified fan RPM. Greenheck.
Kitchen Hood Fans shall be UL 762 listed and shall have grease trough.

H. Split System Heat Pump (IDU/ODU):
1. General: Refer to Paragraph 2.6A for General Requirements. Completely assembled and factory tested. Provide all starters and relays required for operation. All components by same manufacturer. Trane-Mitsubishi.
2. Outdoor Unit:
   a. Compressor: Sealed hermetic rotary compressor with vibration isolator mountings. Crankcase heater, suction line accumulator, recycling timer. High and low head pressure/temperature protection. Motor overload protection, low ambient feature to 20F cooling mode. High and low side service valves. Recycling timer. Single phase start assist kit. 5-year extended warranty.
   b. Fan and Coil: Finned tube non-ferrous coil. Propeller type fan, 1200 RPM maximum, direct drive. Totally enclosed motor, overload protected, permanently lubricated, resiliently mounted.
   c. Cabinet: Weatherproof, factory paint.
3. Indoor Unit:
   a. Supply Fan: Direct drive, multi-speed forward curve, centrifugal fan, resiliently mounted. Thermally protected motor.
   b. Indoor Coil: Copper tube, aluminum fin, DX coil.
   c. Electric Heaters: Integral part of unit, complete with all operational and safety controls, single point wiring terminal, 5-year factory warranty, UL listed as a complete unit.
   d. Condensate Pan: Install under complete coil area with drain connections.
   e. Filter: Washable media. Class 2 or better.
4. Controls: Microprocessor control containing temperature selection, room temperature indication, automatic cooling/heating changeover, malfunction alarm, power failure automatic restart safety, and emergency operation function.

PART 3: - EXECUTION

3.1 PIPING INSTALLATION:

A. General:

1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Lines shall be adequately braced against vertical and lateral movement. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted. Pipe sizes shall not decrease in direction of flow, unless otherwise noted.
2. Joints:
   a. Threaded: Pipe shall be cut square, and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
   b. Welded or Brazed: Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100ºF. Welding or brazing shall be performed by a Certified Welder or Brazer as certified by an organization/institution that uses standards recognized by the American Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
   c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
   d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.
3. Fittings and Valves:
   a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
   b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
   c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
   d. Valves: All valves shall be full line size. At equipment connections, valves shall be full size of upstream piping. Provide a shut-off valve at each point of connection to existing piping.
   e. Valve Accessibility: All valves shall be located so that they are easily accessible. Valves located above ceilings shall be installed within 24" of the ceiling. For situations where this is not practical or where valves are greater than 10' above floor, chain wheel operators shall be provided. Chain shall extend down to 7' above the floor. All such installations must have prior review by the Engineer.
4. Pipe Support:
   a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural

system. Refer to drawings for additional requirements and attachment to structure. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction.

Pipe Size (In.)	Maximum Spacing Between Supports (Ft.)*		
	Copper	Sch. 40 Steel	Plastic
1/2	6	6	4
3/4	6	8	4
1	6	8	4
1-1/4	6	8	4
1-1/2	6	10	4
2	10	10	4
2-1/2	10	10	4
3	10	10	4
4	10	10	4
6	10	10	4
8	10	10	4

*Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings. Plastic piping shall be supported per the manufacturer's recommendations. Seismic requirements may reduce maximum spacing.

b. Hot Water Piping: Support individual pipes with insulation support and pipe hanger. Install per manufacturer's recommendations.

c. Chilled Water Piping: Support individual pipes with insulation support and pipe hanger. Install per manufacturer's recommendations. Piping shall have complete vapor seal.

d. Refrigerant Piping: Support insulated refrigerant line with construction channel and sheet metal support saddle or Cooper B-Line Armafix clamps. 5' spacing. Use isolation shield for uninsulated pipe. When using pre-charged tubing, all changes of direction shall be made with bending tools producing neat uniform bends. Free hand bends will not be accepted.

e. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.

5. Miscellaneous:

a. Escutcheons: Provide chrome plated escutcheons where piping penetrates walls, ceilings, or floors in finished areas.

b. Pipe Sleeves: All piping passing through concrete or concrete block shall be provided with pipe sleeves. Allow 1" (nominal) clearance between sleeve and pipe or pipe insulation. Piping through walls or footings below grade shall be sealed with Link Seal. Pipes passing between floors shall have Holdrite HydroFlame water/firestop sleeves, UL listed.

c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of 2019 CBC Section 714. Pipes

passing between fire rated floors shall have Holdrite HydroFlame water/firestop sleeves, UL listed.

d. Thermometer or Pressure Gage Tap: Provide tee for instrument well. Minimum size of pipe surrounding well shall be 1-1/2". Mount on side of pipe.

e. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.

B. Hot or Chilled Water Piping: Provide shut-off valve for each building and at each connection to equipment. Before threading, welding or grooving any pipe, it shall have a cloth material of the proper size pulled through pipe to clean out any foreign material, and then a visual inspection through pipe to verify it is clean. Any process done to pipe end will require that pipe end be inspected inside before a fitting is fitted to pipe (to insure that cutting oil or pipe burrs are removed). Always have pipe threading machine sloped to prevent cutting oil from running into the pipe. Branch lines leaving horizontal lines shall leave on the horizontal or at an upslope of 45°, unless they are rising up to another horizontal line which will insure the pipe to remain air free. All high points in any part of the system shall have the means to purge air. Unless otherwise noted all vents shall be 1/4" petcocks with 1/4" copper tube discharge. Route tube to condensate pan, floor sink, etc. If a drain point is not available, terminate tube with a return bend to allow water to be collected. Before connection to equipment, all piping shall be thoroughly flushed with water. Only equipment mounted on vibration isolators shall be connected with flexible connection. The manufacturer of the underground piping system shall instruct the installer regarding the manufacturer's required installation procedures. The manufacturer shall also provide sufficient job-site inspection to insure that the work is being accomplished in accordance with the plans, specifications and manufacturer's requirements. Upon completion of the installation, a certificate shall be furnished to the Architect by the manufacturer of the system, certifying the installation was made in accordance with his requirements and in compliance with the plans and specifications.

C. Condenser Water Piping: Provide shut off valve at each connection to equipment. Before installing, all pipe shall be rapped along entire length to loosen sand, mill scale, etc. Pipe 2" and larger shall be cleaned internally with wire brush. Before connection to equipment, all piping shall be thoroughly flushed with water. Do not install strainers between tower sump and pump suction. Connections to equipment mounted on vibration isolators shall be made with flexible connection.

D. Refrigerant Piping: Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted and erected before brazing. Continuously purge with Nitrogen during brazing. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation shall not be less than 70ºF. After evacuation, fill with dry nitrogen to 250 psi and maintain for two-hour period without additional charge. After nitrogen test, purge with refrigerant charged through dryer and maintain holding charge in system and equipment. Refrigerant piping below grade shall be run in 4" (min.) PVC conduit with long radius ells. Seal ends of conduit watertight.

E. Flue Piping: Flue piping shall be installed in accordance with its UL listing and the manufacturer's instructions.

3.2 PIPING INSULATION INSTALLATION:

A. Chilled and Hot Water Supply and Return:

1. General: All chilled and hot water supply and return piping (including all fittings and accessories) and all chilled water equipment shall be insulated. Insulate a sufficient length of make-up water piping to prevent condensation.
2. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied pressure sealing tape.
3. Fittings and Valves:
   a. Wrap all fittings and valves with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket, solvent welded. Seal all joints with factory supplied pressure sealing vapor barrier tape with a 1-1/2" (min.) overlap on both sides of joint. Insulate all flanges, unions and valves except stems and operators. All joints on chilled water piping shall be sealed with vapor barrier coating in addition to the vapor barrier tape.
   b. For miscellaneous fittings and accessories for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the fiberglass blanket with reinforcing mesh, one coat of lagging adhesive, and a final coat of vapor barrier coating.
4. Vapor Barrier Continuity: All exposed ends of insulation and all gaps or voids in vapor barrier shall be sealed with reinforcing mesh, one coat of lagging adhesive and a final coat of vapor barrier coating. Build up all horizontal areas to prevent water accumulation.
5. Pipe Hangers: Seal all joints at pipe hangers with vapor barrier tape. Joints on chilled water piping shall be sealed with vapor barrier coating in addition to the vapor barrier tape.
6. Piping Exposed to Weather:
   a. All piping and fittings exposed to weather shall have, in addition to the above described insulation, an aluminum jacketing. Insulation at grooved pipe couplings shall be covered with aluminum flange fitting covers. Secure in place with factory supplied straps. Install all joints and seams to prevent water entry, seal with 1/8” bead of gray metal jacketing sealant.
   b. For miscellaneous fittings for which aluminum jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the insulation with reinforcing mesh and at least two coats of outdoor mastic. Plastic fitting covers shall not be used where exposed to weather.
7. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of PVC jackets. Do not install this jacket where it will be subjected to a temperature of 150ºF or more such as immediately adjacent to boilers. In these locations install reinforcing mesh, one coat of lagging adhesive and a final coat of vapor barrier coating.
8. Equipment: Chilled water equipment with continuous circulation (pumps, heat exchanger, etc.), shall be insulated with materials similar to those described in Paragraph 2-02. It shall be the Contractor's responsibility to provide adequate

insulation to prevent condensation, a complete vapor barrier, weatherproofing for equipment exposed to the weather, and a neat-appearing installation. Insulate hot water equipment same as above except no vapor barrier. Submit materials and method of installation to Engineer for review.

B. Refrigerant Piping: Cover piping with foamed plastic insulation. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendations. Cover all fittings, unions, valves and connections. Piping exposed to view shall be covered with PVC jacketing. Piping exposed to weather shall be covered with aluminum jacketing, install all joints and seams to prevent water entry, seal with 1/8” bead of gray metal jacketing sealant.

3.3 DUCTWORK INSTALLATION:

A. General:
1. Standards: Unless otherwise noted, all ductwork shall be constructed and installed in accordance with current SMACNA Standards. Ductwork shall be built to a pressure classification equal to or greater than the maximum operating pressure at that point in the ductwork. A copy of these standards shall be maintained at the job site at all times. Duct work and accessories shall be installed in a manner to prevent vibration and rattling.
2. Access: Provide duct access doors as required to adjust equipment and dampers. Provide wall or ceiling access panels, or remote actuators as required where equipment and dampers are not otherwise accessible. Remote regulator shall be as detailed on drawings.
3. Flanges and Escutcheon: Where ductwork penetrates walls, ceilings, or floors, furnish and install flange or escutcheon of same material as duct.
4. Flexible Connections: Connection of ductwork to any vibrating equipment shall be with 3" (min.) flexible connection. Install with ample slack and uniform gap. There shall be no metal to metal contact across flexible connection. Flexible connections exposed to weather shall have a protective sheet metal cover.
5. VAV/VVH System: For all variable air volume (VAV) systems, the supply ductwork between the fan discharge and the VAV boxes shall be constructed per SMACNA standards to a pressure level equal to the maximum shut-off pressure the fan can generate. All joints in this ductwork shall be sealed with duct sealant in accordance with manufacturer's recommendations. Install VAV boxes with four diameters of straight duct on up-stream side.

B. Low Velocity-Low Pressure (up to 2,000 ft/min and up to 2.0 in water):
1. Sheet Metal Ductwork:
a. Ells: Ells with less than standard radius and square ells shall be fitted with turning vanes.
b. Tees: Tees in supply ductwork shall be straight tap-in with extractor or 45 degree take-off as shown on drawings. Grilles or branches in supply ductwork shall be a minimum of 8 duct diameters downstream of tees.
c. Duct Joints and Seams: All joints and seams which are not exposed to weather shall be sealed airtight with duct sealant. All joints and seams exposed to weather shall be sealed air and water tight with outdoor sealant. (See Part 2 of this Specification). All joints on metal ductwork

exposed to view inside building shall be sealed air tight with grey duct sealant.

d. Dampers: Install volume control damper and damper regulator in all branch ducts.

2. Flexible Glass Fiber Ductwork: The use of flexible duct is limited to the last 5 feet of each branch duct (i.e. one 5 foot section of flexible duct may be used to connect the grille to the sheet metal branch duct). No joints are permitted in this 5' length. Hangers shall be 4" wide metal straps spaced to prevent sagging, 42" spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. Joints shall be installed with stainless steel or nylon draw bands, Duro Dyne Dyn-O-Tie. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius of duct centerline not less than 1.5 times the duct diameter).
3. Spiral Wound Metal Ductwork: At side duct grilles, the grille shall be cut directly into the spiral duct. Duct to duct joints shall be made with the spiral seam rotated so that the seam forms a continuous helical pattern across the joint.
4. Moisture Bearing Exhaust Ductwork: Joints shall be made with male end in direction of airflow and shall be sealed watertight with mastic. Unless otherwise indicated, the ducts shall slope down towards the source of moisture (grille, hood, drier, etc.). Sheet metal screws or any other device that protrudes into the duct shall not be used for clothes drier exhaust ducts.
5. Grease Bearing Exhaust Ductwork: Horizontal portions of the duct shall slope down towards the hood at 1/4" per foot (min.) unless the total horizontal length exceeds 75 feet, then the slope shall be 1" per foot (min.). Provide access panels at changes of direction as required by CMC. Drains shall be provided at low points in horizontal ducts per 2016 CMC 510.1.3. Horizontal ducts shall be provided with access in accordance with 2016 CMC Section 510.3.3.
6. Underground Ductwork: Install ducts with constant slope up to grilles. All ducts and fittings shall be anchored to prevent floating as slab is poured. Any rectangular metal duct or fitting which is not protected with a polyvinyl chloride coating shall be encased in 3" (min.) concrete. Polyethylene ductwork installation shall comply with the manufacturer’s installation instructions.

3.4 AIR TERMINALS AND DUCT FITTINGS INSTALLATION:

A. General: Unless otherwise noted, all air terminals and duct fittings shall be installed in accordance with current SMACNA Standards. Terminals and fittings shall be installed in a manner to prevent vibration and rattling. Metal surfaces exposed to view behind grilles and registers shall be painted flat black.

B. Fire/Smoke Damper: Shall be installed in accordance with the manufacturer's recommendations. Provide access doors as required, label per CBC. Manufacturer's instructions shall be available to the inspecting authorities. Shall be tested according to State Fire Marshal requirements.

3.5 DUCTWORK INSULATION INSTALLATION:

A. General: Insulate all sheet metal supply, return and outside air intake ductwork except as noted below. Insulation shall be continuous through walls and floors except at fire dampers.

B. Where Insulation Is Not Required: Do not insulate factory-insulated ducts or casings, acoustic lined ducts, fibrous glass ducts, underground ductwork, supply or return ductwork exposed to view in the space that it serves, or exhaust ductwork.

C. Concealed Ductwork: Wrap concealed ductwork including outside air intakes with fiberglass blanket lapped 2" minimum. Secure with staples 4" on centers maximum on straight runs and 3" maximum at elbows and fittings. Insulation on bottom of ducts wider than 36" shall also be secured with mechanical fasteners at 24" on center.

D. Acoustic Lining: Unless otherwise indicated, all supply and return ductwork in equipment rooms, all ductwork exposed to weather and other ducts as indicated on drawings, shall have acoustic lining. Do not acoustic line outside air intakes. Where acoustic lining is installed, increase each sheet metal dimension to accommodate lining and maintain clear inside duct dimensions shown on drawings. Apply lining with bonding adhesive in accordance with manufacturer's recommendations and also secure with mechanical fasteners in accordance with SMACNA Standards. Seal exposed edges of lining with bonding adhesive.

E. Fire Resistive Wrapped Ducts: Where indicated on drawings, ductwork shall be covered with fire resistive duct wrap. Install in accordance with it’s UL or Omega Point Laboratories Design number (as applicable) and the Manufacturer’s Installation Instructions.

3.6 EQUIPMENT INSTALLATION:

A. General: It shall be the responsibility of the equipment installer to ensure that no work done under other specification sections shall in any way block or otherwise hinder the equipment. All equipment shall be securely anchored in place. All equipment shall be installed level.

B. Air Handling Units: Spring isolators shall be adjusted to allow movement to maximum free spring length. Piping support shall be designed so that piping weight does not bear on equipment. Hot water coil shall be mounted upstream of chilled water coil.

C. Gage Taps: Gage taps, such as Pete's Plugs, shall be installed immediately adjacent to all heat exchanger and pump connections (i.e. inlet and outlet of all pumps, boilers, chillers, condensers, coils, etc.). Taps shall be installed to allow for a pressure gage or thermometer to be easily inserted and read. Provide 1 set of gages (pressure gage with Pete's Plug adapter, chilled water thermometer and hot water thermometer). Deliver to Owner.

D. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

E. Pumps: Install pumps with a minimum of 8 diameters of straight pipe at the pump suction unless a suction diffuser is installed. Sufficient clearance to wall or other obstructions shall be provided so that motor and rotating parts can be removed without disassembly of volute or piping. Anchor bolt configuration shall be compatible with this method of

removal. Pedestal mounted pumps shall have their bases grouted. Realign pump and motor according to Hydraulic Institute Standards after grouting and connection of piping.

F. Boiler: Installation shall be in accordance with California Code of Regulations, Title 8, Industrial Relations. Where required, permit for system operation shall be obtained and permanently posted at installation.

G. Equipment Platforms: Shall be as shown on drawings and as follows: Flashing and platform cover shall be 22 gage (min.) sheet metal. All joints and seams shall be soldered with 2" (min.) overlaps. Provide 3/4" gap around perimeter between roofing and platform cover to facilitate re-roofing. Extend drip lip down 3" (min.). Provide 30# felt under platform cover.

3.7 TESTS AND ADJUSTMENTS:

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested.

B. Piping Tests:
1. General: Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the new test. There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made.
2. Water Piping: Maintain 100 psig water pressure for 4 hours.

3.8 SYSTEM ENERGY BALANCE:

A. Scope: Provide the services of an independent test and balance agency to test, adjust and balance, retest and record performance of the system to obtain design quantities as specified. The agency must prove that they have no affiliation with any equipment manufacturer, design engineer, installing contractor, or any other party which might lead to a conflict of interest, in order to provide an unbiased, third party system balance and report.

B. Qualifications: Prior to commencing work, the agency shall be reviewed by the Engineer and shall be certified by the Associated Air Balance Council, National Environmental Balancing Bureau or Testing, Adjusting and Balancing Bureau. The agency shall provide documentation of having successfully completed at least five projects of similar size and scope.

C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be available for examination. Application of instrumentation shall be in accordance with AABC, NEBB or TABB standards.

D. Submittals: Include in shop drawings copies of forms to be used for testing and balancing showing all data which is to be recorded. Three copies of completed balance report shall

be submitted to and reviewed by the Mechanical Engineer prior to the final mechanical construction review.

E. Procedure - General: Procedure shall be in accordance with Associated Air Balance Council's "National Standards for Field Measurements and Instrumentation - Total System Balance", Volume Two, No. 12173, or equivalent NEBB or TABB standards. System shall be in full, continuous operation during test. Balanced quantities shall be plus 10%, minus 0% of design quantities. All nameplate data, manufacturer, model and serial numbers shall be recorded for each item tested.

F. Extended Warranty: The test and balance agency shall include an extended warranty of 90 days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck or resetting of any item or items in test report. The agency shall provide technicians to assist the Engineer in making any tests he may require during this period of time.

G. Air Balance Procedure (For Each Air Handling System):
1. All air filters shall be clean when air balance is performed.
2. Provide a sketch of the equipment showing exactly where all pressure readings were taken.
3. Adjust blower RPM to design requirements.
4. Record motor full load amperes.
5. Make pitot tube traverse of main supply and return ducts and obtain design CFM at fans.
6. Record system static pressures, inlet and discharge.
7. Record filter quantity, size(s) and pressure drop across filter(s) at each filter bank.
8. Adjust system for design CFM recirculated air.
9. Adjust system for design CFM outside air.
10. Record entering air temperatures. (DB heating, DB and WB cooling.)
11. Record leaving air temperatures. (DB heating, DB and WB cooling.)
12. Adjust all main supply and return air ducts to design CFM.
13. Adjust all zones to design CFM, supply and return.
14. Adjust all diffusers, grilles and registers to plus 10%, minus 0% of design requirements.
15. Adjust CFM at all exhaust fans, make-up units, etc. (high and low speed, where applicable). Record applicable data from items 1 through 11 above.
16. Each grille, diffuser and register shall be identified as to location.
17. Verify proper diffusion pattern for all ceiling grilles and that all sidewall grilles are set for 5 degrees upward deflection unless otherwise noted. Make a notation of any that are not set properly.
18. Size, type and manufacturer of diffusers, grilles, registers and all tested items shall be identified and listed. Manufacturer's ratings shall be used to make required calculations on all items.
19. Readings and tests of diffusers, grilles, and registers shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.
20. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified. Testing agency shall

check all controls for proper calibrations and list all controls requiring adjustment by control installers.

21. All diffusers, grilles and registers shall be adjusted for required air patterns and to minimize drafts.
22. As a part of the work of this contract, THE AIR CONDITIONING CONTRACTOR shall make any changes in pulleys, belts and dampers or the addition of dampers required for correct balance as recommended by air balance agency, at no additional cost to Owner.
23. Set, test and adjust packaged heating/cooling unit economizer operation in cooperation with controls contractor. Record minimum and maximum outside and exhaust airflows.

H. Water Balance Procedure (For Each Pumping System):

1. Set valves for maximum coil flow.
2. Remove and clean all strainers.
3. Examine water in system and determine if water has been treated and cleaned.
4. Check expansion tanks to determine that they are properly charged and that the system is completely full of water. Bleed air from system.
5. Set operating temperatures of all equipment to design requirements.
6. Air balance must be complete before water balance begins.
7. Adjust pumps to design flow by use of differential pressure gage calibrated in feet of water.
8. Adjust water flow through all equipment to design flow.
9. Record leaving and return water temperatures at all equipment. Reset to correct design temperature.
10. Record water temperatures at inlet side of coils. Record rise or drop of temperatures from source.
11. Balance all coils for design flow and mark settings on flow controllers.
12. After coils are balanced, recheck settings at all equipment and readjust if required.
13. Record pressure drop through coils, and reset to design flow. Set pressure drop across bypass valve to match coil full flow pressure drop.
14. Record the following at each coil:
    a. Inlet water temperatures.
    b. Leaving water temperatures.
    c. Pressure drop across coil.
    d. Pressure drop across bypass valve.
15. Record pump suction and discharge pressures at operating condition and also with pump discharge valve completely closed.
16. Record running amperage of pump motor at operating condition and also with pump discharge valve completely closed.
17. Record water metering device readings.

3.9 WATER TREATMENT:

A. General: All new HVAC equipment and auxiliary water piping systems shall be cleaned, passivated and treated as herein specified. Chemical compound identifications are from San Joaquin Chemicals, Inc., a State of California Contractor, License #461677. A written generic formula including active ingredients percentages must be submitted for review to be accepted as equivalent. Provide treatment as required to control scale, corrosion,

biological growth, foaming and general fouling. Chemical treatments indicated below are generic in nature, actual formulations, dosages and application shall be determined by analysis of the make-up water to be treated with consideration for the system metallurgy, type of treatment equipment employed and operating units characteristics. Initial cleaning, preparation and start-up shall be supervised by the water treatment company's field service application specialist having a minimum of ten (10) years' experience with these type applications. The water treatment contracting company shall have not less than fifteen (15) years' experience with these type applications.

B. Cleaning and Initial Preparations:

1. Initial Fill: As the first water is introduced into the system, add not less than 10 gallons for each 1,000 gallons of contained water volume of a liquid blend of alkaline detergent; SANASOLV ® 6103 for closed systems, SANACOR ® 2605 - WR metal passivator as a white rust inhibitor for open galvanized systems, and SANACOR ® CUI for metal passivator as an enhanced copper tube corrosion inhibitor, comprised of the following ingredients:

   Closed (Hot, Chilled, Non-Galvanized Open Systems):
   - Sodium Silicate Penta-hydrate
   - Sodium Tri-Polyphosphate
   - Tri-Sodium Phosphate
   - Dispersing Polymers
   - Wetting Agent, non-ionic

   Open (Galvanized Passivator):
   - Ortho-phosphate
   - Poly-phosphate
   - Dispersing Polymers
   - Azole
   - Buffered at pH 7.2-7.8

   Open (Enhanced Copper Tube Passivator):
   - Azole in solution (pH 7.5 to 8.5)

2. Circulation: The above closed loop detergent shall be re-circulated for not less than twelve (12) hours/not more than forty-eight (48) hours after which the system shall be rapidly dumped with re-circulating pumps operating to provide maximum practical motion, and whenever possible, with simultaneously adding or chasing with rinse water. It is important that make-up water rate exceed water discharge rate. In either case, the system shall be flushed until neutral to phenolphthalein, reaches the same pH and TDS levels as the clean flushing water and is free from suspended material and color. Provide circulating pumps as required. If existing main circulating pumps are utilized for flushing the system, the entire system shall be flushed and re-treated.

   a. After flushing, all strainers shall be removed and cleaned. If the system contained a significant level of suspended solids, recirculating pump seal replacement may be required as requested by the project engineer as recommended by the water treatment field service application specialist. These functions will be the responsibility of the mechanical contractor with supervision by the water treatment applications specialist.

   b. Be sure that all heating and/or cooling coils are kept open during the cleaning and flushing process and that cleaning solution is re-circulating through them and totally flushed from the entire system. These functions will be the responsibility of the mechanical contractor with supervision by the water treatment applications specialist.

c. After flushing cleaner/metal passivator from the open galvanized system, immediately re- passivate galvanized systems with SANACOR® 2605-WR at 10 gallons/1,000 gallons contained water and leave the passivator in the system to naturally deplete during normal operating blowdown cycles.

d. After flushing cleaner/metal passivator from the open condenser water system, immediately re-passivate these enhanced copper alloy tube systems with SANACOR® 2605-CUI at 10 gallons/1,000 gallons contained water and leave the passivator in the system to naturally deplete during normal operating blowdown cycles.

3. Initial Treatment Closed Loop: As soon as possible after flushing (within two hours), and with clean water in the systems, introduce 800 to 1,200 parts per million of sodium nitrite, pH buffer, yellow metal inhibitor and anti-scalants, (SANACOR® 2301-A) and adjust system water pH to 8.5 - 10.5. Maintain treatment concentration in all closed systems using by-pass feeders; (two-gallon feeders for less than 1,000 gallons contained water and five or twelve-gallon feeder for larger systems.

4. Initial Treatment Open System: Introduce 500-1000 parts per million recommended SANACOR® 2600 series antiscalant/antifoulant/metal passivator/inhibitor to open recirculating water systems. Allow this inhibitor to fall naturally within control limits as recommended by the water treatment applications specialist. This inhibitor does not replace the galvanized or enhanced copper tube passivators that should already be in the systems and allowed to dissipate through normal system bleed-off.

C. Certification Before Start-Up: Equipment shall not be started until the water sides of all units have been cleaned and treated per these specifications under the supervision of the water treatment company's applications specialist. The field service applications specialist or their designate shall prepare a letter and submit it to the mechanical contractor and/or consulting engineer indicating that all piping systems have been properly cleaned and treated and are ready to be put into operation.

D. Continuation of Supervision: The water treatment service company shall provide supervision of the water treatment program for a period of not less than one year from commencement of the water treatment program which shall consist of analysis of all treated systems and the submittal of a written analytical report stating the current conditions and recommendations for maintaining optimal controls. This service shall be performed monthly or more frequently as specified or required.

E. Chemical Supply: Provide a one year (12 months) supply of chemicals from commencement of the water treatment program to maintain the following criteria based on 17 hours operation per day, 7 days a week, at 75% loading capacity. Water treatment contractor must allow for one year supply of chemicals, (including biocides) regardless of the system operating conditions. The only exception: if a closed water system is dumped or takes on more than 10% make-up of its total water volume during the first year, additional required chemicals cost over the 10 % will be reimbursed with proper documentation. Part of this documentation requires water treatment contractors proposed closed system use rate requirements to be supplied with Submittals.

1. Chilled Closed System: Provide and maintain an excess sodium nitrite concentration of 800-1200 ppm by addition of SANACOR® 2301-A. Consider ≅ 10% per year water loss by volume.

2. Hot Water Closed System: Provide and maintain an excess sodium nitrite concentration of 800-1200 ppm by addition of SANACOR® 2301-A. Consider ≅ 10% per year water loss by volume.

3. Condenser Cooling Water: Provide and maintain between 200 and 500 ppm total treatment concentration of recommended SANACOR® 2600 series inhibitor. Inhibitor selection and feed rate will be based on make-up water quality, system metallurgy, projected cycles of concentrations, type of system and environmental compliance requirements.
4. Condenser Cooling Water: Provide biocide (SANATOX® 2080) pelletized bromine/chlorine hydantoin (must be over sixty (60%) percent active as Bromine) to be fed via bypass pot feeder specifically designed for this type oxidizing product. A second and sometimes third liquid non-oxidizing biocide and/or bio-dispersant may be considered based on location, environment, system size and type, etc.
5. Responsibility: It is the responsibility of the water treatment service company to guarantee biological control of each treated system for the first year warranty period. In addition to maintaining corrosion rates less than 1.0 mpy for steel, 0.1 mpy for yellow metals, with no pitting, and total elimination of scaling and/or fouling of all treated systems.

F. Equipment and Accessories:
1. Water Meter: A properly sized pressure regulated back-flow preventer shall be installed in any make-up water line where chemicals may be injected. A properly sized contacting head water meter or a paddle wheel flow sensor (in-line or wall mount with pulse counter) which will signal a chemical pump with both internal and external operating characteristics for feeding inhibitor chemical proportional to real-time system make-up. Seametric MJNR-200 1 pulse/10gal
2. Controller: Controller shall continuously monitor the conductivity of an open cooling water stream via a remote or attached sensor. As the conductivity rises above a pre-set conductivity level as established by the water treatment company, the controller shall signal a N/C motorized bleed valve to open, evacuating high TDS recirculating water. The valve shall remain open until the conductivity drops two to five percent below the pre-set level. The conductivity level shall be adjustable from 100-5,000 micro siemens. Controller shall have operating mode indicator lights, connections for chemical pump, N/C bleed-off valve and shall have a conductivity sensor flow switch and flange for wall mounting, Advantage, Aqua Track, Wal-Chem, Lakewood, Pulsatron, models or approved equal. Walchem WCTT600PSNNM-BN
3. Chemical Pump: Positive displacement pump with variable stroke and frequency, 2.0 gph - 250 PSI, both external and internal input function, acrylic or PVC head as appropriate for the chemical proposed with reinforced, thermoplastic housing. Provide foot valve with strainer, 4-function discharge valve, polyethylene tubing. Advantage, Liquid Metronics, Inc., Walchem or approved equal. Walchem1XB-007TCN-U
4. Biocide/Bio-dispersant Pump: Positive displacement Pump with variable stroke frequency, 2.0 gph – 250 PSI with input function from the controller timer, acrylic or PVC head as appropriate for the biocide, thermoplastic housing, provide foot valve with strainer, 4 function discharge valve, polyethylene tubing. Advantage, Liquid Metronics, Inc., Walchem or approved equal. One pump is required, a second pump will be supplied at the discretion of the water treatment company with E.4. Walchem 1XB-007TCN-U
5. Solenoid/Motorized Bleed Valve: Normally closed, pilot operated diaphragm valve or normally closed motorized, ¾” to 2” pipe size based on projected line pressure

and bleed-off rate.Griswold Controls, Model 4160, 115 volt coil, Erie N/C motorized valve or approved equal. GTP-MGV10B/WP

6. Chemical Tank: 65-110-250 gallon polyethylene double walled containment or chemicals resistant powder-coated steel or stainless steel overlay containment of polypropylene chemical bulk container. Proper selection of tank capacity must assure a minimum of three (3) months chemical supply.
   1-DW65-BLUE (INHIBITOR)
   1-DW65-BLUE (BIOCIDE)
7. Brominator: Properly sized for tower capacity to maintain not less than 60 days supply of briquettes during the optimum use period. Include all necessary valves, air vent, calibrated outlet valve, inlet ball valve, calibrated slotted ball valve, drain line, flow meter (2-10 g.p.m. or as required). GTP/BR-40-HP W/MGV10B/WP CPV Moto Valve

G. Analytical Equipment and Reagents:
   Test Master Jr. Test Cabinet, complete or equal
   Myron L 6PIIFC pH/Conductivity/ORP meter
   Sodium Nitrite Drop Test Set
   Open Recirculating Inhibitor Drop Test Set (T. S. 260 or approved equal)
   Bromine/Chlorine Test Set, Color Comparator Type
   Total Alkalinity Drop Test Set
   SANACHECK Bio-Stick Testing
   *All reagents supplied for first year of operation

H. Installation: Install all equipment and accessories per the piping diagrams on drawings and the manufacturer's recommendations as approved by the consulting engineer and under the direction of the water treatment contractor.

I. Electrical: Work in this section must be performed by the electrical contractor under the supervision of the water treatment contractor.

J. Submittal Acceptance: Submittals will not be accepted without annual chemical and biocide use calculations and these calculations must illustrate proper chemical double-walled bulk containment tanks selection and brominator selection based on the water treatment company’s submitted use rate calculation, referring to operating load as specified under E. “Chemical Supply”. The water treatment supplier is obligated to supply items specified for one year regardless of their calculations as submitted, with exception under E for closed loop systems.

END OF SECTION

SECTION 23 09 23 - DIRECT DIGITAL CONTROL AND ENERGY MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions of Section 23 00 00 shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. General: The direct digital control and energy management system (DDC/EMS) includes control panels, control devices, valves, actuators, all line and low voltage control and interlock wiring (including wiring to controllers, switches, timers, relays, etc.) and conduit and related equipment, as required for proper operation of all equipment. Provide all equipment, programming, labor, materials and services necessary for a complete, lawful and operating DDC/EMS as shown or noted on the drawings and as specified herein. All control wiring, line and low voltage shall be installed in conduit. Power wiring, power to DDC/EMS control panels and disconnect switches are included in the Electrical Specifications, except that power wiring for control devices such as controllers, valves, etc., is included in the control system. Electrical work shall be in accordance with Electrical Specifications. The system shall be direct digital control/electric. **The control system shall be direct digital. Distech, without substitution, to match existing. The system shall be Niagara 4, HTML5 based, with open license supervisory controller.** The system shall communicate over the District's Ethernet LAN/WAN, and shall include the latest upgrading (software and firmware) during the warranty period. The data wiring shall have an Ethernet connection at the DDC/EMS panel. A Graphical User Interface (GUI) shall be provided. Coordinate with Section 23 00 01, Heating, Ventilating and Air Conditioning and with Division 26. Comply with ASHRAE 55 and Title 24.

1. All work described in this section shall be installed, wired, circuit tested and calibrated by factory certified technicians qualified for this work.
2. Coordinate and cooperate with commission agent as required by Section 01 91 13.

B. Contractor Qualifications: All controls shall be furnished and installed by a Contractor who is licensed, N4 certified and approved by the controls manufacturer for design, installation, start-up and service of their product. The Contractor must have sufficient personnel to respond to a trouble call at the site within four hours. The Contractor's local manager shall have a minimum of five years' experience in the design, installation, start-up and service of similar systems. The Contractor shall submit a list of at least five projects which are similar in size, scope and contract value to this project. This list shall include the Owner's contact person, phone number and controls contract value.

C. Submittals: Within 60 days of contract award, submit eight (8) copies of shop drawings showing the following aspects of the DDC/EMS system (CAD file with DXF format if required of floor and site plans can be secured from the Architect).

1. All termination points, terminal cabinets, and cabling.

2. Schedule of input and output points.
3. Locations of all visible DDC/EMS system components (i.e. interior and exterior sensors, terminal strips, panels, trench and pull boxes, etc.), identifying specifically any exposed conduit.
4. Descriptive literature for all material and equipment items shall include manufacturer's name and catalog numbers, dimensions, capacities, and all other characteristics and accessories as listed in the specifications or on the drawings.
5. Submit copies of forms to be used for testing and verification showing all data which is to be recorded. Three copies of complete report shall be submitted for review.
6. Complete written sequence of operation for all controlled equipment.

D. Installation and Operation Manuals: Furnish Installation and Operating Manuals for all components. These manuals shall contain full documentation which shall include, without being limited to, the following:
1. General description and specifications.
2. Installation and initial checkout procedures.
3. Complete alignment and calibration procedures for all components.
4. Detailed schematics and assembly drawings and communication trunk diagram with control unit addresses.
5. BACNet architecture diagrams
6. Sequence of Operations.
7. Controller points lists.

1.3 SYSTEM ARCHITECTURE

A. DDC/EMS Equipment: The main controller shall contain the network communications and information management programs providing integrated global control, trend logging, local and remote alarming and fully menu driven user interface. The local network controller must be an intelligent, stand-alone microprocessor based controller which can have a variety of configurations based on their application.

B. Campus-Wide Data Transfer System: The DDC/EMS shop drawings shall indicate where all equipment items are to be located for input and output to complete the system. The conduit/cabling system shall inter-tie these points as required to complete one system to meet the design criteria herein. Conduit shall be used for all EMS wiring whenever access is limited (hard-lid, walls, etc). When EMS wiring is installed in/above accessible areas (such as T-bar ceilings), free-air with J-hooks and wire-ties is acceptable. However, EMS wiring cannot be intermixed or bundled with any other cabling/wiring (Fire Alarm, internet, etc). System high speed communication shall be hardwired using a Belden shielded cable as recommended by DDC manufacturer.

C. User Interface Communication: The user may communicate with the DDC/EMS system with a workstation located at the District Office over the WAN, with a remote workstation, with an On-Campus Operator Workstation, or with a Lap-Top computer (Service Tool).

D. Standard Network Support: All Master Controllers, Workstation(s) and File Server shall be capable of residing directly on the owner’s Ethernet TCP/IP LAN/WAN. Furthermore,

the Master Controllers, Workstation(s) and File Server shall be capable of using standard, commercially available, off-the-shelf Ethernet infrastructure components such as routers, switches and hubs. With this design the owner may utilize the investment of an existing or new enterprise network or structured cabling system. This also allows the option of the maintenance of the LAN/WAN to be performed by the owner's Information Technology Department as all devices utilize standard TCP/IP components. If the DDC/EMS contractor needs an additional data port that is not already provided, its installation must be coordinated with the District's IT department (and IT infrastructure contractor if applicable) and shall be installed at the DDC/EMS contractor's expense. As a result, the DDC/EMS contractor shall ensure any additional data port locations are clearly indicated and that the existing EMS data ports they intend to utilize are addressed/identified prior to construction so they are not damaged or removed. This coordination shall occur between the District's Construction Office, IT department, DDC/EMS operator, IT infrastructure contractor (if applicable), and the project's general construction contractor manager.

PART 2 - PRODUCTS

2.1 GENERAL:

A. General Requirements: The Electronic Microprocessor Based Direct Digital Control and Energy Management System (DDC/EMS) shall monitor the data environment and perform control functions in relation to a programmed strategy and the status of the data environment. The system shall use solid state computer based digital and analog technology. The system shall be standard with the manufacturer to insure on going parts availability and trained technical support. The DDC/EMS shall be of the user programmable type requiring no special computer education for operation. All necessary instruction manuals and user orientation training shall be supplied by the manufacturer or agent thereof. The DDC/EMS shall be UL listed as a Direct Digital Control and Energy Management System. The programmable control requirements of the DDC/EMS shall include, but not be limited to:

OPTIMUM START/STOP (BASED ON HISTORICAL DATA)
TIME OF DAY ROUTINES
SCHEDULED OCCUPANCY ROUTINES INCLUDING HOLIDAYS
CUSTOM TAILORED REPORTING
ACCUMULATING RUN TIME
CRITICAL CONDITION ALARMING
FLUID FLOW SWITCH AND CONTROL ALARMING
PID CONTROL ON ANALOG OUTPUTS
HOT WATER RESET
DAY/NIGHT SETBACK
ECONOMIZER/PURGE
CUSTOM TAILORED REPORTING
ACCUMULATING RUN TIME
POINT OVERRIDE ABILITY FOR EVERY DIGITAL AND ANALOG OUTPUT
SEPARATE MODES AS REQUIRED BY CONTROL SEQUENCE
ALL EXTERIOR LIGHTING CIRCUITS CONTROLLED BY SYSTEM

B. Environment: The DDC/EMS shall operate in an environment of 40 120 degrees F and 10 95% relative humidity. Sensors and control elements shall operate under the temperature, pressure, humidity, and vibration conditions normally encountered in the installed location. The DDC/EMS shall maintain accuracy as follows:
1. +/ 0.5 F for the space temperatures in the 0 F 130 F range.
2. +/ 0.5 F for duct temperatures in the 40 F 130 F range.
3. +/ 1.0 F for outside air temperatures in the 30 230 F range.
4. +/ 1.0 F for water temperature in the 30 230 F range.
5. KWH and KW monitoring within 1.0%.

C. Battery Backup: The system shall be tolerant of power failure and hold memory for a minimum of 12 hours. On power restoration, the system shall automatically and without operator intervention of execution of manual restart procedures:
1. Come On Line.
2. Update all monitored functions.
3. Resume operation based on current time and status.
4. Implement special building start up strategies as required.
5. Log time of power outages and start ups.

D. Program Storage: All JACE 8000 hardware licenses and certificates shall be stored on local MicroSD memory card employing encrypted “safe boot” technology.

E. Protocol: Protocol shall be BACNet. The Main Controller shall be enabled to support and shall be licensed with the following Open protocol drivers (client and server) by default.
1. BACNet
2. Lon
3. Modbus
4. SNMP
5. KNX

F. The Main Controller shall provide the following hardware features as a minimum:
1. Two 10/100 Mbps Ethernet ports.
2. Two Isolated RS-485 ports with biasing switches.
3. 1 GB RAM
4. 4 GB Flash Total Storage / 2 GB User Storage
5. Wi-Fi (Client or WAP)
6. USB Flash Drive
7. High Speed Field Bus Expansion
8. -20-60°C Ambient Operating Temperature
9. Integrated 24 VAC/DC Global Power Supply
10. MicroSD Memory Card Employing Encrypted Safe Boot Technology

G. The Main Controller shall be provided with a 5 Year (SMA) Software Maintenance Agreement. Labor to implement not included.

2.2 SYSTEMS DESCRIPTION:

A. Modular Design/Expandability: The DDC/EMS shall be of a modular design providing distributed processing capability, and allowing future expansion of both input/output

points and processing/control functions. The modular DDC/EMS shall be configured on the main/local concept. The main controller shall have the capability of adding local controllers and the local controllers shall be capable of adding I/O modules.

B. Main (Master) Description: The master shall function as the overall system coordinator, accept control programs, perform automated energy management functions, control peripheral devices and perform all necessary mathematical calculations. The master shall be a microcomputer of modular design. The word size shall be 16 bits or larger, with a memory cycle time less than 1 microsecond. All chips shall be second sourced. The master shall have the following:

1. Protected Access: Key lock protected access to output override switches and internal circuitry.
2. Memory: The master shall have memory required for systems operation and diagnostics or MCP software.
3. Real Time Clock: The master shall have a battery backed uninterruptable "Real Time Clock". The accuracy shall be within ten seconds per day. The RTC shall provide the following information: Time of Day, Day, Month, Year, and Day of Week. The system shall be programmed to automatically correct the clock for day light savings time and leap years and Time Sync.
4. Power: The master shall operate from 120 VAC +/- 20%, 60 Hz. Line voltages below the operating range of the system shall be considered outages. The master shall have over voltage surge protection, and require no additional AC power signal conditioning.
5. Parallel Processing: The master shall be capable of parallel processing, executing separate control programs simultaneously. Any control program may affect control of another program if desired. Each program shall have full access to all I/0 facilities of the processors.
6. Communications Processor: Each master shall provide communication to the District’s Workstation(s) (LAN) and the field buses. In addition, each master must have communications ports that support portable service tool and connection to third party controllers such as a chiller control panel or Variable Frequency Drives.
7. Uninterruptable Functions: Control functions shall not be interrupted due to program entry or other user communications.

C. Local Controller Units: The local units function as a stand-alone controller and as an Input/Output interface of the DDC/EMS and the Data Environment.

1. HVAC units must be fully controlled by a controller connected to the DDC/EMS that can be fully programmed by the DDC/EMS contractor.
2. Monitoring: Local units shall be used to connect the data environment to the system and contain all necessary Input/Output functions to read field sensors and operate controlled equipment based on internal instructions or instructions from the Master. The units shall be fully supervised to detect failures. The units shall report the status of all points in its data environment at the rate of at least once every second. Local units shall connect directly to the Master with a twisted pair shielded RS-485 interface.al unit failure.
3. Unit Failure: Upon failure of the unit (including transmission failure), the unit shall automatically fail off or to a predetermined state for three-way valves. All

local units must run independently in the event of a central unit failure (including transmission failure) in bypass mode via the thermostat.

4. Power: The unit shall operate from 120 VAC, +/-20%, 60 Hz, 220 VAC, +/-20%, 50 Hz or 24 VAC +/- 20%, 50/60 Hz power. For voltages below the operating threshold the unit shall totally shutdown and de energize its outputs.
5. LAN and/or Field Bus: Each unit shall communicate with any unit through the RS-485 interface LAN and/or field bus.
6. Auxiliary Port: Each unit shall be equipped with an auxiliary port to allow local interrogation of input and output values, and keyboard override of outputs through laptop.

2.3 INPUT/OUTPUT CAPABILITY:

A. Inputs: The DDC/EMS shall accept information in the form of a temperature, voltage, digital signal (on off) or pulse counter.

1. Analog Inputs: The Analog Input (AI) function shall monitor each analog input, perform A/D conversion, and hold the digital value in a buffer for interrogation. The A/D conversion shall have a minimum resolution of 10 bits. Input ranges shall be within the range of 0-10 VDC.
2. Digital Inputs: The Digital Input (DI) function shall accept dry contact closures and voltage level or resistance level (5VDC reference voltage) transitions. A voltage level below 1 volt or a resistance below 500 ohms shall be read as ON (closed), a voltage level above 3 volts or a resistance above 1400 ohms shall be read as OFF (open).
3. Pulse Accumulator Inputs: The pulse accumulator function shall have the same characteristics as the DI, except that, in addition, a buffer shall be included to totalize pulses between interrogations. Each input shall accept pulses at a minimum of 2 per second.
4. Temperature Inputs: Temperature inputs originating from a thermistor, shall be monitored and buffered as an AI, except that, automatic conversion to degrees F shall occur without any additional signal conditioning.
5. Input Wiring: All analog inputs shall be two wire devices, with shielded wire for accurate operation.

B. Outputs:

1. Master and local controllers - Form C relay outputs rated at 5 amp, 24 VAC/DC or 2 amp, 30 VAC for on/off or Pulse Width Modulation for maintained operation of field devices. Output pulse width shall be selectable between 0.1 and 3200 seconds with a minimum resolution of 0.1 seconds. Isolation and protection against voltage surges shall be provided. Central plant controllers shall be equipped with an ON/OFF/AUTO switch to manually obtain either output state. Manual overrides shall be reported to the master at each update. An LED shall be provided to indicate the state of each digital output.
2. All digital and analog output points on every controller must have an override (highest priority) input point in the controller's point list in the JACE. This override point must be clearly labeled and identifiable. For example, "DO1ovrd" would be the point to override Digital Output 1.

2.4 SOFTWARE:

A. User Software: HTML5 based. Provide software (required upgrades) for Laptop Computer (Service Tool) and District office workstation, as required.

B. Software Features:
1. Mathematical Requirements: The DDC/EMS shall have a math package capable of addition, subtraction, multiplication, division, square root, greater than and less than functions, minimum and maximum selection functions, and up to five levels of parenthesis for computation of variables. Control commands may be executed based on these calculated variables which are available to the program on a global basis. Math expressions may be used in action and exit commands of control program. The mathematical software shall be capable of mixed mode arithmetic, utilizing Boolean logic statements in combination with basic arithmetic to provide conditional mathematical computations.
2. Passwords: The DDC/EMS shall have multiple levels of user programmable passwords in addition to a master password, for programming security. Separate passwords may be user programmed. Level of password will define user's access level and ability to change system.
3. Trend Logging: The DDC/EMS shall trend log variables. Any system variable (inputs, outputs, numerals, can be trend logged.
4. Messages: The DDC/EMS shall provide alarming, preventative maintenance and status reporting messages.
5. Documentation Format: The programming language of the DDC/EMS shall be plain English based such that a printout of the control program shall serve as the primary documentation for the system.
6. Micro Processor Integrity Checking: Each DDC/EMS microprocessor shall continuously monitor and check itself and produce error messages in the event of a malfunction.
7. Data Plotting: The DDC/EMS shall provide plots of values of system variables on a graph. Graphs may consist of combinations of up to 3 system variables at a time from the history logs.

C. Color Graphics Requirements Provide HTML5 based color graphics which allow user to access and change (based on user access level) all schedules and setpoints (including damper or control valve positions) directly through the user graphics. Real time data shall continuously be updated. Navigation between the screens (forward and backwards) shall be accomplished with the use of a mouse. The minimum graphic screens shall include the following:
1. Site lay-out locations of all equipment being controlled, control component locations, and spaces served. Provide multiple screens-minimum of 1 screen per building plus site and others as needed for clarity. By "clicking" mouse on the desired equipment area a flow diagram will be displayed for the related equipment (as described below - Item 2). By "clicking" the mouse on a conditioned space, a graphic display of the zone conditions (as described below - Item 3) will be displayed.
2. Each building must have a graphical summary page of all the zones in that building that displays zone temperature, set point, discharge air temperature, and fan command.

3. Zone & HVAC Equipment Description on GUI: Each item of HVAC equipment must be clearly identified by what area it serves and its unit number. For example, if HC-2A serves Classroom 4, the GUI should list it as “Classroom 4, HC-2A.” It should NOT be listed as only “HC-2A” or “Classroom 4.”
4. Flow diagrams shall be provided for each HVAC system, such as air-handling system, chilled water system, hot water system, condenser water system, package unit system, brine system with all inputs and outputs dynamically displayed.
5. Each temperature control zone shall have a screen providing set points, temperatures, and related HVAC system status data.
6. Scheduling screens allowing On/Off times to be set.

D. Software Manual: The software manual shall describe programming and testing, starting with a system overview and proceeding to a detailed description of each software feature. The manual shall instruct the user on programming or reprogramming any portion of the system. This shall include all control programs, variables, set points, time periods, messages, passwords and other information necessary to load, alter, test and execute the system. The manual shall include commands, editing and writing control programs, printouts and logs, mathematical calculations, and instructions on modifying any control point, verifying error status, changing passwords, and initiating or disabling control programs.

E. Software Licenses: The owner shall be named the license holder of all software associated with any and all incremental work on the project(s). All Niagara 4 software licenses shall have the “accept.station.in=*”; “accept.station.out=*”; “accept.wb.in=*”; and “accept.we.out=*” section of the software licenses. The intent is to insure that the installed Niagara 4 products may be completely open for integrations. Owner shall be free to direct the modification of the software license, regardless of supplier. In addition, the Owner shall receive ownership of all job-specific software configuration documentation, data files, and application-level software developed for this project. This shall include all custom, job-specific software code and documentation for all configuration and programming that is generated for a given project and/or configured for use within Niagara Framework (Niagara 4) based controllers and/or servers and any related LAN/WAN/Intranet and Internet connected routers and devices. Any and all required IDs and passwords for access to any component or software program shall be provided to the Owner.

2.5 USER INTERFACE:

A. LAN Connections: If an additional LAN connection is needed, the conduit and cable from LAN rack is to be installed by electrical contractor. The planned location of all LAN connections (new and existing) to EMS equipment must be coordinated with the District’s networking staff and EMS staff as early as possible. Final connections shall be made by DDC/EMS Contractor.

B. Direct Computer Communication: The DDC/EMS shall have a computer compatible communication mode for communication with other intelligent devices, which performs data integrity checking, with automatic retransmission of data when errors are detected.

C. JACE software must include all applications to make all folders viewable and accessible in the JACE.

2.6 SYSTEM COMPONENTS:

A. Control Components:
1. Wall Switches: Plates for all wall switches and timers shall match those specified in Division 26.
2. Labels: All labels, signs, etc. shall be engraved, laminated plastic, white on black background, 1/8" high lettering, minimum.
3. Temperature Sensors:
a. Sensor Type: All temperature sensors shall be made of a highly stable, precision thermistor material accurate to within ±0.36 Degrees F. Identify each temperature sensor with a "Lamicoid" label keyed to the control system as-built drawings.
b. Room Sensor: Room temperature sensor shall have Executive Decorator housing with programmable visible temperature indication. Housing shall include an occupancy override, temperature setpoint adjustment and a service tool jack.
c. Vandal Resistant Room Sensor: Where noted, shall be a blank stainless steel wall plate with the sensing element bonded to the back side. The plate back shall be insulated to reduce wall temperature influence.
d. Duct Sensor: Duct temperature sensor shall be a probe type element with 9 inch insertion length. Element shall be installed where air mixture provides a true temperature indication. Where adequate mixing is not practical, the duct temperature sensor shall have an averaging type thermistor element, installed across the entire cross section of the duct.
e. Outdoor Air Sensor: Outdoor air temperature sensor shall be a probe type element mounted in a ventilated, treated white PVC sun shield to minimize radiant energy effects. The sensor and sun shield shall be mounted on a weatherproof outlet box for outdoor installation.
f. Low Differential Air Pressure Applications (0" to 5" W.C.): The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points. Non-interactive zero and span adjustments, adjustable from the outside cover. (0.00 - 1.00" to 5.00") W.C. input differential pressure ranges. 4-20 mA output. Maintain accuracy up to 20 to 1 ratio turndown. Reference Accuracy: +0.2% of full span.
g. CO2 Sensor: The sensor shall have a five year recommended calibration interval. In addition, the sensor shall be provided with a five-year calibration guarantee, providing for free factory replacement if the sensor is found to be out of calibration within five years of the purchase date. The sensor shall have accuracy of ±50 ppm and repeatability of ±20 ppm. All adjustments to the sensor including output scaling, elevation adjustment, relay set point, relay dead-band, linear or exponential output, and single point calibration shall be made via on-board push buttons and LCD display. The LCD display must be covered by a solid door and only viewable when the door is opened for adjustments.

4. Temperature Control Panels: Each panel and each control device or readout on the front of the panel shall be identified with a laminated plastic label with 1/4" high engraved lettering, white on black background. Pilot lights shall be the push to test type.
5. Smoke Detectors: Furnished and installed by Division 26. Power and fire alarm wiring by Division 28. Control wiring by Division 23. Coordinate with Division 26.
6. Status Sensor: Current sensing status sensor (with sensitivity adjustment for belt loss detection).
7. Electric Actuators:
   a. General: Fully modulating, UL listed. Visual position indicator, manual override and clear weather shield where exposed to weather. 24 volt. Belimo.
   b. Valve Actuators: Provide with factory mounting brackets and linkage to the control valve. Capable of shutting off against a 50 psi differential.
   c. Damper Actuators: Positive position feed back and spring return. OSA dampers shall be spring return closed. Actuators shall be direct mounted onto the damper control shaft without linkage. Damper actuators shall be sized to provide a minimum of 5 in-lbs torque per square foot of damper face area.
8. VFD:
   a. General: The variable frequency drive (VFD) shall be a completely adjustable frequency motor drive system consisting of a pulse width modulated invertor for speed control of NEMA Design B induction motors. Variable frequency drives shall be manufactured by a single source. The VFD manufacturer shall have a minimum of five years experience in VFD design. Asea Brown Boveri (ABB). Alternate manufacturers shall submit names, addresses and phone numbers of at least five installations in the immediate area. Provide factory start-up.
   b. Standards: VFD shall be in accordance with the latest revisions of the following:
      1) IEEE Standard 519, Guide for Harmonic Control and Reactive Compensation for Static Power Converters
      2) UL Standard 508, Electrical Industrial Control Equipment
      3) VFD shall be UL listed and bear the UL label.
   c. Design Requirements: The VFD shall be capable of operating in the following conditions: ambient temperature 0 to 40 degrees C and relative humidity 0 to 95%, noncondensing. The power section shall allow the following faults to occur without damage to the VFD: single-phase fault, three-phase short circuit, or phase to ground short circuit. VFD shall include the following features: overcurrent protection, overspeed protection, over temperature protection, electronic thermal motor protection. NEMA 1 or 4 enclosures, as applicable. Provide line reactors, 3% impedence, for all VFD's. Provide load reactors where load side circuit lengths exceed 200 feet.
   d. Adjustments: VFD adjustments shall be set via menu driven selections accessible from the front panel. The VFD shall operate in the auto or manual mode and shall include the following front panel mounted switches and indicators:

1) 2 line x 14 character alphanumeric display
2) Local/ remote switch.
3) Digital indicator of frequency, current, volts, torque, HP, KW, KWhrs and run hrs.
4) Manual speed control
5) Run / stop switch.
6) Power on and run indicator
7) Fault indication including: current limit, overvoltage, undervoltage, overload or thermal motor protection.

9. Pressure Independent Control Valves (VAV Boxes):
   a. General: The control valves shall be pressure independent. Fail safe actuator. The control valves shall accurately control the flow from 0 to 100% full rated flow with an operating pressure differential range of 5 to 50 PSI differential across the valve with a valve body accuracy of +/- 5% variance due to differential pressure fluctuation or +/- 10% total assembly error incorporating differential pressure fluctuation, manufacturing tolerances and valve hysteresis. Sensor is powered by the actuator. Belimo ePIV.
   b. Valve Bodies: Forged brass body and sensor housing (nickel plated), rated at no less than 360PSI, stainless steel ball and stem, female NPT union ends, dual EPDM lubricated O-rings and a brass or TEFZEL characterizing disc.
10. Control Valves:
   a. General: Equal percentage or linear flow characteristics. Unless otherwise noted, select for 2-4 psi pressure drop across the valve at the specified flow. Belimo. 2" and smaller shall be screwed connection, globe or ball valve. 2-1/2" and larger shall be flanged connection, globe or butterfly valve.
   b. Ball Valve: Stainless steel ball and stem, teflon seat and O-rings. 400 psi WOG. Packing shall be reinforced teflon seal washer and stuffing box ring. Stem packing gland screw shall be adjustable for wear. Factory flow characterization disk.
   c. Globe Valve: Contoured plugs for linear control. 316 stainless steel stem, replaceable seat and adjustable operating range. Packing shall be molded BUNA-N. Valves controlling terminal units or above ceilings shall be of the packless type with bellow seal, or spring loaded teflon requiring no packing maintenance. 2" and Smaller: Bronze body, 250 psi WOG. 35 psi maximum working pressure differential. 2-1/2" and Larger: Cast iron body, 125 psi WOG. 25 psi maximum working pressure differential.
   d. Butterfly Valve: Cast iron body, full lug style (with lugs drilled and tapped for isolation and removal of downstream piping), one-piece 416 stainless steel stem, aluminum bronze disc and EPDM or BUNA-N seat to match application. 175 psi WOG. Packing shall be molded BUNA-N.
11. Energy Valves (Air Handlers):
   a. General: The control valves shall be pressure independent. Fail safe actuator. The control valves shall accurately control the flow from 0 to 100% full rated flow with an operating pressure differential range of 5 to 50 PSI differential across the valve with a valve body accuracy of +/- 5% variance due to differential pressure fluctuation or +/- 10% total assembly

error incorporating differential pressure fluctuation, manufacturing tolerances and valve hysteresis. Sensors are powered by the actuator. Belimo EV.

b. Valve Bodies: Forged brass body and sensor housings (nickel plated), rated at no less than 360PSI, stainless steel ball and stem, female NPT union ends, dual EPDM lubricated O-rings and a brass or TEFZEL characterizing disc. 2-1/2" and larger shall have cast and ductile iron bodies.

12. Mitsubishi Controller. CITY MULTI Controls Network (CMCN) controller with on-site LCD and internet IP accessibility. BACnet interface module.
13. Mitsubishi Room Sensor/Controller: Shall be wall mounted "in-room" wired remote controller.

B. Conduit: Conduit to be a minimum 1" diameter, and to have at least 25% spare capacity, except drops to room sensors may be run in ½" conduit. Conduit shall be run in electrical or mechanical trenches wherever possible. Site conduit (building to building) will be installed (and terminated inside the building) by Division 26.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION:

A. General: All electrical work shall be in accordance with the California Electrical Code and the Electrical Specification Sections. All electric/electronic systems shall be hardwired in conduit, except as specifically allowed by 1.3, B. Wiring shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed wiring shall run parallel to room surfaces; location shall be approved by the Architect. No structural member shall be weakened by cutting, notching, boring or otherwise. Provide a 120 volt circuit for each device requiring external power. Dedicated circuits shall be provided where required. Any devices or wiring exposed to the weather shall be protected in weatherproof enclosures such as NEMA 3R and weatherproof conduit.

B. Labeling of System: DDC/EMS Contractor shall provide complete labeling of all terminals at all panels or equipment terminal strips and wiring. Equal to Brady marking on wires and number on terminals in sequence corresponding to control diagram.

C. Programming:
1. The Direct Digital Control and Energy Management System (DDC/EMS) operational program shall be provided by the DDC/EMS Contractor. The DDC/EMS Contractor shall be responsible for programming the system and shall coordinate the scheduling (on/off times) with the Owner. Prior to start-up, the DDC/EMS Contractor shall provide any testing program he feels necessary to fully test the operation of the various components.
2. The DDC/EMS Contractor shall load the operational program into the DDC/EMS controller from his office via the District's network (via VPN) or at the job site via a direct connect cable. Prior to starting up the system, the DDC/EMS Contractor shall:

a. Confirm that the control system has been connected to the District's LAN/WAN and that the LAN/Wan is working.
b. Confirm the functionality of the DDC/EMS controllers and all input points by reading the input values, and comparing them with a measured temperature, pressure, voltage, current, or resistance as appropriate. Calibrate all transducers as required.
c. Confirm the functionality of all digital output points by manual operational of the relay contacts. Use proper discretion in starting and stopping equipment.
d. Confirm the functionality of all analog output points by manually imposing an adjustable voltage on the appropriate circuit to check proper operation of the controlled device. Calibrate all transducers as required.
e. The DDC/EMS Contractor shall notify the General Contractor (one week in advance of) when the system will be ready for loading and testing the operational program. The DDC/EMS Contractor's start-up technician shall be present while the program is being loaded and shall communicate with the programmer prior and after program loading to confirm proper operation.

D. Training: Prior to final acceptance, the DDC/EMS Contractor shall provide operational training to the Owner's personnel. The training sessions shall include a complete demonstration of the system. Dates and times of the training sessions shall be coordinated through the Owner not less than one week prior to session. A total of 40 hours of instruction shall be provided. The DDC/EMS Contractor shall maintain a log of training sessions including dates, times and names/titles of those attending. The DDC/EMS Contractor shall submit a copy of this log on request. Contractor shall provide 1 week factory certified training schedule and class at owners' discretion.

E. Testing and Acceptance: The DDC/EMS Contractor shall furnish a complete and operating system. The DDC/EMS Contractor shall also verify, in the presence of the Owner, the system accuracy and proper function of each controlled device and sensor. The following items shall be successfully demonstrated prior to acceptance by the Owner:
1. All system outputs including controllers, relays, and other control devices shall be addressed and start/stop functions demonstrated.
2. All inputs shall be displayed and all event-initiated functions shall be demonstrated.
3. Demonstrate program integrity and power restore sequence during and after a power failure and restoration.
4. Deliver all Record Drawings, wiring diagrams, equipment specifications, installation and Operation Manuals and other documentation as required to describe the system.
5. Complete operator training in the use, programming, and operation of the system.

F. Start-up of the System:
1. The start-up period starts when the following conditions are met:
a. The DDC/EMS system and all involved HVAC equipment have been installed, connected to the DDC/EMS system and are ready to operate.

b. A start-up meeting has been conducted with representative of the General Contractor, Architect/Engineer, maintenance staff, and the DDC/EMS Contractor.

c. Consensus is reached, by the representatives at the above referenced meeting that it is appropriate for the start-up process to start.

2. The alarm pagers called by the control system during the start-up period shall be the pagers carried by the Mechanical Contractor and/or DDC/EMS Contractor as appropriate. The Mechanical Contractor and DDC/EMS Contractor shall respond to all pages from the control system and work cooperatively to insure that the building environmental standards are maintained.

3. The start-up process shall be completed and the warranty period shall start when the following conditions are met.

a. All training to be provided as part of the project has been completed.

b. No "alarm" or "condition reports" are being generated by the DDC/EMS system for seven (7) calendar days (168 hours) due to incomplete or inaccurate installation or programming.

c. All adjustments and "fine tuning" of the system have been completed.

G. Verification: A written testing and start-up report must be submitted for approval before acceptance. In addition to the DDC/EMS Contractor's testing and start-up report, the Owner may independently verify the test results. The report on test results shall include setpoints and operating ranges of all components.

3.2 SEQUENCE OF OPERATION: The below sequences of operation are to be used as a primary guideline for DDC/EMS control logic sequence development. Any/all variations from the below operation sequences must be approved by the District’s DDC/EMS operator prior to implementation. All fans providing ventilation to meet minimum outside air requirements shall run continuously during occupied hours. Airside equipment (air handlers, etc.) shall start by normally open relay and signal from DDC/EMS.

A. Provide graphics meeting District standards using the existing control sequences for the Central Plant and as indicated below.

B. System Operation Schedule: The central plant shall operate at the schedule set by the District.

C. Central Plant Equipment: The campus circulation pumps shall be started/stopped by the BAS or manually. The pump speed shall be modulated to maintain a minimum pressure as reported by the pressure transmitters. The lead pump shall be cycled to 80% of capacity. When the system demand exceeds this set point the lag pump shall be started and the two pumps track in unison to maintain system pressure. Ramp down sequence shall be in reverse order. The lead/lag pumps shall be alternated on a run time basis (adjustable) by the BAS, or by manual selector switch. Pressure transmitters shall be located as shown on the plans. At the differential pressure sensor locations for the chilled and hot water piping, provide an engraved plastic tag indicating “PRESSURE SENSOR”. On the pressure sensor, provide a brass tag indicating “PRESSURE SENSOR FOR DISTRIBUTION PUMP CONTROL”.

1. Boiler: The boiler pump and boiler are started by a signal from the BAS and operate continually until BAS shut-down by either time schedule or by outside

air temperature rise to 65 degrees F (adjustable). Boiler pump shall continue to run for 15 minutes (adjustable) after boiler shut down.

2. The boiler shall be interlocked with a flow switch to insure flow. The boiler temperature is controlled by the boiler thermostat.
3. A 2-way isolation valve in the boiler inlet shall be interlocked with the boiler. It shall be closed when the boiler is off.
4. Heating hot water reset control: (Initial set point 150°F). Main loop water temperature shall be BAS controlled. The main loop reset temperatures as controlled by BAS shall be adjustable. The BAS shall check the opening positions of all hot water control valves every 10 minutes (adj.). When any valve opens to 95% of maximum, the loop temperature shall reset to 2°F above previous set point. The maximum set point is 150°F (adj.). If any hot water control valve on the system with the greatest opening position below 85% (adj.) of maximum opening, the loop temperature shall reset to 2°F below the previous set point. The minimum set point is 120°F (adj.)
5. Chiller: Chiller and pumps are started by BAS and upon proof of evaporator and condenser flow the chiller is allowed to operate on its internal controls to maintain chilled water temperature. Provide control boards, wiring and programming for the chiller to allow the District maintenance and EMS departments to monitor the chiller operations through the micro-processor that is built into the chiller. Provide front end control boards and dedicated communication/control wiring as required.
6. The chilled water pump starts by BAS signal and operates continually until BAS shut down. Chilled water pump to run for 15 minutes (adjustable) after chiller shut down.
7. Cooling chilled water reset control: (Initial set point 44°F). Main loop water temperature shall be BAS controlled. The main loop reset temperatures as controlled by BAS shall be adjustable. The BAS shall check the opening positions of all chilled water control valves on the system every 10 minutes (adj.). When any valve opens to 95% of maximum, the loop temperature shall reset to 1°F below previous set point. The minimum set point is 44°F (adj.). If the coil control valve on the system the greatest opening position is below 85% (adj.) of maximum opening, the loop temperature shall reset to 1°F above the previous set point. The maximum set point is 50°F (adj.)

D. Air Handler - VAV:

1. General: The unit shall be activated by the BAS. The unit shall be capable of an economizer cycle. A static pressure sensor located 2/3 of the distance down the supply ductwork shall cause the VFD to vary the air volume of the supply fan to maintain a constant duct pressure. A static pressure sensor located in the return ductwork 2/3 of the distance from the most remote return grille towards the return/exhaust fan shall cause the VFD to vary the air volume of the return/exhaust fan to maintain a constant return duct pressure.
2. Minimum Outside Air Control: The DDC shall modulate the outside air and relief dampers to maintain the required minimum outside air (except in economizer mode), proportional to the signal used to control the supply fan speed. The outside air damper positions shall be developed in coordination with the Balancing Contractor. One set point shall be with the supply fan VFD setting for maximum scheduled air flow. The outside air dampers shall be adjusted to

provide the minimum scheduled air flow with the VFD at this position. The second set point shall be with the supply fan VFD setting for minimum scheduled air flow (30% of maximum air flow). The outside air dampers shall be adjusted to provide the required minimum air flow with the VFD at this position. The relief dampers shall also be set using this procedure. See notes at drawing schedule regarding demand control ventilation with CO2 sensors.

3. Heating: (Initial leaving air temperature set point 85°F) On system startup, if the temperature sensors for all VAV/VVH boxes on an air conditioning system call for heating, the outside air (OSA) damper is closed, the relief damper is closed and the control valve is fully open. All VAV/VVH boxes shall be fully open. As the space temperature approaches set point, the OSA and relief dampers open and modulate to provide minimum outside air. Signals from the VAV/VVH box temperature sensors shall be able to reset the leaving air temperature set point. The DDC/EMS shall check the air flow of all VAV/VVH boxes on the system every 10 minutes (adj.). When any box air flow is above 95% (adj.) of maximum position the air handler leaving air set point shall be reset to 1°F above the previous set point. The maximum leaving air temperature is 85°F (adj.). If the VAV/VVH box on the system with the greatest air flow is below 85% (adj.) of the maximum air flow, the leaving air set point shall reset to 1°F below the previous set point. The minimum leaving air temperature is 75°F (adj.).
4. Cooling and Ventilation: (Initial leaving air temperature set point 55°F) A temperature sensor downstream of the cooling coil shall modulate the system to maintain a downstream supply air temperature of 55°F (adj.). The first source of cooling is the outside air in Economizer mode. When the outside air temperature is below 55°F, the outside air damper shall modulate to maintain set point. When the outside air temperature is 55°F to 75°F, the outside air shall open fully, and the cooling coil control valve modulates to maintain set point. When the outside air is above 75°F then the outside air damper closes to minimum position, and the control valve shall modulate to maintain set point. The DDC/EMS shall check the air flow of all VAV/VVH boxes on the system every 10 minutes (adj.). When any VAV/VVH box air flow is above 95% (adj.) of maximum position the air handler leaving air set point shall be reset to 1°F below the previous set point. The minimum leaving air temperature is 55°F (adj.). If the VAV/VVH box on the system with the greatest air flow is below 85% (adj.) of the maximum air flow, the leaving air set point shall reset to 1°F above the previous set point. The maximum leaving air temperature is 65°F (adj.).
5. Purge Cycle: At 4:00 a.m. during the cooling season between April 15 and October 15, if the room temperature exceeds the outside air temperature, the unit shall run with the outside air and relief dampers 100% open. The unit shall stop and the OSA and relief dampers shall close when the room temperature is within 2 degrees of the OSA temperature.
6. Off Cycle: The outside air and relief dampers go to the closed position and the fans shut off.
7. Variable Air Volume Box (VAV): (Cooling set point 74°F, Heating set point 71°F). Each variable air volume box shall be controlled by a wall mounted temperature sensor through the DDC. The air volume shall increase as the demand for cooling increases. All air volumes and temperature set points shall be adjustable through the DDC. The cross flow sensor shall be furnished and installed by the box manufacturer. The box shall open fully if the supply air

temperature is greater than 80°F. Provide additional status for supply duct temperature and static pressure.

8. Variable Air Volume Box with Heating Coil (VVH): Same as VAV above, except as follows. On a call for full heating, the VVH boxes open to full air flow and the hot water valve is fully open. As the demand for heat decreases the hot water valve modulates toward the closed position. The hot water valve shall fail in the closed position. Provide additional status for hot water valve position.

E. Air Handler – Single Zone: Same as Air Handler – VAV, except no VAV functions.

F. Split-System Heat Pump (IDU/ODU): Shall be activated by BAS. Unit shall be controlled by integral controls. Provide temperature sensor for the area being controlled and status sensors for indoor and outdoor units.

G. Exhaust Fans: Refer to schedules.

H. Equipment Shut Down: Where noted on schedules, smoke detectors shall shut down units when smoke is detected and signal fire alarm system.

I. Domestic Hot Water Circulating Pump: Shall start/stop by BAS signal. Current sensor shall report pump status to BAS.

J. Fire/Smoke Damper: Close the fire/smoke damper on alarm and shut down the air moving equipment serving the damper and signal fire alarm system.

K. Lighting: BAS shall energize exterior lighting. Provide relay with an override switch.

L. Provide monitoring points for the following plumbing equipment:
WH-1 Water Heater: Run Time, Alarm
P-1 Domestic Water Booster Pump: Alarm

M. Outside and Return Air Damper Minimum Airflow Set Points: The Control Contractor shall set the outside air damper position airflow set points per design and air balance.

1. CO2 Reset of Minimum Outside Air: The reset of the minimum outside air setpoint shall be based on the CO2 sensor with the greatest demand.
2. CO2 Sensor Set Points: The Control Contractor shall determine the base ambient CO2 concentration level after the air handler system has been balanced and the building is unoccupied. The upper and lower CO2 concentration set points shall be developed as follows:
The lower CO2 concentration set point shall be 200 ppm (adj.) above the base ambient CO2 concentration level.
The upper CO2 concentration set point shall be 600 ppm (adj.) above the base ambient CO2 concentration level.

END OF SECTION

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
1. Materials and equipment shall be furnished and installed in support of electrical work described in these plans and specifications including but not limited to, raceways, boxes, enclosures, feeders, branch circuiting, supports, terminal cabinets, sleeves, gutters, panels, transformers, switchgear, lighting fixtures, controls, relays, contactors, in order to complete and make fully functional the systems described.
2. Complete fire alarm and annunciation system as shown and/or required by Division of State Architect, California State Fire Marshal including monitoring equipment, wiring for central station connection and graphic annunciator specified by Architect.
3. Lighting systems, both interior and exterior as shown on the plans and as specified herein, including controls, occupancy sensors, photocell controls, LED’s, drivers, racks, supports, fasteners, straps, and miscellaneous mounting hardware and support structures for such equipment.
4. Utility company site work as required by local utility companies. All utility company conduits, raceways, trenching, backfilling, utility vaults, equipment pads and substructures shall meet both the respective utility companies requirements as well as those of the authority having jurisdiction, whichever is more restrictive. In no case shall work be completed and covered without the written approval of the serving utility companies both on and off site.
5. Duct banks and raceways for all power and lighting systems as shown and/or required. Duct banks shall include all trenching, racking, conduit, concrete, backfill, boxes, pads, substructures required for a fully developed and useable pathway for cables, conductors, as shown on site, etc.
6. HVAC and plumbing electrical: Conduit, conductors and terminations for all line voltage power, line voltage controls and fusible and/or non-fusible safety disconnect switches for HVAC equipment, including but not limited to air conditioners, furnaces, fans, heat pumps, cooling towers, system pumps, condensing units. Provide protective equipment unless otherwise noted, etc. including protective devices.
7. Plumbing Electrical: Conduit, conductors and terminations for plumbing equipment with power requirements including necessary fusible and/or non-fusible safety disconnect devices. Provide motor starters where required.
8. Power and Lighting Distribution: Furnish and install power and lighting distribution systems including but not limited to switchgear, panels, feeders, transformers, branch circuits, devices, fixtures, disconnect switches, contactors, controls, etc. for a complete working system.

9. Emergency Responder Radio Coverage System to provide complete coverage in new buildings for public safety agencies as shown on plans as required by authority having jurisdiction, (AHJ), and specified here-in, including performance testing, amplifiers, cabling, antennas, pathways, etc. as required for a complete operating system.
10. Production lighting infrastructure, associated lighting controls, and equipment.
11. Lighting acceptance testing, documentation and completion of required forms as specified in Section 26 56 70, LIGHTING ACCEPTANCE TESTING.
12. Allocation of time to adequately train the Owner on the use and operation of all systems installed within the facility or on the property. Minimum two week advance notice shall be coordinated with the Owner and his representatives. Training shall be as outlined in individual system specifications identified to follow.

B. Related Sections Under Other Divisions:
1. Mechanical Wiring: Control circuit wiring, energy management controls and interlocks for mechanical equipment shall be installed by Mechanical Contractor.
2. Painting of electrical equipment where exposed and required by the Architect to be painted as described elsewhere in the specification.
3. Irrigation System: Provide all line voltage (50 volts or above) connections to irrigation system equipment, time clocks and or powered satellite controls. Coordinate locations of this work with the Landscape Contractor.
4. Pole Bases: Contractor shall be responsible to furnish light standard concrete pole bases, rebar, bolt templates and anchor bolt kits for a complete installation. Concrete, rebar, excavation shall be in accordance with all parts of this specification.
5. HVAC Control Raceway: Raceways, boxes, and control wiring for thermostats, temperature sensors and control components specified within the mechanical specifications, shall be furnished and installed as required by Division 25 and installed in accordance with the minimum wiring methods allowed for branch circuit wiring in Division 26 (the BAS systems and components are installed in accordance with Division 25).
6. Smoke Fire Dampers: Verify all required locations and coordinate with Mechanical plans for points of connection for power and fire alarm system connections (power and fire alarm connection shall be by Electrical Contractor).
7. Duct mounted smoke detectors: Coordination with Mechanical plans for exact locations and points of connection for power and fire alarm system connections (power and fire alarm connection shall be by Electrical Contractor).
8. Audio Visual System: all work as shown on Audio Visual drawings and specifications noted to be performed by electrical contractor.

1.3 SYSTEM DESCRIPTION

A. The electrical plans indicate the general layout and arrangement; the architectural drawings and field conditions shall determine exact locations. Field verify all conditions and modify as required to satisfy design requirements as well as code minimums. Maintain all required working clearances as described in CEC Article 110 as well as other applicable articles.

B. Discrepancies shall be brought immediately to the attention of the Architect for clarification. The Architect shall approve any changes. Prior to rough-in, refer to architectural plans that shall take precedence over electrical plans with respect to locations.

C. Contact local serving utility companies and verify all utility company requirements prior to commencement of utility work. Make proper adjustments to the construction to satisfy the serving utility requirements if they differ from the construction documents. It shall be the Contractor's responsibility to contact each utility company for obtaining finalized utility design drawings and/or approval, and for scheduling inspection of utility infrastructure installations.

D. Charges imposed by the electric and communications utility companies shall be paid by Owner directly to utility companies.

1.4 SUBMITTALS AND SHOP DRAWINGS

A. Before construction, submit in accordance with the General Conditions of this Specification: A complete list of all materials proposed to be furnished and installed under this section.

B. Manufacturers' specifications, catalog cuts and shop drawings as required to demonstrate compliance with the specifications. Identify specific intended use for each component where submittal may be ambiguous. Submit entire bound submittal at one time; partial submittals will not be accepted. At a minimum, submittals will be required for the following:
   1. Utility service/site work equipment including ducts, conduits, fittings, concrete manholes, concrete pullboxes, vaults, trench racks, accessories, etc.
   2. Distribution equipment including main switchboards, distribution switchgear, transformers, distribution panels and breakers, motor controls, distribution and branch circuit panels, grounding, surge protection devices, etc.
   3. Electrical equipment including disconnects, fuses, raceways, straps and racks, fittings, conductors, boxes, gutters, devices, plates, etc.
   4. Lighting equipment including fixtures, LED's, drivers, mounting accessories, color charts (where required), etc.
   5. Lighting control equipment including low voltage switching system, dimmer switchbank / accessories, occupancy sensing equipment, time clocks, contactors, photocells, lumen sensors, etc.
   6. Constructability review letter/comments for lighting acceptance testing as required by Section 26 56 70, LIGHTING ACCEPTANCE TESTING.
   7. Complete system component submittals and shop drawings specific to this project for:
      a. Fire Alarm System
      b. Occupancy sensor drawings.
      c. Network lighting controls.
      d. Overcurrent protective device coordination study.
   8. Conduit including all fittings, etc.
   9. Wiring and cable, terminations, etc.
   10. Fire rating penetration materials, details, etc.

C. The intent of these specifications is to establish a standard of quality for materials and equipment. Therefore, some items are identified by manufacturer or trade name designation. Substitutions shall be subject to the Architect's approval. Samples of the proposed and substitute materials may be required for inspection prior to approval. Costs, if any, for evaluation of substitutions shall be the Contractor's responsibility. The decision of the Architect shall be final. Where the substitution will affect other trades, coordinate all changes with those trades concerned and pay any additional costs incurred by them as a result of this substitution. Approval of substitutions shall not relieve the Contractor from providing an operational system in accordance with all applicable codes and ordinances.

D. SUPPORTING DEVICES
   1. Where walls, floor, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for ducts, conduit and pipe must be included and approved before the submittals must include spacing, static loads and seismic loads at all attachment and support points.
   2. Provide seismic details of seismic restraints and anchors; including number, size and locations for each piece of equipment.

1.5 DELIVERY, STORAGE AND HANDLING

A. Storage of equipment for the job is the responsibility of the Electrical Contractor and shall be scheduled for delivery to the site, as the equipment is required. Damage to the equipment delivered to the site or in transport to the job shall be the responsibility of the Electrical Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials shall be new and bear the label of or be listed by a nationally recognized testing laboratory. The quality and suitability of all materials shall conform to the standards and practices of this trade.

B. Supplied materials shall be of a current manufactured product line. Discontinued products are not acceptable. Where products are identified on the contract documents by part number, supply the current product model or series which meets the specification and intended use of the specified component.

2.2 SUPPORTING DEVICES

A. Hangers: Kindorf B-905-2A Channel, H-119-D washer, C105 strap, 3/8” rod with ceiling flange.

B. Concrete Inserts: Kindorf D-255, cast in concrete for support fasteners for loads up to 800 lbs.

C. Pipe Straps: Two-hole galvanized or malleable iron.

D. Luminaire Chain: Campbell Chain 75031, 90-lb. test with steel hooks.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Professionalism and appearance of installations shall be in accordance with accepted practices of this trade. Installation methods shall conform to manufacturers' specifications and

recommendations. The Contractor shall man the job with qualified journeymen and helpers in this trade for the duration of the job. It is the Contractor's responsibility to communicate with and keep the job superintendent appraised of changes or clarifications, etc.

B. Employment of any person on any job in the capacity of an electrician is not permitted unless such person has qualified for and holds a valid Journeyman Electrician Pocket Card or General Journeyman Electrician Certificate issued by the State of California Division of Apprenticeship Standards except, Contractor may employ electrical helpers or apprentices on any job of electrical construction, new or existing, when the work of such helpers or apprentices is performed under the direct and constant personal supervision of a journeyman electrician holding a valid Pocket Card accepted by the State of California Division of Apprenticeship Standards.
   1. Each Pocket Card carrying journeyman electrician will be permitted to be responsible for the quality of workmanship for a maximum of one helper or apprentice during any same time period, provided the nature of work is such that good supervision can be maintained and the quality of workmanship is the best, as expected by Owner and implied by the latest edition of the National Electrical Code.
   2. Before each journeyman electrician commences work, deliver to Owner at the project site, a photocopy of the journeyman’s valid Pocket Card.

C. Materials shall be installed in accordance with the manufacturers' specification and recommendations. They must conform to the approval AHJ adopted codes and standards, but not less than the 2019 CEC and all applicable codes and standards, including but not necessarily limited to California Code of Regulations Title 24, NFPA, National Electrical Manufacturers Association, ANSI, CBC, and any other adopted ordinances of applicable agencies having jurisdiction. Refer to general conditions of specifications.

D. Electrical Contractor shall lay work out in advance in order to avoid unnecessary cutting, chasing, and drilling of floors, walls, ceilings and other surfaces. Work of this nature shall be carefully done so as not to damage work already performed by other trades. Any damage which results must be properly repaired at no extra cost to the Owner. Such alterations shall not depreciate the integrity of the structure. Approval for cuts or penetrations in structural members shall be by the Architect.

E. Supporting Devices:
   1. Verify mounting height of all luminaires or items prior to installation when heights are not detailed.
   2. Install vertical support members for equipment and luminaires, straight and parallel to building walls. Provide independent supports to structural member for electrical luminaires, materials, or equipment installed in or on ceiling, walls or in void spaces or over furred or suspended ceilings.
   3. Do not use other trade’s fastening devices as supporting means for electrical equipment, materials or luminaires. Do not use supports or fastening devices to support other than one particular item.
   4. Support conduits within 18” of outlets, boxes, panels, cabinets and deflections. Maximum distance between supports not to exceed 8’ spacing.
   5. Securely suspend all junction boxes, pull boxes or other conduit terminating housings located above suspended ceiling from the floor above or roof structure to prevent sagging and swaying.
   6. Provide seismic bracing per UBC requirements for this location, and as per structural engineer.

7. Supporting Devices: Safety factor of 4 required for every fastening device or support for electrical equipment installed. Support to withstand four times weight of equipment it supports. Bracing shall be per Structural Engineer.

F. Coordinate work with other trades as required to eliminate any delays during construction. Coordinate changes with other prime contractors to avoid construction conflicts.

G. Engineer's Field Observation: When Electrical Engineering representative performs a field observation, the Electrical Contractor shall be present and available to remove equipment covers as needed.

H. Drawings of Record: Provide a full and accurate set of field record drawings marked up in a neat and understandable manner submitted to the Owner Representative, Construction Manager, or Architect upon completion of the work and prior to issuance of a certificate of completion. The drawings shall dimension all electrical facilities including but not limited to underground conduit, vaults, boxes as well as conduit routing scaled to within 12" of actual field conditions and shall be kept up to date on a daily basis reflecting changes or deviations. Electrical facilities shall be accurately drawn on the plan to scale. Refer to the general conditions of these specifications for additional requirements. Record drawings shall be required to identify both horizontal and vertical dimensions to visible and fixed points such as concrete, asphalt, buildings, sidewalks, etc.

I. Identification: Provide engraved laminated plastic nameplates for all switchboards, panelboards, fire alarm system cabinets, main devices, control panels, time clocks, contactors and safety disconnect switches accurately identifying each device. Labels shall be attached to the equipment by means of screws or rivets. Self-adhering labels will not be acceptable. Refer to Section 26 05 53, IDENTIFICATION OF ELECTRICAL SYSTEMS.

J. Safety: The Electrical Contractor is responsible to maintain equipment in a safe and responsible manner. Keep dead front equipment in place while equipment is energized. Conduct construction operations in a safe manner for employees as well as other work persons or anyone visiting the job site. Provide barriers, trench plates, flags, tape, etc. The Contractor shall hold all parties harmless of negligent safety practices that may cause injury to others on or near the job site.

K. Guarantees: Equipment and labor shall be guaranteed and warranted free of defects, unless otherwise stated to be more restrictive, for a period of one year from the date of final acceptance by the Owner. A written warranty shall be presented to the Architect at the time of completion prior to final acceptance. Equipment deemed to be damaged, broken or failed should be repaired or replaced at no additional cost to the Owner. Materials or system requiring longer than a one-year warranty as described herein shall be separately warranted in separate letters of guarantee stating the duration of warranty.

L. Operating and Installation Manuals: Provide two copies each of manuals, operating and installation instructions for equipment indicated in submittal packages. Instruct the Owner's representative as to the operation and location of equipment necessary to allow them to operate the facility upon final acceptance for each system installed as part of this project. This instruction period shall be prearranged with the Owner's representative prior to occupancy of the facility and the weeks prior to training scheduled.

M. In service training: Provide in service training to Owner's Staff for each system installed as part of this project. Training sessions to be scheduled with Owner in advance, and shall be a minimum of 8 hours for each system.

N. Lighting Acceptance Testing: Provide two copies of lighting acceptance testing results and equipment operating manuals as specified in Section 26 56 70, LIGHTING ACCEPTANCE TESTING. Instruct the Owner on operation of control systems as noted in Paragraph J above.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 26 05 13 – MEDIUM VOLTAGE CABLES (Above 600 Volts)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Medium voltage cables (cable for systems above 600 volt).

B. Related Work:
   1. General electrical requirement and items that are common to more than one section of Division 26: Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Conduits for medium voltage cables: Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
   3. Requirements for personnel safety and to provide a low impedance path for possible ground fault currents: Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

1.3 SUBMITTALS

A. Submit in accordance with the general conditions of the specification and Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

B. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   2. Include splice and termination kit submittal information prior to purchase and installation.

C. Installer Approval:
   1. Employees who install the splices and terminations shall have not less than three years of experience splicing and terminating cables which are equal to those being spliced and terminated, including experience with the materials in the kits.
   2. Furnish satisfactory proof of such experience for each employee who splices or terminates the cables to the Inspector of Record (IOR).

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the designation only.

B. Underwriters Laboratories (UL):
   1. 1072 Safety Medium-Voltage Power Cables

C. National Fire Protection Association (NFPA):
   1. 70 California Electrical Code (CEC)

D. National Electrical Manufacturers Association (NEMA):
   1. WC71-99 Standard for Non-Shielded Cables Rated 2001-5000 Volts for Use in the Distribution of Electrical Energy.
   2. WC74-20005-46 KV Shielded Power Cable for Use in the Transmission and Distribution of Electrical Energy.

E. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   1. 48-96 Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 KV Through 765 KV

F. 386-95 (R2001) Separable Insulated Connector Systems for Power Distribution Systems above 600 V

G. 404-2000 Extruded and Laminated Dielectric Shielded Cable Joints Rated 2500-500,000 Volts

H. 592-90 (R1996) Exposed Semi-conducting Shields on High-Voltage Cable Joints and Separable Insulated Connectors

PART 2 - PRODUCTS

2.1 MATERIAL, MEDIUM VOLTAGE CABLE

A. Medium voltage cable shall be EPR MV-105, in accordance with the CEC and NEMA WC71, WC74 and UL 1072. Approved manufacturers are General Cable, Rome, Okonite, or Engineer approved equal.

B. Shall be single conductor stranded copper with ground shield and fully jacketed.

C. Insulation:
   1. Insulation level shall be 100 percent.
   2. Types of insulation:
      a. Cable type abbreviation, EPR: Ethylene propylene rubber insulation shall be thermosetting, light and heat stabilized.
      b. Cable type abbreviation, CCLP: Polyethylene insulation shall be thermosetting, light and heat stabilized, chemically crosslinked.

D. Conductors and insulation shall be wrapped separately with semiconducting tape.

E. Insulation shall be wrapped with non-magnetic, metallic shielding.

F. Heavy duty, overall protective jackets of chlorosulphonated polyethylene, neoprene or polyvinyl chloride shall enclose every cable.

G. Cable temperature ratings for continuous operation, emergency overload operation and short circuit operation shall be not less than the NEMA WC71 or WC74 Standard for the respective cable.

H. Manufacturer's name and other pertinent information shall be marked or molded clearly on the overall outside surface of the jackets, or incorporated on marker tapes within the cables at reasonable intervals.

2.2 MATERIAL, SPLICES AND TERMINATIONS

A. The materials shall be compatible with the conductors, insulations and protective jackets on the cables and wires. Approved manufacturers are 3M, Elastimold, Raytheon or approved equal.

B. The splices shall insulate and protect the conductors not less than the insulation and protective jackets on the cables and wires which protect the conductors. In locations where moisture might be present, the splices shall be watertight. In manholes and handholes the splices shall be submersible.

C. Splicing and Terminating Fittings: Shall be in accordance with IEEE 386, 404 and 592.
   1. Shall be heavy duty, pressure type fittings, which will assure satisfactory performance of the connections under conditions of temperature cycling and magnetic forces from available short circuit currents.
   2. The fittings shall be suitably designed and the proper size for the cables and wires being spliced and terminated. Terminations to bus shall be with two hole lugs.

D. Splicing and Terminating Kits:
   1. General:
      a. Shall be assembled by the manufacturer or supplier of the materials and shall be packaged for individual splices and terminations or for groups of splices and terminations.
      b. Shall consist of materials designed for the cables being spliced and terminated and shall be suitable for the prevailing environmental conditions.
      c. Shall include detail drawings and printed instructions for each type of splice and termination being installed, as prepared by the manufacturers of the materials in the kits.
      d. Detail drawings, and printed instructions shall indicate the cable type, voltage rating, manufacturer's name and catalog numbers for the materials indicated.
      e. Voltage ratings for the splices and terminations shall be not less than the voltage ratings for the cables on which they are being installed.
      f. Shall include shielding and stress cone materials.
   2. Epoxy resin kits shall be as follows:
      a. Compatible with the cable insulations and jackets and make the splices watertight and submersible.
      b. Thermosetting and generate its own heat so that external fire or heat will not be required.
      c. Set solid and cure in approximately 60 minutes in 21 degree C (70 degree F) ambient temperature.
      d. Not deteriorate when subjected to oil, water, gases, salt water, sewage and fungus.
      e. Furnished in pre-measured quantities, sized for each splice and each termination, with two resin components in an easy mixing plastic bag which will permit mixing

the resin without entrapping air or contaminants. Other methods of packaging and mixing the epoxy resin components will be considered for approval, provided they include adequate safeguards to assure precise proportioning of the resin components and to prevent entrapping air and contaminants.

f. Use snap-together, longitudinally-split, interlocking seam, transplant mold bodies or taped frameworks, injection fittings and injection gun or pouring equipment. Completely fill voids within the splices and terminations.

E. Premolded Rubber Splices and Terminations:
1. Splices and terminations shall be in accordance with IEEE 48, 386, 404 and 592.
2. Premolded rubber devices shall have a minimum of .125” semi-conductive shield material covering the entire housing. Test each rubber part prior to shipment from the factory.
3. Grounding of metallic shields shall be accomplished by a solderless connector enclosed in a watertight rubber housing covering the entire assembly. The grounding device and splice or terminator shall be of same manufacturer to insure electrical integrity of the shielded parts.
4. The premolded parts shall be suitable for indoor, outdoor, submersible, or direct burial applications.

PART 3 - EXECUTION

3.1 INSTALLATION, MEDIUM VOLTAGE CABLE

A. Installation shall be in accordance with the CEC, and as shown on the drawings.

B. Use suitable lubricating compounds on the cables and wires to prevent damage to them during pulling in. Provide compounds that are not injurious to the cable and wire jackets and do not harden or become adhesive.

C. Splicing of cables is allowed only with prior approval from the engineer. Splice the cables and wires only in manholes and accessible junction boxes where unavoidable. Ground shields in accordance with Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

D. In manholes, trenches and vaults install the cables on suitable porcelain insulators with steel cables racks. Ground cable racks in accordance with Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

E. In manholes, underground raceways and other outdoor locations:
1. Seal the cable ends prior to pulling them in to prevent the entry of moisture.
2. For ethylene propylene rubber and polyethylene insulated cables, use bags of epoxy resin which are not less than 1/4" larger in diameter than the overall diameter of the cable. Clean each end of each cable before installing the epoxy resin over it.

3.2 INSTALLATION, SPLICES AND TERMINATIONS

A. Install the materials as recommended by their manufacturer including special precautions pertaining to air temperature during installation.

B. Ethylene Propylene Rubber and Polyethylene Insulated Cables:
   1. Cables rated 8000 volts or less: Install epoxy resin splices and terminations, or premolded rubber splices and terminations.
   2. Cables rated more than 8000 volts: Install premolded rubber splices and terminations.

C. Installation shall be accomplished by qualified personnel trained to accomplish high voltage equipment installations. All instructions of the manufacturer shall be followed in detail.

3.3 FEEDER IDENTIFICATION

A. In each manhole and pullbox install permanent tags on each circuit's cables and wires to clearly designate their circuit identification and voltage. In manholes the tags shall be the embossed brass type and shall also show the cable type and voltage rating. Position the tags so they will be easy to read after the fireproofing is installed. See Section 26 05 53, IDENTIFICATION OF ELECTRICAL SYSTEMS.

3.4 FIELD TESTS FOR MEDIUM VOLTAGE CABLE

A. New Cable:
   1. Acceptance tests shall be performed on new cable in accordance with IEEE 48 and as specified herein.
   2. Test new cable after installation, splices, and terminations have been made, but before connection to equipment and existing cable.

B. High Potential Test:
   1. Leakage current test shall be by high potential DC step voltage method.
   2. Prior to high potential test, test the cable and shields for continuity, shorts, and grounds.
   3. High potential test shall measure the leakage current from each conductor to the insulation shield. Use corona shields, guard rings, taping, mason jars, or plastic bags to prevent corona current from influencing the readings. Unprepared cable shield ends shall be trimmed back 1” or more for each 10 kV of test voltage.

C. Safety Precautions:
   1. Exercise suitable and adequate safety measures prior to, during, and after the high potential tests, including placing warning signs and preventing people and equipment from being exposed to the test voltages.

D. Test Voltages:
   1. New shielded EPR and CCLP cable DC test voltages shall be as follows:

		Test Voltage KV	
Rated Circuit Voltage Phase-to-Phase Volt	Wire Size AWG or MCM	100 percent Insulation Level	133 percent Insulation Level

2001-5000	8-1000	25	25
5001-8000	6-1000	35	35
8001-15000	2-1000	55	65
15001-25001	1-1000	80	100

E. High Potential Test Method:
   1. Apply voltage in approximately 8 to 10 equal steps.
   2. Raise the voltage slowly between steps.
   3. At the end of each step, allow the charging currents to decay, and time the interval of decay.
   4. Read the leakage current and plot a curve of leakage currents versus test voltage on graph paper as the test progresses. Read the leakage current at the same time interval for each voltage step.
   5. Stop the test if leakage currents increase excessively or a "knee" appears in the curve before maximum test voltage is reached.
      a. Repair or replace the cable and repeat the test.
   6. Upon reaching maximum test voltage, hold the voltage for five minutes. Read the leakage current at 30 second intervals and plot a curve of leakage current versus time on the same graph paper as the step voltage curve. Stop the test if leakage current starts to rise, or decreases and again starts to rise. Leakage current should decrease and stabilize for good cable.
   7. Terminate test and allow sufficient discharge time before testing the next conductor.

F. The contractor shall furnish the instruments, materials and labor for these tests and forward the results in a single bound copy to Engineer, indicating compliance with specification and manufacturers installation requirement.

END OF SECTION 26 05 13

SECTION 26 05 19 – LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Wires and cables.
2. Connectors.
3. Lugs and pads.

1.3 SYSTEM DESCRIPTION

A. Provide wires, cables, connectors, lugs, strain reliefs, racking insulators for a complete and operational electrical system.

1.4 SUBMITTALS

A. Provide product data for the following equipment:
1. Wires.
2. Cables.
3. Connectors.
4. Lugs.
5. Splice Kits.
6. Strain Relief Fittings.
7. Cable Racking and Insulators.

B. Provide the insulation cable testing report in the project closeout documentation, refer to Closeout Requirements in the General Conditions portion of this specification.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of the CEC, latest adopted version with amendments by local Authority Having Jurisdiction (AHJ).

B. Furnish products listed by UL or other testing firm acceptable to AHJ.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Wires and Cables: General Cable, Okonite, Southwire, or approved equal.

B. Connectors: Burndy, Ilsco, Thomas & Betts, or approved equal.

C. Wire connectors shall be minimum 75 degree centigrade rated and properly sized for the number of conductors being connected, terminated, spliced etc. All above grade connectors shall be solderless lug or plastic wire nut type, screw on, pressure cable type (wire nut or spring nut type), 600 volt, 105 degree C, with skirt to cover all portions of stripped wires. Connector shall be U.L. rated for number and size of conductors being joined together as a splice.

D. Splices:
1. Branch Circuit Splices: Ideal, Scotch-Lock, 3M, or approved.
2. Feeder Splices: Compression barrel splice with two layers Scotch 23 and four layers of Scotch 33+ as vapor barrier.
3. Screw Terminal Lugs.
4. Kearney Split Bolt.

2.2 WIRES AND CABLES FOR LINE VOLTAGE SYSTEM AND CONTROLS. WIRE AND CABLE SHALL BE:

A. Copper, 600 volt rated throughout. Conductors 12AWG to 10AWG, solid or stranded. Conductors 8AWG and larger, stranded.

B. Phase color to be consistent at all feeder terminations; A-B-C, top to bottom, left to right, front to back. Phasing tape shall be permitted on sizes #6 and larger. Neutrals shall be solid white with color stripe as indicated.

C. Color Code Conductors as Follows:

		Phase			Neutral		Ground
	A Ph	B Ph	C Ph	A Ph	B Ph	C Ph	
208/120V							
3 Ph	Blk	R/Blk	BL	W/Blk	N.A.	W/BL	Grn
240/120V							
1 Ph	Blk	R	N.A.	W/Blk	W/R	N.A.	Grn
480/277V	Brn	Org	Yel	Gry/Brn	Gry/Org	Gry/Yel	Grn
Blk = Black, R = Red, BL = Blue, Grn = Green, Brn = Brown, Org = Orange, Yel = Yellow, Gry = Grey, W = White							

D. All conductors shall be copper unless otherwise noted. Minimum size for individual conductors shall be #12 AWG unless otherwise noted. Sizes #8 AWG and larger shall be stranded conductor. Individual conductors shall be insulated with type, XHHW, THW, THHN/THWN 600-volt insulation unless otherwise noted. Control, signal, communication conductors shall be as dictated by the vendor of that equipment or as specified here-in. Proper insulation type shall be used for the proper environmental application (waterproof, wet location, plenum, temperature rated, etc.). If a condition exists where the application is uncertain, contact the Engineer for direction. Contractor is responsible to follow specific cabling requirements described in other sections of this specification relative to various communications and controls systems as well as the respective riser diagrams shown on plans. If a discrepancy occurs, communicate such discrepancy to the Architect and Engineer immediately for resolution.

E. Insulation types THWN, THHN or XHHW. Minimum insulation rating of 90C for branch circuits.

2.3 CONNECTORS

A. Copper Pads: Drilled and tapped for multiple conductor terminals.

B. Lugs: Indent/compression type for use with stranded branch circuit or control conductors.

C. Solid Conductor Branch Circuits: Spring connectors, wire nuts, for conductors 12 through 8AWG.

2.4 LUGS AND PADS

A. Ampacity: Cross-sectional area of pad for multiple conductor terminations to match ampere rating of panelboard bus or equipment line terminals.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation: Conductors shall not be installed until after conduit systems are permanently in place. Use an approved non hardening type wire pulling lubricant if lubricant is to be used. Maintain all conduits and wire pulls free from foreign material. If due to field conditions, more than a total of 300 degrees of bend are required; a pull box shall be furnished and installed for ease of installation. Said pull boxes must be sized and rated for the appropriate application and must remain easily accessible upon completion of the project (approval of the location shall be obtained from the Architect prior to installation). Show these pullboxes on the field record drawings. Conductors installed in underground raceways on site shall be duct sealed and taped where they exit the raceway to prevent the entrance of foreign material and moisture after the conductors are installed. Proper drainage shall be provided for underground pull and splice boxes.

B. Insulation: Use proper insulation types where temperature and environment are a factor.

C. Splices at or below grade level are not allowed.

D. Labeling: All conductors in panels, switchboards, terminal cabinets, vaults, pull boxes, and junction boxes shall be labeled with tape number markers indicating circuit number and identifying system. All labeling shall be permanent. In pullboxes and vaults, provide embossed brass tags identifying system serviced and function. See Section 26 05 53 IDENTIFICATION OF ELECTRICAL SYSTEMS.

E. All conductors, wiring, cable where installed below floor, slab or underground shall be considered wet locations, and shall be rated accordingly. Non waterproof cabling is not allowed in any below grade or wet application.

F. Cables routed together in cable tray shall be stacked, organized and tie wrapped together in a neat and workman like manner. Random cable routing is not acceptable.

G. Cable and conductors routed through pull boxes and vaults shall be properly supported on porcelain or equal insulators mounted on steel rack inserts. Bend radius of cable or conductor shall not be less than six times the overall cable diameter.

H. Wires and Cables:
   1. Conductor Installation:
      a. Install conductors in raceways having adequate, code size cross-sectional area for wires indicated.
      b. Install conductors with care to avoid damage to insulation.

c. Do not apply greater tension on conductors than recommended by manufacturer during installation.
d. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation.

2. Conductor Size and Quantity:
   a. Install no conductors smaller than 12AWG unless otherwise shown.
   b. Provide all required conductors for a fully operable system.
3. Provide dedicated neutrals (one neutral conductor for each phase conductor).
4. Conductors in Cabinets:
   a. Cable and train all wires in panels and cabinets for power and control neatly and uniformly. Use plastic ties in panels and cabinets.
   b. Tie and bundle feeder conductors in wireways of panelboards.
   c. Hold conductors away from sharp metal edges.
   d. Connectors: Retighten mechanical type lugs and connectors for conductors to equipment prior to Notice of Completion.

3.2 FIELD QUALITY CONTROL

A. Tests:
1. Test conductor insulation on feeders of 400 amp and greater for conformity with 1000 volt megohmmeter. Use Insulated Cable Engineers Association testing procedures. Minimum insulation resistance acceptable is 1 megohm for systems 600 volts and below.

2. Test Report: Prepare a typed tabular report indicating the testing instrument, the feeder tested, amperage rating of the feeder, insulation type, voltage, the approximate length of the feeder, conduit type, and the measured resistance of the megohmmeter test. Submit report with operating and maintenance manual.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Grounding and bonding requirements of electrical installations for personnel safety and to provide a low impedance path for possible ground fault currents as described in CEC Article 250.
   2. “Grounding electrode system” refers to all electrodes required by CEC, as well as including made, supplementary, lightning protection system and telecommunications system grounding electrodes.
   3. The terms “connect” and “bond” are used interchangeably in this specification and have the same meaning.

B. Related Work:
   1. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 05 19, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment grounding conductors shall be UL 83 insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be permitted to be identified per CEC.

B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes No. 10 AWG and smaller shall be ASTM B1 solid bare copper wire.

C. Conductor sizes shall not be less than what is shown on the drawings and not less than required by the CEC, whichever is greater.

2.2 GROUND RODS

A. Copperclad steel, 3/4" diameter by 10’ long, conforming to UL 467 unless otherwise noted on drawings and details.

B. Quantity of rods shall be as required to obtain the specified ground resistance or additional rods shall be driven to obtain specified resistance or less.

2.3 SPLICES AND TERMINATION COMPONENTS

A. Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

PART 3 - EXECUTION

3.1 GENERAL

A. Ground in accordance with the CEC, as shown on drawings, and as hereinafter specified.

B. System Grounding:
   1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
   2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.

C. Equipment Grounding: Metallic structures (including ductwork and building steel), enclosures, fire sprinklers, plumbing piping, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be bonded and grounded.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

A. Make grounding connections which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

3.3 SECONDARY EQUIPMENT AND CIRCUITS

A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.

B. Metallic Piping, Building Steel, and Supplemental Electrode(s):
   1. Provide a grounding electrode conductor sized per CEC between the service equipment ground bus and all metallic water and gas pipe systems, building steel, and supplemental or made electrodes. Jumper insulating joints in the metallic piping. All connections to electrodes shall be made with fittings that conform to UL 467.
   2. Provide a supplemental ground electrode and bond to the grounding electrode system.

C. Service Disconnect: Provide a ground bar bolted to the enclosure with lugs for connecting grounding conductors.

D. Switchgear, Switchboards:
1. Connect the various feeder equipment grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
2. For service entrance equipment, connect the grounding electrode conductor to the ground bus.
3. Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and grounding conductor to the equipment ground bus.

E. Transformers:
1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to nearest component of the grounding electrode system and the ground bar at the service equipment.

F. Conduit Systems:
1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor sized per CEC.
2. Non metallic conduit systems shall contain an equipment grounding conductor, except that non-metallic feeder conduits which carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment need not contain an equipment grounding conductor.
3. Metal conduit containing only a grounding conductor, and which is provided for mechanical protection of the conductor, shall be bonded to that conductor at the entrance and exit from the conduit.

G. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, power and lighting branch circuits.

H. Boxes, Cabinets, Enclosures, and Panelboards:
1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes.
2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.

I. Motors and Starters: Provide lugs in motor terminal box and starter housing or motor control center compartment to terminate equipment grounding conductors.

J. Receptacles shall not be grounded through their mounting screws. Ground with a jumper from the receptacle green ground terminal to the device box ground screw and the branch circuit equipment grounding conductor.

K. Ground lighting fixtures to the equipment grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures

connected with flexible conduit shall have a green ground wire included with the conductors from the fixture through the flexible conduit to the first outlet box.

L. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

3.4 CONDUCTIVE PIPING

A. Bond all conductive piping systems, interior and exterior, to the building to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

3.5 GROUND RESISTANCE

A. Grounding system resistance to ground shall not exceed 25 ohms. Make necessary modifications or additions to the grounding electrode system for compliance without additional cost to the Owner. Final tests shall assure that this requirement is met.

B. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE Standard 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

C. Services at Pacific Gas and Electric Company interface point shall comply with their ground resistance requirements.

D. Below-grade connections shall be visually inspected by the IOR prior to backfilling. The Contractor shall notify the IOR 24 hours before the connections are ready for inspection.

E. Furnish a copy of tests to Owner at completion of project.

3.6 GROUND ROD INSTALLATION

A. Drive each rod vertically in the earth, not less than 9 1/2’ in depth.

B. Where permanently concealed ground connections are required, make the connections by the exothermic process to form solid metal joints. Make accessible ground connections with mechanical pressure type ground connectors.

C. Where rock prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified resistance.

END OF SECTION

SECTION 26 05 33 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Conduit and fittings.
2. Outlet boxes.
3. Weatherproof outlet boxes.
4. Junction and pull boxes.
5. Floor boxes and poke-through.
6. Cabinets, termination cabinets.
7. Gutters.
8. Concrete boxes and vaults.

B. Related Work:
1. Installation of all wire, cable, conductor, boxes/gutters, pull ropes, fiber optic cable raceway, conduit, innerduct, cable sleeve and duct as described on the plans and/or as specified here-in. This scope shall include pathways to be installed underground on site and offsite, underslab, above grade, both concealed and exposed, overhead concealed and exposed as appropriately applied. Raceways/boxes shall be installed in accordance with their intended and allowed uses and as specified here-in whichever is more restrictive. Size and capacity of all raceway/boxes shall be as specified here-in or as depicted on the drawings, but shall not be less than that required by code. Larger raceway sizes may be specified than code would permit. The specifications shall govern.
2. Listed products for termination, coupling, extending, benching supports of raceways shall be used.
3. Raceways/boxes described by this section shall include, but not be limited to, power for site utilities and lighting, controls, fire alarm, power distribution, lighting, lighting controls, and other building low voltage/communications systems controls as may be required. Raceways, boxes and duct paths required for utility companies shall be installed per plans unless utility company requirements are more restrictive at which time those requirements shall take precedence.
4. Protection of and cleanliness of pathways and raceways must be assured during the construction process in order to eliminate the possibility of debris entering the conduit, duct, pathway resulting in decreased wire capacity and potential damage to installed conductors and cables.
5. Pathways are shown in a diagrammatic way and are generally accurate as to routing, however, it is the Contractor's responsibility as a means and methods process to coordinate with all other trades that require space within a building. The Contractor shall

obtain approval for installation of raceways routing through structural footings, retaining walls, columns, beams, perlins, grade beams, etc.

6. It is the Contractor's responsibility to insure that all raceway and boxes systems penetrate fire assemblies and sound rated assemblies in an approved manner using the appropriate and listed products for the purpose.
7. Trenching and backfilling for all underground conduit systems installed by the Electrical Contractor shall be the responsibility of the Contractor. Conduits shall have minimum cover requirement of 36" below finish grade. More stringent depth requirements may be imposed by the local agency and utility company and shall be adhered to, and / or this specification or as detailed on the plans. Joint trenching may be utilized where practicable and where permitted by this specification. Concrete, native material and sand shall be used as backfill material and shall be compacted in accordance with and coordinated with the grading and site preparation requirements. Conduits shall rest in a minimum of 4" bed of sand prior to backfill and compaction. Locations of existing underground (UG) utility systems shall be determined by calling Underground Service Alert (USA) at least 48 hours prior to any excavation. Also refer to Section 26 05 46.13, ELECTRIC UTILITY SYSTEMS.
8. Minimum conduit size shall be 1/2" except if plan shows or code requires larger size. Exception: Use minimum 3/4" for underslab and below grade applications outside of building exterior walls.
9. All lighting, electrical, fire alarm and emergency radio responder radio coverage systems shall be installed in a metallic conduit system dedicated to each type of system. Open cabling is allowed for telecom/data, audio/visual and low voltage lighting control cabling only.
10. All line voltage wiring within the building shall be installed in metallic conduit systems.
11. All conduit, concrete pads, underground concrete shall be furnished and installed with the approved materials and type for the application. Provide proper traffic control during construction as well as barriers and protection of all excavations and trenching.
12. Empty or future conduits shall be properly plugged with plastic caps or inserts with a 3/8" polyethylene pull rope. Plastic or "duct" tape will not be acceptable.
13. Exterior installations: After conductors are installed, seal conduit ends to prevent entrance of foreign material using pliable duct seal, caps or waterproof expanding foam.
14. All systems including lighting, lighting controls, power distribution, fire alarm, etc. shall be in dedicated conduit systems.
15. Underground conduits entering building shall have the open end of conduit within building above the elevation of the conduit outside the building such that water cannot enter building through conduit. If such a condition exists, a pull box outside of building footprint shall be installed in conduit route before conduit enters building whereby top of pull box is below finish floor of building and moisture may exit box before entering building.
16. No single conduit run of any type shall exceed 300 degrees of radius bend from termination box to termination box.
17. Separate Raceway System: Provide a separate dedicated raceway system for each system installed, do not combine different systems into a raceway system.
18. Spare, Future Conduits: Conduits labeled conduit only, spare, or for future use, shall be provided with a pullrope, capped at each end, labeled as spare with destination marked, and turned over to the Owner in an unused state. Contractor shall not utilize these conduits for the installation of cabling or conductors as part of this scope of work. Contractor to verify and install at no additional cost to the Owner, additional conduits as required for the installation of the systems being installed.

19. Outlet System: Provide electrical boxes and fittings as required for a complete installation. Including but not limited to outlet boxes, junction boxes, pull boxes, bushings, locknuts, covers and all other necessary components.
20. Code Compliance: Comply with CEC as applicable to construction and installation of electrical boxes and fittings and size boxes according to CEC 312, 314 and 366 except as noted otherwise.
21. Outlets to be flush mounted: Maintain integrity of insulation and vapor barrier. Unless otherwise noted, flush mount all outlet boxes.
22. Provide putty pads of proper type around outlet boxes and/or as detailed on plan to meet sound transmission restrictions and fire ratings of walls.

1.3 SUBMITTALS

A. Provide Shop Drawings and Product Data for the Following Equipment:
1. Conduit and fittings.
2. Outlet boxes.
3. Weatherproof outlet boxes.
4. Junction and pull boxes.
5. Floor boxes and poke-through.
6. Cabinets, termination cabinets.
7. Gutters.
8. Concrete boxes and vaults.
9. Putty pads.
10. Raceways

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.

B. Furnish products listed by UL or other independent and nationally recognized testing firm.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Heavy wall Rigid Non-Metallic Conduit, shall be PVC schedule 40 manufactured in accordance with NEMA Standard TC-2, UL-651 and WC 1094A specifications.

B. Extra heavy wall non-metallic conduit, shall be PVC schedule 80 manufactured in accordance with NEMA Standard TC-2, UL-651 and WC 1094A specifications.

C. Galvanized Rigid Steel (GRS) conduit shall be PVC Coated, hot dipped galvanized, zinc coated and shall comply with Underwriters Laboratories UL-6, ANSI Specification C-80.1 and Federal Specification WW-C-581E.

D. Electrical Metallic Tubing (EMT) shall be color coded as indicated, zinc coated, with a protective coating applied to the inside surface and shall comply with Underwriter Laboratories UL-797 ANSI Specification C-80.3 and Federal Specification WW-C-563A.

E. Flexible Metal Conduit (FMC) shall be continuous wound reduced wall galvanized steel produced to UL standards.

F. Liquid tight flexible metal conduit shall have a thermoplastic cover over a galvanized steel core containing an integral copper ground in sizes to 1 1/4" and shall be in compliance with UL standards and CEC Article 350.

G. Manufacturers:
1. Outlet Boxes: Bowers, Raco, Steel City or equal.
2. Weatherproof Outlet Boxes: Bell, Red Dot, [Carlon] or equal.
3. Floor Boxes: Wiremold/Walker, Hubbell, Steel City, or equal.
4. Junction and Pull Boxes: Circle AW, Hoffman, Wireguard or equal.
5. Box Extension Adapter: Bell, Red Dot, [Carlon] or equal.
6. Conduit Fittings: O-Z Gedney, Thomas & Betts, or equal.
7. Vaults: Christy, Brooks, Utility Vault or equal.
8. Putty pads: 3M, Hilti, or equal.
9. Heavy wall rigid non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
10. Extra heavy wall non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
11. Galvanized Rigid Steel (GRS) conduit shall be hot dipped galvanized, zinc coated and shall comply with Underwriters Laboratories UL-6, ANSI Specification C-80.1 and Federal Specification WW-C-581E.
12. Electrical Metallic Tubing (EMT) shall be zinc coated, with a protective coating applied to the inside surface and shall comply with Underwriter Laboratories UL-797 ANSI Specification C-80.3 and Federal Specification WW-C-563A.
13. Flexible Metal Conduit (FMC), Alflex, American Flexible Conduit or equal.
14. Liquid tight flexible metal conduit, Anacanda (type UA), Electri-flex Liquatite or equal.
15. Floor Boxes, Single Gang, Walker/Wiremold 880 CS Series or approved equal.
16. Floor Boxes, Multiple Gang, Walker/Wiremold RFB Series or Walker Omnibox multi-service floor box with carpet plates, and/or water resistant device covers.
17. Masonry Boxes, outlets in concrete, Raco Series 690 or equal.
18. Floor Boxes, Poke-Thru, Hubbell PT7 Series, Walker/Wiremold RC4 Series, or approved equal unless otherwise noted.
19. Floor Boxes, Poke-Thru, Furniture Feed, Walker/Wiremold RC9 Series or approved equal.
20. Exterior In-Grade Boxes for Non-Utility Company, Precast concrete or polymer concrete, Utility Vault and Christy.

2.2 OUTLET BOXES

A. NEMA 1 gutter, junction and pull boxes shall be fabricated from code gage steel finished in grey enamel with screw cover fronts and concentric knockouts in all sides.

B. NEMA 3R gutter, junction and pull boxes shall be fabricated from code gage galvanized steel with screw cover fronts and concentric knockouts in the bottom only. Any penetrations to the side, top or back shall be weatherproofed in an approved manner such as “MYERS” gasketed type hub or equal.

C. Steel outlet boxes and plaster rings shall be galvanized rigid assemblies, either one piece pressed or factory welded construction containing the size and number of knockouts required. Steel outlet boxes shall be manufactured, sized and installed in accordance with CEC Article 314. Device Outlet: Installation of one or two devices at common location, minimum 4” square, minimum 1 1/2" deep. Single or 2 gang flush device plaster ring. Raco Series 681 and 686 or equal. Refer to drawings for data/communication outlet boxes.

D. Luminaire Outlet: minimum 4” square with correct plaster ring depth, minimum 1 1/2” deep with 3/8” luminaire stud if required. Provide proper depth plaster ring on bracket outlets and on ceiling outlets.

E. Multiple Devices: Three or more devices at common location. Install 1 piece gang boxes with 1 piece device plastering. Install one device per gang unless otherwise allowed.

F. Construction: Provide galvanized steel interior outlet wiring boxes, of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices. Boxes shall be properly secured to the structure such that they are flush with the finish surface. Boxes shall be made structurally secure by means of the proper fastening devices.

G. Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, plaster rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

2.3 WEATHERPROOF OUTLET BOXES

A. Construction: Provide corrosion-resistant cast iron, with zinc finish, weatherproof outlet wiring boxes, of the type, shape and size, including depth of box, with threaded conduit ends, cast metal face plate with spring-hinged waterproof cap suitably configured for each application, including face plate gasket, blank plugs and corrosion proof fasteners. Weatherproof boxes to be constructed to have smooth sides, zinc, galvanized finish.

B. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner. Weatherproof boxes in wet locations as described in CEC 406.9 (B) shall be provided with a “while-in-use” cover; red dot ‘CK’ Series of aluminum die-cast construction, NEMA 3R, with lacquer finish.

2.4 JUNCTION AND PULL BOXES

A. Construction: Provide galvanized sheet steel junction and pull boxes, with screw-on covers; of the type shape and size, to suit each respective location and installation; with welded seams and equipped with steel nuts, bolts, screws and washers.

B. Location:
   1. Install junction boxes above accessible ceilings for drops into walls for receptacle outlets from overhead.

2. Install junction boxes and pull boxes as required to facilitate the installation of conductors and limiting the accumulated angular sum of bends between boxes, cabinets and appliances to 300 degrees.
3. Locations: Junction boxes shall be located only where necessary and only in equipment rooms, closets, and accessible attic and underfloor spaces. A horizontal distance of 24" shall separate outlet boxes on opposite sides of occupancy separation walls, fire-rated walls or partitions.
4. Labeling: Junction box covers shall be marked with indelible ink indicated the circuit numbers passing through the box.

2.5 BOX EXTENSION ADAPTER

A. Construction: Cast iron with gasket.

B. Location: Install over flush wall outlet boxes to permit flexible raceway extension from flush outlet to fixed or movable equipment.

2.6 CONDUIT FITTINGS

A. Requirements: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and plastic conduit bushings of the type and size to suit each respective use and installation.

B. Steel boxes may allow for field knock-out modifications, but shall in all other ways conform to code requirements.

2.7 FLOOR BOXES - SINGLE GANG

A. Construction: Deep cast iron fully adjustable before and after concrete pour with all required components for complete activation. Verify required components for application of service fittings, covers, monuments, and the like, attached to floor boxes.

B. Activations:
1. Flush: Provide brass duplex or single signal cover, hinged with set screw lock. Carpet or tile finish ring.
2. Monuments: Provide stainless steel monuments with power receptacle or data grommet as noted.
3. Coordinate specific application of systems as noted on Drawings.

C. Location: Concrete floor. Use poke-thru of same construction in non-concrete structure. Verify exact locations. Ensure flush with finish surface.

2.8 FLOOR BOXES - MULTIPLE GANG

A. Construction: Deep cast iron, fully adjustable before and after pour. Equal to Walker/Wiremold RFB Series or Walker Omnibox multi-service floor box with carpet plates, and/or water resistant device covers. Verify color. Partition for different power or signal

applications. Provide required power receptacle devices and signal grommets or receptacles as noted. Flange type shall be compatible with floor covering for either carpet or vinyl as required and shall be brass type not polycarbonate.

B. Floor mounted boxes shall be water tight and cast iron when installed in grade level concrete slab floor, fully adjustable with interior and exterior leveling screws. Receptacle flange shall be brass with a duplex lift lid. Flange type shall be compatible with floor type. Before installation, coordinate exact location with Architect.

2.9 FLOOR BOXES - POKE-THRU

A. Fire rated for 4 hour, dual service, flush brass cover and service fitting prewired specification grade receptacle, voice/data jacks, as specified.

B. Furniture Feed: Fire rated per floor assembly rating, finish flange and service head assembly.

2.10 EXTERIOR IN-GRADE BOXES FOR NON-UTILITY COMPANY USE SHALL BE:

A. Precast concrete or polymer concrete type with full bottoms and draining into gravel drywell. . Pull boxes 24” x 36” and larger shall have full bottom, set on a minimum of 24” of crushed rock with drainage as detailed on plans.

B. Flushmount in hardscape and 1” above grade in softscape.

C. Provided with full vehicular type cover, stamped with “ELECTRIC”, “LIGHTING”, COMMUNICATIONS”, etc. cover identification as shown on the drawings or as applicable.

D. Provided with brass hold-down bolts in cover.

E. Provided with necessary box extensions to gain proper depth.

F. Seal all conduit in underground boxes with duct seal after conductors have been installed.

2.11 IN-GRADE UTILITY COMPANY BOXES AND VAULTS

A. In-grade boxes and pads for utility company, shall be as specified by the respective utility company with all of the company’s requirements and construction methods met.

2.12 PUTTY PADS

A. Intumescent moldable firestop putty designed to protect electrical outlet boxes.

B. Designed to install around outside of outlet boxes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Conduit systems listed below are for use in installations where they are permitted to be used by CEC and/or other occupancy restrictions. The below installation methods do not intend to suggest that these materials be installed in conflict with any applicable code. Special attention to applications shall be made in building types such as Educational, Health Care, wet location, hazardous locations, assembly occupancy and multi-story, but not limited to these. Requirements which are more restrictive than the CEC may be called for by the drawings and / or these specifications. These requirements must be adhered to. The Electrical Contractor shall be responsible to use the proper conduit system for the application. Exposed conduit is not allowed below ceilings or above slab of floor, without the permission and approval of the Architect. All conduits shall be concealed except in electrical and telecommunication rooms. All Metallic Conduit installed below grade shall be PVC coated type.

B. Non-Metallic Rigid Conduit shall be used in concrete slabs, below concrete slabs on grade, or underground outside of a building slab or foundation. Maintain minimum depth requirements and cover with appropriate fill material. Minimum 4” of bedding and cover of backfill material 1/4" size grain and smaller maximum. Conduit shall be heavy wall Schedule 40 or 80, rigid PVC only. Rigid utility P&C duct shall not be used in any application. Properly sized grounding conductors shall be installed per CEC article 250, in all non-metallic conduit branch circuit and feeder runs. PVC conduit shall be formed or field bent only with the use of properly approved bending tools such as to not decrease the internal bore of the conduit. All conduits shall be cut square and reamed of burrs. Approved and compatible glue shall be used on all PVC fittings to attain watertight joints.

C. Galvanized Rigid Steel (GRS) conduit shall be used where exposed less than 8’–0” above finished grade to 18” below finished grade and where subject to physical damage. Conduits shall be cut square and reamed to remove burrs and sharp edges. Strap conduit below 8’ above grade at 5’ intervals. Unless otherwise noted, threadless setscrew and threadless weathertight fittings may be used in lieu of threaded fittings. All threaded ends entering a junction box of any type shall require one locknut on the inside and one on the outside of the enclosure and be provided with a plastic bushing or grounding bushing where necessary for proper grounding. Where exposed to moisture, a watertight hub or other approved method shall be required. All conduits shall be stubbed up straight and uniform into junction boxes, panels, cabinets, etc., and shall be (GRS) properly supported and strapped. All GRS conduit located below grade, shall be Pvc Coated Type..

D. Electrical Metallic Tubing (EMT) shall be used as allowed by code and as permitted by this specification. It shall not be in contact with soil or the concrete slab on the ground floor of any structure. Connectors and couplings shall be steel insulated set screw type where installed in indoor dry locations not subject to moisture. Where the potential for moisture is present, compression type weathertight fittings are required. One hole conduit straps are permitted from 1/2" to 1” and two hole conduit straps are required for size 1 1/4” and larger. EMT shall not be allowed in areas subject to physical damage. Install copper ground wire sized per CEC 250-122 in all EMT conduits. EMT shall be color coded as follows: Yellow – 277/480Volts, Red – Fire Alarm Circuits, Silver – 120/208Volts, Blue – Low Voltage Circuits (Under 50Volts).

E. Flexible conduit may be used where concealed in building construction or above dropped ceilings, but shall meet the following criteria: No individual run from distribution panel to last device shall exceed a cumulative length of 6’ of flexible conduit from start to end. Flexible conduit shall not exceed a total directional change of 270 bending degrees in any one run between conduit terminations. Squeeze type or Jake type steel flex fittings of a grounding type are required. Flexible conduit must be supported in accordance with CEC. Where exposed to the weather, moisture, or spray down flexible conduit shall be of the liquidtight type. Fittings shall be manufactured for use with liquidtight flexible conduit. All motor connections shall be made with liquidtight flex. Flexible conduit may not be used where exposed except for last 2’ of equipment connection and unless otherwise noted or approved. A copper ground wire sized per CEC 250-122 shall be installed in all flexible conduit runs. Flexible conduit may not be used exposed. Weatherproof liquid tight conduit shall not be used at roof level for equipment connections with lengths exceeding 24” nor shall it be used to circumvent a rigid conduit system in a horizontal direction. Connect recessed lighting fixtures to conduit runs with a maximum of 6’ of flexible metal conduit extending from junction box to fixture.

F. Underground conduits and transition to above grade/slab shall be:
1. GRS elbows.
2. GRS risers from GRS elbow below grade to equipment (device, outlet, panel, cabinet, etc.) above grade.
3. GRS elbows/risers to be PVC coated or 10 MIL taped wrapped (1/2” lapped) to 3” above finish grade or top of slab.

G. Conduit Supports: Conduit runs may be supported by one-hole and two-hole straps or supports as manufactured by Unistrut, Minerallac, Caddy or equals. Supports may be fastened by means of anchors, shields, beam clamps, toggle bolts, or other approved methods appropriate for the application and size of conduit. Conduit support methods are subject to review by the engineer and authority having jurisdiction for adequacy. Installations deemed inadequate shall be corrected by the contractor at no cost to the Owner.

H. Bends and offsets shall be made with approved tools for the type of conduit being utilized. Bends shall be made without kinking or destroying the smooth bore of the conduit. Parallel conduits shall be run straight and true with bends uniform and symmetrical. Minimum radii shall be per CEC 344-24.

I. Conduit Stub-outs below grade shall be capped with plastic cap, and identified by placing a pull box marked with correctly identified utility such as “Elec”, “Tel”, etc. Dimension for exact location on field record drawings.

J. Conduit Seals: Where below grade conduits enter structure through slab or retaining wall of building or basement, seal the inside of each conduit as follows:
1. Provide damming material around conductors 3” into conduit.
2. Fill 3” of conduit with 3M #2123 sealing compound.
3. Wrap conductors where they exit the conduit with 3M #2229 "Scotch Seal" mastic tape. Lap tape to approximate diameter of the raceway and wrap outside of conduit opening with (minimum) one turn.
4. Use conduit sealing bushings type CSB (O-Z/Gedney) or equal.
5. Empty conduits shall be sealed with standard non-hardening duct seal compound and then capped to prevent entrance of moisture and gases and to meet fire resistance requirements.
6. Provide cable drip loop minimum 12” high.

K. Marker tape: Place plastic yellow marker tape at 12” below finish grade along and above buried conduits. Label tape "CAUTION: ELECTRICAL LINES BELOW" or similar wording.

L. Electrical and communications systems raceways routed underground shall not occupy the same trench as plumbing utilities such as sewer, water, storm drain, gas or other wet or dry gaseous utility system. A minimum of 12” of undisturbed earth is required. Where utilities must cross in closer proximity to each other due to physical constraints, 6” minimum crossing distances are allowed, however 18” on all sides of a utility crossing must be concrete encased.

M. Duct bank defined here-in shall be four or more conduits in a common trench, conduit spacers and saddles shall be required in all trenches where more than two conduits over 2” in diameter travel in the same trench. Proper spacing between systems as outlined above shall be required and spacers shall be located each 5’ (maximum) along trench route from point to point.

N. Conduits, routed below footings, slabs, grade beams, columns, and other structural elements shall be installed in strict compliance with structural details and criteria shown on structural plans. Clearances below structural elements and sleeves through structural elements must be carefully planned to avoid conflict and must be approved by the structural engineer if conflict arises.

O. All conduit or raceways passing through fire rated walls, floors, or ceilings shall be installed with a listed penetration method which protects the opening to the same rating as the assembly and is non hardening.

P. Expansion Joints
1. Conduits 3” and larger, that are secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. Install the couplings in accordance with the manufacturer’s recommendations.
2. Provide conduits smaller than 3” with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 5” vertical drop midway between the end. All conduit shall have a copper green grounding bonding conductor installed.

Q. Seismic Joints
1. At seismic joints, provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes or approved fittings, on both sides of the joint. Connect conduits to junction boxes with sufficient slack flexible conduit such that these slack conduits are 1 1/2 times the distance between conduit ends. Flexible conduit shall have a copper green ground bonding jumper installed.

R. Location: Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.

S. Anchoring: Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.

T. Special Application: Provide weatherproof outlets for locations exposed to weather or moisture.

U. Knockout Closures: Provide knockout closures to cap unused knockout holes where blanks have been removed.

V. Mount heights of outlet boxes, unless otherwise required by ADA, shall be as noted on drawings.

W. Coordinate all electrical device locations with the architectural floor plan and interior and exterior elevations to prevent mounting devices within elements that they may conflict such as cabinetry, mirrors, planters, etc.

X. Size outlet and junction boxes to minimum wire fill space requirements. Upsize box as required to allow ease of wire installation and device installation.

Y. Outlet and junction boxes in fire rated walls shall be gauged and spaced so as not to exceed the maximum penetration allowed by the assembly without compromising the fire rating. If a conflict arises relative to a specific condition, the contractor shall follow the requirements of the fire authority and ask for guidance from the design team. At no time should a larger box be installed prior to resolution of conflict.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 05 34 - CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Cabinets where shown on the contract drawings and specified herein.

B. Related Work:
   1. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 05 53, IDENTIFICATION OF ELECTRICAL SYSTEMS.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Type: Cabinets shall be flush or surface mounted type as indicated on the contract drawing, as per Code and U.L. Standard 50.

B. Cabinet Construction: Sizes as indicated, constructed of code gauge sheet steel with hinged lockable doors, common keyed with panelboards. Equip cabinets with 3/4" fire retardant treated plywood backboards and/or barriers as applicable, terminal blocks for connection; index card holders and cards mounted behind heavy plastic on inside of cabinet doors.

C. Finish: Cabinets shall be chemically cleaned and the fronts shall be finished in same way as panelboards and switchboards.

D. Controls: As indicated on the contract drawings.

E. Identification: Provide on exterior of cabinet doors engraved plastic nameplate identifying the cabinet as designated on the Contract Drawing. Lettering shall be white on black finish and shall be minimum 3/16” high. Affix nameplates to cabinet doors with a minimum of two escutcheon pins or screws.

PART 3 - EXECUTION

3.1 GENERAL

A. Required: To be located where indicated on the Contract Drawing and installed as per manufacturer's instruction. Securely fasten to structural members or Unistrut support in vertical and plumb position and at heights indicated.

B. Nameplates: Conform to provisions noted above or as designated on the plans.

END OF SECTION

SECTION 260535 - PRODUCTION SYSTEMS ELECTRICAL INSTALLATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provision of services as listed within Div. 26 related to the installation of production systems and electrical infrastructure including:

   a. Production lighting control systems
   b. Production AV systems
   c. Telescopic seating units
   d. Production power "company switches"
   e. Coordination with all related sections doing adjacent or integrated work.

B. It shall be under the work in this section to provide electrical infrastructure, accommodations and connections to systems in other Sections.

1. It shall be under the work of a specialty sub-contractor for Section 11 61 83 – Production Lighting Control to furnish equipment only to the jobsite. It is under the work in this Div. 26 Section to coordinate with, receive, install all equipment (line voltage and low voltage) and provide all power infrastructure, conduit, raceway, wire, connectors, hardware and other incidental items, terminations for both line voltage and testing to provide a complete and working system. Reference PL Documents for other electrical requirements.
2. It shall be under the work of a specialty sub-contractor for Section 12 66 23 – Telescopic Seating to furnish equipment to the jobsite. It is under the work in this Div. 26 Section to coordinate with, receive, install all equipment and connection panels (line voltage and low voltage) mounted to the building, and provide all power infrastructure, conduit, raceway, wire, connectors, hardware and other incidental items, terminations for both line voltage and low voltage and testing to provide a complete and working system, including low voltage aisle lighting accommodations. Reference PS Documents for other electrical requirements.
3. It shall be under the work of a specialty sub-contractor for Section 27 41 16 – AV Systems to provide and install equipment, including low-voltage wire pull. It is under the work in this Div. 26 section to provide and install a complete and working line-voltage isolated-ground power infrastructure. It is also under the scope of Div. 26 to provide and install all low-voltage conduit, raceway, and standard backboxes. Specialty backboxes will be provided by the 27 41 16 contractors to Div. 26 for installation. Reference AV Documents for other electrical requirements.

C. It is under the work of this section to provide all conduit and backboxes to all Production Lighting and AV systems.

1. Exception: Surface and rail mounted Production Lighting backboxes will be furnished by Div 11 Production Lighting Control Systems.

2. Exception: Floor boxes and specialty (non-standard or NEMA) backboxes will be furnished by Div 27 AV Systems.

1.2 RELATED SECTIONS

A. Coordinate with the following sections in carrying out this work:

1. Division 1 General Conditions
2. Section 11 61 33 – Production Rigging
3. Section 11 61 83 – Production Lighting Control
4. Section 12 66 23 – Telescopic Seating
5. Other Division 26 Sections
6. Section 27 41 16 - AV Systems

1.3 REFERENCES

A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.

B. All production system design drawings and specifications assume 100% above-grade, above-slab EMT conduit.

1. At the contractor's option, Rigid PVC and/or Rigid Metal Conduit (RMC) may be used at in-slab/on-grade, under-slab/in-grade, or in-slab/not on-grade conditions, so long as the requirements referenced below are met.

1.4 SYSTEM DESCRIPTION

A. Production Lighting Control System

1. The system shall be designed for the control of production lighting and shall consist of factory pre-wired dimming and processing rack enclosures containing dimmers, relay panels, power supplies, breakers, terminals and/or control electronics.
2. Dimmed and Relay circuits shall be connected to factory pre-wired wiring devices.
3. System shall work in conjunction with specified low-voltage control and receptacle stations.
4. All equipment is furnished as equipment only and must be installed and connected by the electrical contractor.

B. AV Systems- Electrical Power

1. The IG power system will be designed to provide clean power with reduced susceptibility to EMI/RFI, using an isolated ground and a dedicated isolation transformer.

C. AV Systems- Low Voltage Conduit

1. The conduit system is designed to reduce susceptibility to EMI/RFI, using EMT metallic conduit and physical separation.

D. "Company Switches" are cabinets and receptacles specially designed for temporary production power connections.

E. Fixed Seating

1. The fixed audience seating is furnished with aisle lighting fixtures pre-wired into the chairs. The seats come with pigtails that must be terminated into cast in slab junction boxes and conduit provided by division 26. Some of the seats are demountable, and the connection must be made removable via plug-and-socket.
2. The fixed audience seating contractor shall furnish a low voltage transformer and manual dimmer(s) for aisle light intensity adjustment to be installed and connected by division 26.

F. Telescopic Seating System

1. A motorized telescopic seating system is being furnished and installed by the specialty sub contractor for Section 126623 – Telescopic Seating System. The Seating contractor will also provide any specialty or proprietary connector panels and face plates for device connection.
2. The seating contractor will provide all connectors, cable or flexible conduit and wire required for connections to the seating systems at wall box locations.
3. Motor connections:

   a. The seating manufacture will provide Motor power terminations and/or receptacles and any disconnects required for installation.
   b. Mounting and terminations to the building are under the work of the div 26 contractor.

4. Aisle lighting

   a. The seating contractor will provide transformers for aisle lights mounted in a wall box with a labeled cover plate as well as manual dimmer(s) for aisle lighting intensity adjustment, mounted in a labeled wall box with a locking cover.
   b. It is under the work of the Div 26 electrical contractor to mount equipment and provide terminations for all aisle lights.

5. It is under the work of this section to provide:

   a. All conduit, boxes to furnish devices related to seating systems.
   b. Any common receptacles panels or connections and any black face plates for pull boxes.
   c. Terminations for all line and low voltage connections including motor power and aisle light power.

1.5 DESIGN CRITERIA

A. Production Lighting System

1. Branch production lighting wiring and infrastructure shall provide 115VAC +/-3% at all wiring devices under a 575w lighting load.

2. Production dimming shall be rated for 100% continuous operation. Branch wire size and conduit/raceway shall be sized for the full rated loads of the dimmers and 100% continuous operation of every circuit without deration on any part of the circuit or system, subject to the maximum overall feeder and protection devices as listed in Drawings. For 20A loads, assume 10AWG wire unless otherwise noted. Splices in the wire are not acceptable, the wire shall be continuous from dimmer rack connection to distribution device wire connector strip without any connections or splices in the wire between.
3. Control wiring shall be installed per the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
4. In-slab/on-grade and under-slab/in-grade conditions: At the contractor's option, Rigid PVC and/or Rigid Metal Conduit (RMC) may be used, so long as the following conditions are met:

    a. Contractor must use the "wet location" cable as identified in the Production Lighting wiring key.
    b. "Wet Location" cable is larger in diameter, so the contractor must calculate the conduit sizes to maintain compliance with NEC fill ratios. Submit calculations for review.
    c. "Wet Location" cable is more expensive. The project will not accept a cost increase due to lack of communication between electrical contractor and Production Lighting contractor.

B. AV Systems: Isolated Ground and Isolation Transformer

1. All power to AV systems must be on a dedicated K-13 rated transformer, combined with an isolated ground system. AV power will be identified with orange outlets throughout the facility.
2. All orange IG outlets shall be identified with a label indicating load center and circuit. "P-Touch" style labels are acceptable.
3. The isolated ground system shall be a "star" configuration, meaning that all AV power system grounds ultimately reference the building ground at only one point, typically located in the main electrical service room. This location shall be in a separate junction box and shall be clearly labeled as to its function with a screw-on lamicoid label.
4. The main branches for the IG system (from main electrical room to branch AV power panels) will be fed with #3/0 AWG insulated ground cable. From these main points, branch load circuits connect to an IG busbar using standard-size (12 or 14 AWG) conductors. In addition, a #3/0 AWG IG conductor must be brought to the AV equipment racks, for termination to an equipment rack busbar, provided by the AV contractor.

C. AV Systems: Motorized Breaker Panel with Sequencing Card

1. Provide Lyntec Manufacturing Model RPC with the following options:

    a. Sequencing from contact closure and network control connection
    b. Integrated IG buss bar in attached separate cabinet.
    c. Bolt-On Breakers.

d. Panelboard style
e. Circuit and main breakers as shown in electrical panel schedules
f. Provide control boards for all breakers in the panel.

2. In cases where one panelboard services circuits in two different spaces, configure panel with multiple sequencer control cards, so the panel may act as separate systems.
3. The AV systems contractor will provide the low-voltage control panel that will activate and de-activate the sequencing unit. Coordinate with AV systems contractor for connection and proper configuration of sequencing and timing.
4. The Fire Alarm system contractor will provide a contact closure for instantly shutting down power to all circuits. Connect to emergency terminals on Lyntec sequencing board. Coordinate with Fire Alarm systems contractor for connection and configuration.

D. AV Systems: Low-voltage conduit system

1. All low-voltage AV conduit shall be as indicated in the AV drawings, using a 100% EMT conduit pathway.
2. In-slab/on-grade and under-slab/in-grade conditions: At the contractor's option, Rigid PVC and/or Rigid Metal Conduit (RMC) may be used, so long as the following conditions are met:

   a. Contractor must use the "wet location" cable as identified in the AV cable schedule.
   b. "Wet Location" cable is larger in diameter, so the contractor must re-calculate the conduit sizes to maintain compliance with NEC fill ratios. Submit calculations for review.
   c. "Wet Location" cable is more expensive. The project will not accept a cost increase due to lack of communication between electrical contractor and AV contractor.
   d. Contractor must maintain stated separation and grouping requirements.

3. In-slab/not on-grade conditions, such as metal deck or floors not on grade: Rigid PVC and/or Rigid Metal Conduit (RMC) may be used, so long as the following conditions are met:

   a. Contractor must maintain stated separation and grouping requirements.

4. All AV wiring shall be installed per the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements.

   a. Contractor shall be responsible if work under their control voids or jeopardizes manufacturers' warranties.
   b. The following shall be met:
      1) NEC Article 725 and 800

5. The AV conduit system is comprised of five different signal types, A thru F:

   a. Mic
   b. Line

c. Video/Communication/Data
d. Loudspeaker
e. Empty
f. Fiber

6. Each signal type (A thru F) is a separate system of conduits. A typical system will have five conduits exiting each on-stage multi-box.
7. The following conduit separation tables shall be observed:

SEPARATION OF AV CONDUIT TO AC *AV CONDUIT TYPE SEPARATION*

	AV CONDUIT			A	B	C	D	E/F
AC- BRANCH LOAD	36”		A	--	12”	12”	12”	12”
AC- FEEDER	48”		B	12”	--	6”	6”	6”
AC- BRANCH DIMMED LOAD	36”		C	12”	6”	--	6”	6”
TEL/DATA	12”		D	12”	6”	6”	--	6”
CONTROL (OTHER)	12”		E	12”	6”	6”	6”	--

1.6 SUBSTITUTIONS

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the Owner’s Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall including the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner’s Representative shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS

A. Reference applicable sections for submittal requirements. Final wire types and electrical installation requirements shall be indicated on final approved shop drawings for each discipline. The final approved shop drawings shall supersede the contract documents.
B. Shop Drawings:

1. Submit full-size (minimum 30” x 42”) scaled shop drawings that show the following:

a. All production systems conduits or devices to be included in-slab, under-slab, or in concrete/CMU walls.
b. Dimensioned locations of in-floor trenchduct, floor boxes, or any other production systems device that will be cast in concrete, including conduit sizes and entry points.
c. Dimmer rack and relay panel mounting
d. Floor pocket mounting

2. Submit manufacturer cut sheets or product data for the following devices:

   a. Motorized Breaker Panel Board
   b. Company Switches
   c. Overhead Cable Tray
   d. Floor Pockets
   e. NEMA-1 Raceway

3. Contractor is responsible for any repair or remediation necessary due to failure to receive approval for production systems conduit or devices placed in-slab, under-slab, or in CMU walls.
4. Conduit, Backboxes and Electrical Systems Verification Letter:

   a. Within 30 days of contract award, the contractor shall review all relevant information pertaining to the production lighting control systems low-voltage conduit, backboxes, and line-voltage electrical work to be performed by division 26. A formal memo, outlining acceptance (or desired changes) of the contract drawing shall be provided. Failure to provide this memo indicates acceptance of, and liability for, the conduit, backboxes and electrical systems as indicated in the contract drawings.
   b. If the contractor chooses to exercise the option to place conduit in-slab and on-grade or under-slab and in-grade, the contractor shall submit a revised AV conduit riser with new conduit size calculations using cables from the “wet-rated” AV cable schedule.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Components and types per referenced specification sections except where manufacturer’s recommendations and requirements vary.

   1. Refer to final, approved production systems manufacturers or specialty sub contractor’s shop drawings for final control wiring types, counts and routes, which shall govern over drawings. Coordinate with manufacturer or specialty sub-contractor for alternate routes and wire counts in case of field limitations.

2.2 PRODUCTION LIGHTING

A. All power and control wiring shall be labeled at each end and connected per circuit assignments as shown on the PL drawings and approved shop drawings, as applicable.
B. Provide excess tails at ends as recommended by the manufacturer.
C. Control wiring shall be continuous with no splices per the applicable industry standards.
D. Wiring device wiring:

   1. Branch load wiring shall include a dedicated neutral for each circuit, sized as a current carrying conductor. No common neutrals will be accepted.

2. Provide one ground wire for every 6 circuits within each wiring device with a minimum of one ground wire per wiring device, homerun to and terminated at the dimmer rack or relay panel, sized per applicable regulatory requirements.
3. Any and all parallel circuits shall be home run to the dimmer racks unless otherwise noted.
4. Coordinate circuit management for proper landing on device lugs. Coordination shall include, but not be limited to verifying with the manufacturer during the submittal process and prior to manufacturing, provision of the appropriate lug sizes within the devices.
5. Branch circuit load wiring shall be continuous no splices will be acceptable between dimmer lugs and wiring device terminal strip.
6. Coordinate with manufacturer for the provision of properly sized terminals and lugs, as appropriate for compliant wiring. Wire size reductions or spliced leaders used for stepping down wire size to fit manufactures' terminals is not acceptable.
7. All power and control wiring for production systems shall be pulled in metal raceway. This shall include empty raceway provided for future production systems wiring.
8. Production lighting conduit shall be no smaller than 1" diameter, or the greater of what is required by either the applicable code, Drawings or the final, approved equipment shop drawings.

2.3 AV SYSTEMS

A. All low-voltage AV conduits shall have the following:

1. Clear and permanent labels at each end.
2. Pull strings installed. Pull strings shall be the type with distance markings to indicate length of conduit.

B. Overhead cable tray

1. Provide Cooper B-Line Series One, three dividers with four compartments, non-ventilated (solid) bottom, solid removable lids and associated clips, 18" width, 6-8" depth.
2. Provide in locations as shown in the drawings.

C. Floor Pockets

1. Install floor pockets at locations as shown on the drawings. Floor pockets will be provided by the AV and PL contractors.

   a. At locations where pocket is to be located on grade, provide "pour pan" below floor pocket backbox. Pour pan will provide at least 1" of concrete between grade and backbox to prevent corrosion.
   b. Floor pocket backbox shall be placed in flooring material to yield a finished product that is flush with the finish floor, including floor box cover.

2.4 MOTORIZED & SEQUENCED BREAKER PANELS

A. See related panelboard section. Provide motorized and sequenced breaker panels with the following features:

1. All A.C. power for the AV system shall be supplied from a time sequenced source capable of being remote controlled from multiple locations.
2. A means of visual operator feedback shall provide an indication of the progress of the power turn-on or turn-off sequence at each control point.
3. Time between sequence steps shall be adjustable from 1/8 second to 1 second.
4. Sequencing shall have a time delay adjustable between the low-level equipment circuits and the power amplifier circuits. The delay time shall have a field adjustable range from 1 second to 8 minutes.
5. The sequencing system shall be capable of shedding the load within 3 seconds after a power failure and automatically re-sequencing when power resumes and remains above 105 volts for more than 5 seconds without operator intervention.
6. The sequencing system shall have brownout protection; monitoring the line voltage and triggering an automatic shutdown if the line voltage drops below 95 volts for more than 2 seconds.
7. The sequencing system shall have emergency shutdown capability triggered by external contacts.
8. Un-sequenced circuits, as required, shall be supplied from the same A.C. source so that a single lever main circuit breaker is dedicated to the sound system.
9. Three phase sequenced panelboards shall have 200% neutrals.
10. All sequenced panelboards shall have a separate and attached isolated technical ground section.
11. All branch circuit breakers shall be bolt-on.

B. Provide panel size & circuits as indicated on the plans.
C. Provide LynTec Manufacturing model RPC series Sequencing Panelboard. Contact information: 800-724-4047. www.lyntec.com

2.5 COMPANY SWITCHES

A. 200A & 400A, 120/208VAC, 3-phase company switches shall have the following features:

1. Unit shall be UL Listed and labeled, and NEC Article 520 compliant.
2. The unit shall have a wiring chamber that contains both direct wire lugs and single pole industry standard “Camlok E1016” output connectors. Provide six cam-lock connectors. Individual connectors of appropriate sex per regulations and industry standard.
3. Cam and lug cables shall enter and exit the wiring chamber from access holes in the bottom of the enclosure.
4. A lockable hinged access door shall provide access to the wiring chamber, denying access to the connections when mated.
5. Outside of door shall have safety precautions dominantly displayed.
6. The access door shall engage the shunt trip mechanism of the main circuit breaker whenever it is not fully closed, so that connections cannot be made or broken under load.
7. Output lug connections shall accommodate a maximum of 250mcm cable.
8. The unit shall contain (1) 100% rated 3 pole main circuit breaker with a 65K AIC rating.
9. Breaker shall be recessed beneath the plane of the front panel of the unit to prevent accidental operation.

10. Breaker shall be equipped with an OSHA compliant lockout and tagout padlock attachment to lock the handle in the off position when not in use.
11. The unit shall be equipped with light emitting diode indicator lights for each supply phase, labeled with NEC specified color-codes and alphabetic names of phases.
12. Contractor connections to the main circuit breaker shall accept up to 500mcm wire.
13. Enclosure shall be fabricated from 14 gauge steel and shall have (4) welded mounting tabs.
14. Special Accommodations:

    a. For the production lighting company switch, provide dual neutral connections.
    b. For the AV systems company switch, provide both isolated ground and building ground connections.

15. Acceptable units, subject to the specifications herein:

    a. Lex Products Powergate Company Switch
    b. ESL Power Systems Show Switch
    c. Or equal

B. Provide company switches in locations as shown on drawings. 120/208VAC, 3-phase, 100A company switches shall have the following features:

1. 3-phase, 120/208VAC safety mechanical interlocked pin and sleeve 4-pole 5-wire connector

    a. Mechanical interlock shall prevent the switch from being turned on –when nothing is plugged in and shall prevent something from being unplugged – when something is turned on.

2. Unit shall be UL Listed and labeled with safety interlocked outlet containing an integral 100A circuit breaker.
3. Ul Listed circuit breaker rated 65kAIC @ 208VAC provide short circuit and overcurrent protection.
4. Indicator lights for power on
5. 5100R9W pin and sleeve receptacle with protective cover.
6. Actuator rod allows user to turn on/off and reset tripped breaker.
7. Powder coated wrinkle black galvanneal enclosure, type 1
8. Certified for current interrupting at full rated current and voltage.
9. Rated for 10,000 mechanical cycles and 6,000 electrical cycles.
10. 21” x 11” x 10.5”
11. Acceptable units, subject to the specifications herein:

    a. ESL Power Systems – CSPS-100C-208Y/120-65-311-55-CW1

PART 3 - EXECUTION

3.1 INSTALLATION

A. Production Lighting Control System

1. It is under the work in this Div. 26 Section to receive and store the necessary materials and equipment for installation of the dimmer system. It is the intent of these specifications and plans to include everything required for proper and complete installation and operation of the dimming system, even though every item may not be specifically mentioned. The contractor shall deliver on a timely basis to other trades any equipment that must be installed during construction.
2. It is under the work in this Div. 26 Section to be responsible for field measurements and coordinating physical size of all equipment with the architectural requirements of the spaces into which they are to be installed.
3. It is under the work in this Div. 26 Section to install all lighting control and dimming equipment in accordance with final, approved manufacturer's approved shop drawings.

3.2 CONDUIT/RACEWAY INSTALLATION

A. Conduit/raceway shall not be placed where it obstructs production functions or the proper installation of other production systems.

1. No conduit/raceway is permitted on lighting pipes or rigging grids used for performance. Crossing pipes or grids used for performance shall only be allowed where authorized by the District's Representative. This restriction includes all horizontal catwalk railings. Vertical conduit/raceway shall be placed on vertical structural hangers or where otherwise permitted by the District's Representative.
2. No conduit/raceway is permitted within stage rigging wells.
3. No devices are permitted below 6" above bottom of fly tower rigging/roof beams.
4. No conduit/raceway is permitted on the fly tower gridiron walking surface.
5. No conduit/raceway is permitted on tension grid hangers below 6'-8" above walking surface of tension grid.
6. Clear zones shall be maintained where noted on Drawings and on specialty sub-contractors approved shop drawings. Violations shall be corrected as required by the District's Representative at no additional cost to the District.

B. Any conduit required to be placed in concrete slab or in grade shall be approved by the consultant. See requirements above.

C. Coordinate with related contractors and District's Representative.

3.3 COMMISSIONING

A. Production Lighting Control System

1. All branch load circuits shall be live tested before connecting the loads to the dimmer system load terminals.
2. All branch load circuits shall be live tested after termination for proper wiring, continuity and polarity. Irregularities shall be corrected before arrival of manufacturer's factory-trained personnel and Owner's Representative checkout.
3. Upon completion of the installation, including testing of load circuits, the contractor shall notify the dimming system manufacturer that the system is available for formal checkout.

4. Notification shall be provided in writing, two weeks prior to the time factory-trained personnel are needed on the job site.
5. No power is to be applied to the dimming system unless specifically authorized by written instructions from the manufacturer.

B. Isolated Ground System

1. Upon final checkout, the contractor shall demonstrate the integrity of the isolation grounding system by removing the IG connection to the main building ground at the central connection point, and metering ground at various IG outlets throughout the space.

C. The Div. 26 Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or Owner's Representative as a result of incomplete or incorrect wiring, or erroneous representation that the Systems are complete and ready for the related Contractor or Owner's representative to carry out their work.

END OF SECTION

SECTION 26 05 46.13 – ELECTRIC UTILITY SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Manholes, handholes and ducts to form a complete underground raceway system.
   2. "Duct" and "conduit", and "raceway" are used interchangeably in this specification and have the same meaning. Refer to Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS for approved raceway and materials as well as execution.
   3. Scope of Work: Furnishing, installation and connection of manholes, handholes and ducts to form a complete underground raceway system for distribution of electrical and signal systems and utility service entrance facilities. This specification shall also provide guidance for construction of the utility company underground and substructure requirements. Contact serving company directly and obtain current detailed requirements of installation and adhere by same. Provide trenching, conduit, backfill, boxes and equipment pads as applicable. Nothing here in shall be construed to be in conflict with the requirements of the utility company, which shall take precedence over any possible conflicting requirement.

B. Related Work:
   1. SITEWORK.
   2. FLATWORK.
   3. LANDSCAPING.
   4. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   5. Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings and boxes for raceway systems.
   6. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

1.3 SUBMITTALS

A. Submit in accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

B. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   2. Include manholes, handholes, duct materials, and hardware. Proposed deviations from details on the drawings shall be clearly marked on the submittals.

3. If necessary to locate manholes or handholes at locations other than shown on the drawings, show the proposed locations accurately on scaled site drawings.
4. Precast manholes and handholes: Submit detail drawings and design calculations for approval prior to installation.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. Underwriters Laboratories, Inc. (UL):
1. UL 467 Grounding and Bonding Equipment
2. UL 651 Schedule 40 and 80 Rigid PVC Conduit
3. UL 6 Electrical Rigid Metal Conduit-Steel

C. National Fire Protection Association (NFPA):
1. 70 California Electrical Code (CEC)

D. National Electrical Manufacturers Association (NEMA):
1. RN 1 Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
2. TC 2 Electrical Polyvinyl Chloride (PVC) Tubing And Conduit
3. TC 3 PVC Fittings For Use With Rigid PVC Conduit And Tubing

E. American Concrete Institute (ACI):
1. 318 Building Code Requirements For Structural Concrete

F. American Society for Testing and Materials (ASTM):
1. C478 Standard Specification for Precast Reinforced Concrete Manhole Sections
2. C478M Standard Specification for Precast Reinforced Concrete Manhole Sections (Metric).
3. F512 Standard Specification for Smooth-Wall Polyvinyl Chloride (PVC) Conduit and Fittings for Underground Installation

G. Utility company Handout Package and Construction Requirements for Underground and Substructure Installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete: ACI 318, 3000 psi minimum 28 day compressive strength.

B. Reinforcing Steel: Number 4 minimum.

C. Manhole Hardware:
1. Frames and covers (traffic type).

2. Sump frames and gratings.
3. Pulling Irons: 7/8” diameter hot dipped galvanized steel bar with exposed triangular shaped opening.
4. Cable supports:
   a. Cable stanchions, hot rolled, heavy duty, hot dipped galvanized "T" section steel 2 1/4" by 1/4" in size and punched with 14 holes on 1 1/2" centers for attaching cable arms.
   b. Cable arms, 3/16” gage, hot rolled, hot dipped galvanized sheet steel pressed to channel shape. Arms shall be approximately 2 1/2" wide and 14” long.
   c. Insulators for cable supports, high glazed, wet process porcelain.
   d. Spares: Equip each cable stanchion with two spare cable arms and six spare insulators for future use.
   e. Miscellaneous hardware, hot dipped galvanized steel.

D. Handhole Hardware:
1. Frames and covers configuration as shown on the drawings.
2. Pulling irons, 7/8” diameter galvanized steel bar with exposed triangular shaped opening.

E. Ground Rod Sleeve: Provide a 3” PVC sleeve in manhole floors so that a driven ground rod may be installed.

F. Manholes and Handholes shall be precast units and be constructed as described below. Units shall comply with ASTM C478, C478M.
1. Size: Plan area and clear height shall be not less than that shown on the drawings.
2. Accessories, hardware, and facilities shall be the same as required for poured in place type.
3. Assume ground water level 3’ below ground surface unless a higher water table is shown in the boring logs and adjust design accordingly.

G. Ducts:
1. Size shall be as shown on drawings.
2. Ducts (concrete encased):
   a. Plastic Conduit:
      1) NEMA TC6 & 8 and TC9 plastic utilities conduit UL 651 and 651A Schedule 40 PVC.
      2) Duct shall be suitable for use with 90 degree C rated conductors.
3. Ducts (direct burial):
   a. Plastic duct:
      1) NEMA TC2 and TC3, EPC-40, Type II.
      2) UL 651 and 651A, Schedule 40 Schedule 80 PVC.
      3) Duct shall be suitable for use with 75 degree C rated conductors.
   b. Rigid metal conduit, PVC-coated: UL6 and NEMA RN1 galvanized rigid steel, threaded type, coated with PVC sheath bonded to the galvanized exterior surface, nominal 0.040” thick.

H. Ground Rods: Per Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

I. Ground Wire: Stranded bare copper No. 6 AWG minimum.

J. Conduit Spacers: Prefabricated plastic.

K. Warning Tape: Standard 4 mil polyethylene 3” wide tape, detectable type, red with black letters, imprinted with “CAUTION BURIED ELECTRIC CABLE BELOW”.

L. Pull Rope: Plastic with 200 pound minimum tensile strength.

PART 3 - EXECUTION

3.1 TRENCHING

A. Refer to EARTHWORK section of specification for trenching back-filling, and compaction requirements.

B. Work with extreme care near existing ducts, conduits, cables, and other utilities to avoid damaging them.

C. Cut the trenches neatly and uniformly for utility company trenches, notify for inspections by utility company a minimum of 48 hours in advance.

D. Conduits to be installed under existing paved areas, roads, and railroad tracks which are not to be disturbed shall be protected into place. Conduits shall have a minimum of 36” cover.

E. Trench Preparation: A 4” sand bedding is required if trench bottom is not rock free. A 4” sand covering over the cable is required if the native backfill is not rock free. Backfill and compaction should meet all applicable requirements. The serving utility company may require 100% sand backfill. All backfill requirements shall also meet or exceed those set forth in the earthwork or civil section of this specification.

F. Excavation: Provide 6” gravel in bottom of excavated holes for subsurface transformers and all concrete boxes. Spare gravel shall be available for final adjustment. The Contractor is responsible for final grade level of enclosures and boxes. Non-conformance will be corrected by electrical contractor at his expense.

G. Conduit Routing: Sharp turns, bends, or other irregularities in the conduit must be avoided. Minimum radius bends shall be as required by the serving utility company. Every effort should be made to obtain a straight water tight conduit line. The end of all spare conduits must be capped. The utility company Inspector must approve deviation from layout.

H. Conformance: All work must conform to the utility company “handout package” and Specification specific to this project.

I. Joint Trenching: Maintain all required depths, clearance and separations as required by code, ordinance or utility company policies. Coordinate with other utilities to confirm requirements.

3.2 PADMOUNTED EQUIPMENT

A. Provide adequately sized and reinforced concrete pads with openings for conduit(s) as necessary by the utility company and or the equipment manufacturer.

B. A grounding system shall be installed at each padmounted piece of equipment including, but not limited to, a ground rod, grounding conductor, ufer, and ground grid (where indicated).

C. Padmounted equipment shall be bolted to concrete pad with minimum 5/8” x 7 1/2" anchor bolts, one in each of 4 corners of each section of padmounted equipment.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 05 53 – IDENTIFICATION OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Nameplates and warning signs where specified herein and as shown on contract documents including the following:
      a. Nameplates and warning signs permanently installed on all electrical equipment and devices including, but not limited to, the following items:
         1) Enclosures for transformers, switchboards, panels, pullboxes, cabinets.
         2) Enclosures for all separately enclosed devices including, but not limited to, disconnect switches, circuit breakers, contactors, time switches, control stations and relays, fire alarm panels and lighting control panel.
         3) Wall switches not within sight of outlet controlled.
         4) Special systems such as, but not limited to, telephone, fire alarm, warning and signal systems. Identification shall be at each equipment rack, terminal cabinet, control panel, annunciator and pullbox.
         5) Devices mounted within and part of equipment including circuit breakers, switches, control devices, control transformers, relays, indication devices and instruments.

B. Related Work:
   1. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 05 34, CABINETS.
   3. Section 26 24 13, SERVICE AND DISTRIBUTION SWITCHBOARD.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABEL DESIGNATIONS

A. Equipment labels indicating equipment designations both emergency and normal. Designation data per drawings or to be supplied with shop drawings approval.

B. Panelboard labels showing panel designation, voltage, phase and source.

C. In accordance with CEC, provide arc flash protection warning labels on all switchboards, panelboards, distribution panels, transformers, safety switches, transfer equipment, etc. Labels shall be per ANSI Z535.4 guidelines.

2.2 MATERIALS

A. For Labels: Three layer laminated plastic or micarta with engraved white letters over black background.

B. For Emergency Equipment: Use engraved white letters over red background.

C. For Warning Signs: Minimum 18 gauge steel with red lettering on white porcelain enamel finish.

D. Arc flash labels shall be provided as required by CEC Article 70E.

PART 3 - EXECUTION

3.1 MOUNTING

A. Equipment labels shall be mounted by self-tapping, threaded screws and bolts, or by rivets. Adhesive types are not acceptable unless specifically noted in this section.

3.2 HEIGHTS ON LABELS

A. Panelboards, Switchboards and Special Systems Enclosures: 1/4" identify equipment designation; 1/8” identify voltage rating and source.

B. Individual Circuit Breakers, Switches, and Motor Starters in Panelboards, Switchboards, and Motor Control Centers: 3/16” identify circuit and load served, including location of equipment.

C. Enclosed Circuit Breakers, Enclosed Switches, and Motor Starters: 3/16” identify load served.

D. Transformers: 3/16” identify equipment designation; 1/8” identify primary and secondary voltages, primary source and secondary load. Include location of primary source or secondary load if remote from transformer.

3.3 WARNING SIGNS

A. Warning signs shall be permanently mounted with cadmium plated steel screws or nickel-plated brass bolts.

B. Warning signs to read "DANGER - HIGH VOLTAGE", with letters 1 1/2" high, 3/16” stroke minimum.

C. Provide warning sign on all doors or immediately next to door for equipment rooms, enclosures or closets containing equipment energized above 150 volts to ground as per CEC, and/or as directed by the Architect. For interior finish spaces and interior doors, signage shall be coordinated and approved with the Architect in advance of installation.

END OF SECTION

SECTION 26 05 73 – OVERCURRENT PROTECTIVE DEVICE COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Overcurrent Protective Device Coordination.
   2. A short circuit and coordination study shall be prepared for the electrical overcurrent devices to be installed under this project to assure selective coordination, proper equipment and personnel protection.
   3. The study shall present an organized time current analysis of each protective device in series from the individual overcurrent device back to the utility and the on-site generator sources. The study shall reflect the operation of each device during normal and abnormal current conditions.
   4. Implement as part of this contract, all manufacturer's recommendations for maximum protection and best selective coordination at no additional cost to Owner.
   5. The Contractor shall furnish an ARC Flash analysis study per NFPA 70E – Standard For Electrical Safety In The Workplace, Reference Article 130.3 and Appendix D.

B. Related Work:
   1. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 24 16, PANELBOARDS: Low voltage panelboards.

1.3 SUBMITTALS

A. In accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL, submit the following:
   1. Complete short circuit and coordination study as described herein.
   2. ~~Protective equipment shop drawings shall be submitted with the protective device stud~~y. ~~Protective equipment shop drawings will not be accepted prior to protective device stud~~y.
   3. Certification: Two weeks prior to final inspection, submit four copies of the following to the Engineer:
      a. Certification by the Contractor that the protective devices have been adjusted and set in accordance with the approved protective device study.
      b. Final setting values for each adjustable trip device.

AD6-SP04
See Last Page of this Spec.

1.4 REFERENCES

A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   1. IEEE 141 – Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems
   2. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
   3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis
   4. IEEE 241 – Recommended Practice for Electric Power Systems in Commercial Buildings
   5. IEEE 1015 – Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.
   6. IEEE 1584 - Guide for Performing Arc-Flash Hazard Calculations

B. American National Standards Institute (ANSI):
   1. ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
   2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures

C. The National Fire Protection Association (NFPA)
   1. NFPA 70 - National Electrical Code, latest edition
   2. NFPA 70E – Standard for Electrical Safety in the Workplace

1.5 QUALIFICATIONS

A. The protective device study shall be prepared by qualified engineers of the switchgear manufacturer or an approved consultant. The Contractor is responsible for providing all pertinent information required by the preparers to complete the study. Submit engineer's qualifications with study.

1.6 REQUIREMENTS

A. The complete study shall include a system one line diagram, short circuit and ground fault analysis, and protective coordination plots.

B. One Line Diagram:
   1. Show on a single line diagram, all electrical equipment and wiring to be protected by the overcurrent devices installed under this project. Clearly show, on the one line, the schematic wiring of the electrical distribution system.
   2. Also show on the one line diagram the following specific information:
      a. Calculated fault impedance, X/R ratios, and short circuit values at each bus.
      b. Breaker and fuse ratings.
      c. Generator kW and Transformer kVA and voltage ratings, percent impedance, X/R ratios, and wiring connections.
      d. Voltage at each bus.
      e. Identification of each bus.
      f. Conduit material, feeder sizes, length, and X/R ratios.

C. Short Circuit Study:
   1. Systematically calculate the fault impedance to determine the available short circuit and ground fault currents at each bus. Incorporate the motor contribution in determining the momentary and interrupting ratings of the protective devices.
   2. The study shall be calculated by means of a computer program. Pertinent data and the rationale employed in developing the calculations shall be incorporated in the introductory remarks of the study.
   3. Present the data determined by the short circuit study in a table format. Include the following:
      a. Device identification.
      b. Operating voltage.
      c. Protective device.
      d. Device rating.

D. Calculated short circuit current.

E. Coordination Curves:
   1. Prepare the coordination curves to determine the required settings of protective devices to assure selective coordination. Graphically illustrate on log paper that adequate time separation exists between series devices, including the utility company upstream device. Plot the specific time current characteristics of each protective device in such a manner that all upstream devices will be clearly depicted on one sheet.
   2. The following specific information shall also be shown on the coordination curves:
      a. Device identification.
      b. Voltage and current ratio for curves.
      c. 3-phase and 1-phase ANSI damage points for each transformer.
      d. No damage, melting, and clearing curves for fuses.
      e. Cable damage curves.
      f. Transformer inrush points.
      g. Maximum short circuit cutoff point.
   3. Develop a table to summarize the settings selected for the protective devices. Include the following in the table:
      a. Device identification.
      b. Relay CT ratios, tap, time dial, and instantaneous pickup.
      c. Circuit breaker sensor rating, long time, short time, and instantaneous settings, and time bands.
      d. Fuse rating and type.
      e. Ground fault pickup and time delay.

1.7 ANALYSIS

A. Analyze the short circuit calculations, and highlight any equipment that is determined to be underrated as specified. Propose approaches to effectively protect the underrated equipment.

B. After developing the coordination curves, highlight areas lacking coordination. Present a technical evaluation with a discussion of the logical compromises for best coordination.

1.8 ADJUSTMENTS, SETTINGS AND MODIFICATIONS

A. Necessary final field adjustments, settings and modifications shall be made by the contractor to conform with the protective device study without additional cost to the Owner.

B. All final circuit breaker and relay settings and fuse sizes shall be made by the manufacturer and contractor in accordance with the recommendations of the protective device study.

PART 2 - PRODUCTS

2.1 STUDIES

A. Contractor to furnish short-circuit and protective device coordination studies as prepared by equipment manufacturer or an approved consultant.

B. The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E - Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D.

2.2 DATA COLLECTION

A. Contractor shall furnish all data as required by the power system studies. The Engineer performing the short circuit, protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.

B. Contractor shall contact PG&E and verify available fault current delivered to the site and all other utility company information pertaining specific to this project and include in study.

C. Source combination may include present and future motors and generators.

D. Load data utilized shall include proposed loads obtained from contract documents provided by Owner, Contractor, and PG&E.

E. Include fault contribution of existing motors in the study, with motors greater than 5 hp. The Contractor shall obtain required equipment data, to satisfy the study requirements.

2.3 SHORT-CIRCUIT AND PROTECTIVE DEVICE EVAULATION STUDY

A. Use actual conductor impedances if known. If unknown, use typical conductor impedances based on IEEE Standards 141-1993.

B. Transformer design impedances shall be used when test impedances are not available.

C. Provide the following:

1. Calculation methods and assumptions
2. Selected base per unit quantities
3. One-line diagram of the system being evaluated
4. Source impedance data, including electric utility system and motor fault contribution characteristics
5. Typical calculations
6. Tabulations of calculated quantities
7. Results, conclusions, and recommendations.

D. Calculate short-circuit momentary and interrupting duties for a three phase bolted fault at each:
1. Electric utility's supply termination point.
2. Incoming switchgear.
3. Unit substation primary and secondary terminals.
4. Low voltage switchgear.
5. Motor control centers.
6. Standby generators and automatic transfer switches.
7. Branch circuit panelboards.
8. Other significant locations throughout the system.

E. For grounded systems, provide a bolted line to ground fault current study for areas as defined for the three phase bolted fault short circuit study.

F. Protective Device Evaluation:
1. Evaluate equipment and protective devices and compare to short circuit ratings
2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short circuit stresses
3. Adequacy of transformer windings to withstand short circuit stresses
4. Cable and busway sizes for ability to withstand short circuit heating
5. Notify Owner in writing, of existing, circuit protective devices improperly rated for the calculated available fault current.

2.4 PROTECTIVE DEVICE COORDINATION STUDY

A. Proposed protective device coordination time-current curves shall be graphically displayed on log-log scale paper.

B. Include on each curve sheet a complete title and one-line diagram with legend identifying the specific portion of the system covered.

C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which device is exposed.

D. Identify device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.

E. Plot the following characteristics on the curve sheets, where applicable:
1. Electric utility's protective device.
2. Medium voltage equipment relays.

3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
4. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands.
5. Transformer full-load current, magnetizing inrush current, and ANSI transformer withstand parameters.
6. Conductor damage curves.
7. Ground fault protective devices, as applicable.
8. Pertinent motor starting characteristics and motor damage points.
9. Pertinent generator short-circuit decrement curve and generator damage point.
10. Other system load protective devices for the largest branch circuit and the largest feeder circuit breaker in each motor control center.

F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

2.5 ARC FLASH HAZARD ANALYSIS

A. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E, Annex D.

B. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short circuit and coordination study model. Alternative methods shall be presented in the proposal.

C. The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and splitters) where work could be performed on energized parts.

D. The Arc-Flash Hazard Analysis shall include all equipment and locations as part of this project.

E. Safe working distances shall be specified for calculated fault locations based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm2.

F. The Arc Flash Hazard analysis shall include calculations for maximum and minimum contributions of fault current magnitude. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume a minimum motor load. Conversely, the maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.

G. Arc flash computation shall include both line and load side of main breaker calculations, where necessary.

H. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2002 section B.1.2.

2.6 REPORT SECTIONS

A. Input Data:
1. Short-circuit reactance of rotating machines
2. Cable and conduit materials
3. Bus ducts
4. Transformers
5. Reactors
6. Aerial lines
7. Circuit resistance and reactive values.

B. Short-Circuit Data:
1. Source fault impedance and generator contributions
2. X to R ratios
3. Asymmetry factors
4. Motor contributions
5. Short circuit kVA
6. Symmetrical and asymmetrical fault currents.

C. Recommended Protective Device Settings:
1. Phase and Ground Relays:
   a. Current transformer ratio
   b. Current setting
   c. Time setting
   d. Instantaneous setting
   e. Specialty non-overcurrent device settings
   f. Recommendations on improved relaying systems, if applicable.
2. Circuit Breakers:
   a. Adjustable pickups and time delays (long time, short time, ground)
   b. Adjustable time-current characteristic
   c. Adjustable instantaneous pickup
   d. Recommendations on improved trip systems, if applicable.

D. Incident energy and flash protection boundary calculations
1. Arcing fault magnitude
2. Device clearing time
3. Duration of arc
4. Arc flash boundary
5. Working distance
6. Incident energy
7. Hazard Risk Category
8. Recommendations for arc flash energy reduction

PART 3 - EXECUTION

3.1 EQUIPMENT AND FIELD ADJUSTMENTS

A. Adjust relay and protective device settings according to the recommended settings table provided by the coordination study. Field adjustments to be completed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.

B. Contractor to make all necessary modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies and include all recommendations at no additional cost to owner.

C. Following completion of all studies, acceptance testing and startup by the field engineering service division of the equipment manufacturer, a 2-year warranty shall be provided on all components manufactured by the engineering service parent manufacturing company.

3.2 ARC FLASH WARNING LABELS

A. The Contractor shall provide a 3 1/2" x 5” thermal transfer type label of high adhesion polyester for each work location analyzed, a sample is included in this specification.

B. The label shall have an orange header with the wording, “WARNING, ARC FLASH HAZARD”, and shall include the following information:
1. Location designation
2. Nominal voltage
3. Flash protection boundary
4. Hazard risk category
5. Incident energy
6. Working distance
7. Engineering report number, revision number and issue date.

C. Labels shall be machine printed, with no field markings.

D. Arc flash labels shall be provided in the following manner and all labels shall be based on recommended overcurrent device settings.
1. For each 600, 480 and applicable 208 volt panelboards, one arc flash label shall be provided.
2. For each motor control center, one arc flash label shall be provided.
3. For each low voltage switchboard, one arc flash label shall be provided.
4. For each switchgear, one flash label shall be provided.
5. For medium voltage switches one arc flash label shall be provided

E. Labels shall be field installed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.

3.3 ARC FLASH TRAINING

A. The equipment vendor shall train personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 8 hours). Maintenance procedures in accordance with the requirements of NFPA 70E, Standard For Electrical Safety Requirements For Employee Workplaces, shall be provided in the equipment manuals. The training shall be certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET).

AD6-SP04 Refer to Specification Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION:

1. Refer to Part 1 1.3.A.2: Revise paragraph to read:

   Protective equipment submittals and shop drawings may be submitted at the same time or prior to completion of the overcurrent protective device study. If equipment submittals / shop drawings are submitted prior to completion of overcurrent protective device study for the benefit of schedule acceleration, Contractor shall provide written acknowledgement that device ratings provided in equipment shop drawings are contingent upon finalization of protective device study. Such acknowledgement will allow for equipment procurement concurrent with protective device study, but does not otherwise absolve the Contractor from providing equipment that complies with the requirement of the overcurrent protective device study.

END OF SECTION

SECTION 26 08 10 - ELECTRICAL ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
1. Testing, evaluation and calibration of equipment provided, installed and connected in Division 26.
2. Evaluation of connection and normal operation of utilization equipment, provided in other Divisions, for installation and connection in Division 26.

1.3 REFERENCES

A. Acceptance Testing Criteria: Latest edition of Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, published by IETA.

B. Applicable Codes, Standards and References:
1. National Electrical Code (NEC).
2. National Electrical Manufacturer's Association (NEMA).
3. American Society for Testing and Materials (ASTM).
4. Institute of Electrical and Electronic Engineers (IEEE).
5. International Electrical Testing Association (IETA).
6. American National Standards Institute (ANSI).
7. State and local codes and ordinances.
8. Insulated Power Cable Engineers Association (IPCEA).
9. Association of Edison Illuminating Companies (AEIC).
10. OSHA Part 1910; Subpart S, 1910.308.
11. National Fire Protection Association (NFPA).

1.4 SYSTEM DESCRIPTION

A. Performance Requirements:
1. Retain the services of a recognized independent testing firm for the purpose of performing inspections and tests as specified herein.
2. Independent test firm providing report direct to Architect.
3. All material, equipment, labor and technical supervision to perform tests and inspections provided by testing firm.

4. It is the intent of these tests to assure that all electrical equipment, Contractor or Owner supplied, is operational within industry and manufacturer's tolerances and is installed in accordance with design Specifications.
5. Tests and inspections determine suitability for energization.
6. Supply to the independent testing organization complete sets of approved shop drawings, coordination study (provided by Contractor's equipment supplier under Contractor's direction, setting of all adjustable devices and other information requested by testing agency).

B. Scope of Testing, Evaluation and Calibration:
1. Power transformers.
2. Distribution transformers.
3. Low voltage circuit breakers.
4. Switchboards.
5. Ground fault protective signaling.
6. Protective relays and associated instrument transformers.
7. Grounding systems.

1.5 SUBMITTALS

A. Test Reports:
1. Maintain written record of all tests.
2. At completion of project, assemble and certify a final test report. Submit report to Architect prior to final acceptance to include:
   a. Summary of project.
   b. Description of equipment tested.
   c. Visual inspection report.
   d. Description of tests.
   e. Test results.
   f. Conclusions and recommendations.

1.6 QUALITY ASSURANCE

A. Qualifications of Testing Firm:
1. Corporately independent testing organization which can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers and installers of equipment or systems evaluated by testing firms.
2. Independent organization as defined by OSHA Title 29, Part 1936 and IETA.
3. Regularly engaged in the testing of electrical materials, devices, appliances, electrical installations and systems for the purpose of preventing injury to persons or damage to property and other equipment.
4. Engaged in testing practices for minimum of 2 years.
5. Use only full-time technicians, regularly employed by firm for testing services. Electrically unskilled employees are not permitted to perform testing or assistance of any kind. Electricians and line workers may assist, but may not perform testing or inspection services.
6. Submit proof of above qualifications with Bid Documents.

B. Certifications:

1. Comply with OSHA criteria for accreditation of testing laboratories, Title 29, Parts 1907, 1910 and 1936. Full membership in the IETA constitutes proof of such criteria.
2. Lead, on site, technical person currently certified by IETA in Electrical Power Distribution System Testing.
3. All instruments used by testing firm to evaluate electrical performance meet IETA Specifications for Test Instruments.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Tests:
1. Contractor's Responsibilities:
   a. Perform routine insulation resistance, continuity and rotation tests for all distribution and utilization equipment prior to and in addition to tests performed by testing firm.
   b. Notify the testing firm when equipment becomes available for acceptance tests. Coordinate work to expedite project scheduling.
2. Testing Firm's Responsibilities:
   a. Notify Architect prior to commencement of any testing.
   b. Report directly to Architect any systems, material or installation found defective on the basis of acceptance tests.
   c. Provide auxiliary portable power supply necessary for conducting tests.

3.2 ADJUSTING

A. Final Settings: Testing firm responsible for implementing all final settings and adjustments on protective devices and tap changes in accordance with specified values.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 09 00 - CONTROLS AND INSTRUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Control devices, shown on the drawings and/or required by other sections, to assure a complete and operating system.
   2. Furnish submittals/shop drawings for all equipment in this section as described in Section 26 05 00, 1.4, COMMON WORK RESULTS FOR ELECTRICAL.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Terminal and Control Cabinets shall be manufactured from code gauge galvanized steel with hinged locking covers finished in grey or hammer tone enamel. Knockouts, barriers and plywood backing shall be provided where required. Cabinets shall be of raintight construction where exposed to the weather. Approved manufacturers are Circle AW, Wireguard, Benner-Nawman, or equal.

B. Photocontrols and time switches shall be provided as indicated on the drawings. Approved manufacturer is nLight or equal. Where indicated on the fixture schedule, photocells in outdoor fixtures shall be factory installed and wired.

C. Lighting Contactors shall be of the correct number of poles with suitable contact ampere ratings. Provide fusing protection for all lighting contactor control circuits. Verify all coil voltages prior to installation. Approved manufacturers are Eaton, Square "D" or equal.

D. Motor Controls shall be magnetic with motor overload thermal relays. Individual thermal elements sized to the correct motor full load amps shall be used. Provide correct NEMA rated enclosure. Select proper voltage, class, size and horsepower rating. Select the correct coil voltage if magnetic.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Power to all irrigation controllers shall be provided by the Electrical Contractor as required for the irrigation equipment. Also provide and install conduit sweeps as required to house low voltage wiring between controller and exterior below grade.

B. General Purpose Control Contactors shall be rated for the use with the correct ampere rating, voltage, size and horse power rating. Select the correct control coil voltage.

END OF SECTION

SECTION 26 09 23 - OCCUPANCY SENSORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Work:
1. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
2. Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
3. Section 26 05 19, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
4. Section 26 27 26, WIRING DEVICES.
5. Section 26 56 70, LIGHTING ACCEPTANCE TESTING.
6. Section 26 09 43, NETWORK LIGHTING CONTROLS

1.2 SYSTEM DESCRIPTION

A. The occupancy sensors shall sense the presence of human activity within the desired space and enable or disable the on/off manual lighting control function provided by local switches.

B. Upon detection of human activity by the detector, initiate a time delay to maintain the lights on for a preset period of time. Field adjustable time delay setting from 30 seconds to 15 minutes.

C. Sensors shall have factory set PIR sensing sensitivity for maximum sensitivity. Provide time delay at 10 minutes.

D. Install system in accordance with manufacturer's recommendations and instructions.

E. All line voltage sensors, control units, and relays UL listed

1.3 SUBMITTALS

A. Provide, on reproducible architectural floor plan specific to this project, a layout of sensors indicating their sensing distribution.

B. Provide wiring diagrams indicating low voltage and line voltage wiring requirements.

PART 2 - PRODUCTS

2.1 PASSIVE INFRARED SENSORS - GENERAL

A. The passive infrared sensors shall detect presence, in the floor area being controlled, by detecting changes in the Infrared energy. Detect small movements, i.e., when a person is writing while seated at a desk.

B. Provide a temperature compensated dual element sensor and a multi element fresnel lens.

C. The sensor shall utilize DIP switch adjustments for "on" mode operation, time delay, and sensitivity.

D. Provide a daylight filter which ensures that the sensor is insensitive to short-wavelength infrared waves, i.e., those emitted by the sun.

E. The sensors not to protrude more than 1 1/2" from the wall or ceiling and should blend in aesthetically.

F. Conceal adjustments and mounting hardware under a removable cover to prevent tampering with adjustments and hardware.

G. Low Voltage Sensors:
1. Sensor shall provide complete coverage of the controlled area.
2. Sensors shall operate on 24VDC power.
3. Sensors shall operate remote power switch packs.
4. Sensors can be wired in parallel to allow coverage of large areas.
5. Sensors shall be provided with auxiliary relays.
6. Manufacturer: nLight.

H. Wall Switch Sensors:
1. 300 sq. ft. area coverage, with a field of view of 180 degrees.
2. Completely self-contained sensor system that fits into a standard single gang box. Internal transformer power supply, a latching dry contact relay switching mechanism compatible with electronic ballasts, compact fluorescent, and inductive loads. Triac and other harmonic generating devices are not allowed.
3. Rated to switch loads as indicated on drawings.
4. Provide adjustable daylight feature that holds lighting "off" when a desired footcandle level is present.
5. Provide integral off override switch with no leakage current to the load or ground.
6. Provide hard 1mm poly IR2 lens, soft lens is not acceptable.
7. Manufacturer: Nlight.

2.2 DUAL TECHNOLOGY SENSORS

A. Utilize same technologies as passive infrared and ultrasonic.

B. Upon a person entering a space, motion from both technologies must be sensed before lighting will be turned on. After this has occurred, detection by either technology will hold lighting on for the set time period. Sensor shall have a retrigger time delay where only one motion is necessary to turn on the lights within 5 seconds after turning off.

C. Manufacturer: nLight.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install occupancy sensors as directed by manufacturer's instructions. Complete all electrical connections to all control circuits, occupancy sensors, power supply pack and low voltage wiring.

B. Verify with manufacturer's representative that the sensors are laid out in compliance to manufacturers published sensing distribution. Provide additional sensors for complete coverage of the space being sensed.

3.2 QUALITY CONTROL

A. Use manufacturer's published testing and adjusting procedures to adjust sensors time delay, daylight sensitivity, and passive infrared sensitivity to satisfaction of the Owner.

B. Verify each sensor setting for each type of room with owner, field adjust each as required at end of job.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 09 43 – NETWORK LIGHTING CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. The lighting control system specified in this section shall provide time-based, sensor-based (both occupancy and daylight), and manual lighting control.

B. The system shall be capable of turning lighting loads on/off as well as dimming lights.

C. All system devices shall be networked together enabling digital communication and shall be individually addressable.

D. The system architecture shall be capable of enabling stand-alone groups (rooms) of devices to function in some default capacity even if network connectivity to the greater system is lost.

E. The system architecture shall facilitate remote operation via a computer connection.

F. The system shall not require any centrally hardwired switching equipment.

1.2 SUBMITTALS

A. Product Datasheets (general device descriptions, dimensions, wiring details, nomenclature)

B. Manufacturers complete detailed shop drawings specific to this project.

C. Other Diagrams – as needed for installation, special operation or interaction with other system(s)

D. Example Contractor Startup/Commissioning Worksheet – must be completed prior to factory start-up

E. Hardware and Software Operation Manuals

F. Other operational descriptions as needed

1.3 QUALITY ASSURANCE

A. All steps in sensor manufacturing process shall occur in the USA; including population of all electronic components on circuit boards, soldering, programming, wiring, and housing.

B. All components and the manufacturing facility where product was manufactured must be ROHS compliant.

C. In high humidity or cold environments, the sensors shall be conformably coated and rated for condensing humidity and -40 degree Fahrenheit (and Celsius) operation.

D. All applicable products must be UL / CUL Listed or other acceptable national testing organization.

1.4 COORDINATION

A. Coordinate lighting control components to form an integrated interconnection of compatible components.

B. Coordinate lighting controls with BAS either through IP based, intercommunication of system or hardwired auxiliary relay outputs.

C. The installing contractor shall be responsible for a complete and functional system in accordance with all applicable local and national codes.

1.5 WARRANTY

A. All devices in lighting control system shall have a 5 year warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. This specification is based on the nLight Network Control System from Sensor Switch.

2.2 SYSTEM REQUIREMENTS

A. System shall have an architecture that is based upon three main concepts; 1) intelligent lighting control devices 2) standalone lighting control zones 3) network backbone for remote or time based operation.

B. Intelligent lighting control devices shall consist of one or more basic lighting control components; occupancy sensors, photocell sensors, relays, dimming outputs, manual switch stations, and manual dimming stations. Combining one or more of these components into a single device enclosure should be permissible so as to minimize overall device count of system.

C. System must interface directly with intelligent LED luminaires such that only CAT-5/6 cabling is required to interconnect luminaires with control components such as sensors and switches. See applicable specification sections.

D. Intelligent lighting control devices shall communicate digitally, require ~3 mA of current to function (Graphic WallPod excluded), and possesses at least two RJ-45 connectors.

E. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher level network backbone.

F. Devices within a lighting control zone shall be connected with CAT-5 low voltage cabling in any order.

G. Lighting control zone shall be capable of automatically configuring itself for default operation without any start-up labor required.

H. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.

I. Power for devices within a lighting control zone shall come from either resident devices already present for switching (relay device) or dimming purposes, or from the network backbone. Standalone “bus power supplies” shall not be required in all cases.

J. All switching and dimming for a specific lighting zone shall take place within the devices located in the zone itself (i.e. not in a remotely located devices such as panels) to facilitate system robustness and minimize wiring requirements. Specific applications that require centralized or remote switching shall be capable of being accommodated.

K. System shall have one or more primary wall mounted network control “gateway” devices that are capable of accessing and controlling connected system devices and linking into an Ethernet LAN.

L. System shall use “bridge” devices that route communication and distribute power for up to 8 directly connected lighting zones together for purposes of decreasing system wiring requirements.

M. System shall have a web-based software management program that enables remote system control, status monitoring, and creation of lighting control profiles.

N. Individual lighting zones shall be capable of being segmented into several channels of occupancy, photocell, and switch functionality for more advanced configurations and sequences of operation.

O. System shall be capable of operating a lighting control zone according to several sequences of operation. System shall be able to change a spaces sequence of operation according to a time schedule so as to enable customized time-of-day, day-of-week utilization of a space. Note operating modes should be utilized only in manners consistent with local energy codes.
   1. Auto-On / Auto-Off (via occupancy sensors):
      a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
      b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
      c. Pressing a switch will turn lights off. The lights will remain off regardless of occupancy until switch is pressed again, restoring the sensor to Automatic On functionality.

2. Manual-On / Auto-Off (also called Semi-Automatic)
   a. Pushing a switch will turn lights on.
   b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
3. Manual-On to Auto-On/Auto-Off
   a. Pushing a switch will turn lights on.
   b. After initial lights on, zones with occupancy and/or photocell sensors turn lights on/off according to occupancy/vacancy and/or daylight conditions.
   c. Sequence can be reset via scheduled (ex. daily each morning) events.
4. Auto-to-Override On
   a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
   b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.
   c. Sequence can be reset via scheduled (ex. daily each morning) events
5. Manual-to-Override On
   a. Pushing a switch will turn lights on.
   b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.
   c. Sequence can be reset via scheduled (ex. daily each morning) events
6. Auto On / Predictive Off
   a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
   b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
   c. If switch is pressed, lights turn off and a short “exit timer” begins. After timer expires, sensor scans the room to detect whether occupant is still present. If no occupancy is detected, zone returns to auto-on. If occupancy is detected, lights must be turned on via the switch.
7. Multi-Level Operation (multiple lighting levels per manual button press)
   a. Operating mode designed specifically for bi-level applications
   b. Enables the user to cycle through the up to four potential on/off lighting states using only a single button.
   c. Eliminates user confusion as to which of two buttons controls which load
   d. Three different transition sequences are available in order to comply with energy codes or user preference)
   e. Mode available as a setting on all nLight devices that have single manual switch (ex. nWSD, nPODM, nPODM-DX).

f. Depending on the sequence selected, every button push steps through relays states according to below table:

Sequence	Altern. Seq		Full On Seq.		3 Step On Seq.	
State #	Relay 1	Relay 2	Relay 1	Relay 2	Relay 1	Relay 2
1	On	Off	On	Off	On	Off
2	Off	On	-	-	Off	On
3	-	-	On	On	On	On
4*	Off	Off	Off	Off	Off	Off

(*step only present for devices without separate off button)

P. Task bar style desktop application shall be available for personal lighting control.

Q. An application that runs on “smart” handheld devices (such as an Apple® IPhone®) shall be available for personal lighting control.

R. Control software shall enable logging of system performance data and presenting useful information in a web-based graphical format and downloadable to .CSV files.

S. Control software shall enable integration with a BMS via BACnet IP.

T. System shall provide the option of having pre-terminated plenum rated CAT-5 cabling supplied with hardware.

2.3 INDIVIDUAL DEVICE SPECIFICATIONS

A. Control Module (Gateway)
1. Module shall be a wall mounted user accessible device that is capable of communicating and controlling downstream system control devices and linking into an Ethernet.
2. Devices shall be powered by low voltage, fit within a two gang switch box (or mounting ring), and have a backlit LCD panel.
3. User control shall be made available via finger-touch buttons with no moving parts. Buttons shall be capable of being locked for security.
4. Device shall have three RJ-45 ports for connection to other backbone devices (bridges) or directly to a lighting control zones devices.
5. Device shall automatically detect all devices downstream of it.
6. Device shall have a standard and astronomical internal time clock.
7. Device shall have one RJ-45 10/100 BaseT Ethernet connection.
8. Each control gateway device shall be capable of linking 400 devices to the management software.
9. Device shall be capable of using a dedicated or DHCP assigned IP address.
10. Network Control Gateway device shall be the following Sensor Switch model number: nGWY.

B. Networked System Occupancy Sensors
1. Occupancy sensors system shall sense the presence of human activity within the desired space and fully control the on/off function of the lights.

2. Sensors shall utilize passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state; thus preventing false on conditions. Ultrasonic or Microwave based sensing technologies shall not be accepted.
3. For applications where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions), a sensor with an additional "dual" technology shall be used.
4. Dual technology sensors shall have one of its two technologies not require motion to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT) which both looks for occupant motion and listens for sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) shall not be acceptable.
5. All sensing technologies shall be acoustically passive meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonics technology. Ultrasonic or Microwave based sensing technologies shall not be accepted.
6. Sensors shall be available with zero, one, or two integrated Class 1 switching relays, and up to one 0-10 VDC dimming output. Sensors shall be capable of switching 120 / 277 / 347 VAC. Load ratings shall be 800 W @ 120 VAC, 1200 W @ 277 VAC, 1500 W @ 347 VAC, and ¼ HP motor. Relays shall be dry contacts.
7. Sensors shall be available with one or two occupancy "poles", each of which provides a programmable time delay.
8. Sensors shall be available in multiple lens options which are customized for specific applications.
9. Communication and Class 2 low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.
10. All sensors shall have two RJ-45 ports.
11. All sensors shall have the ability to detect when it is not receiving valid communication (via CAT-5 connections) and blink its LED in a pattern to visually indicate of a potential wiring issue
12. Every sensor parameter shall be available and configurable remotely from the software and locally via the device push-button.
13. Sensors shall be able to function together with other sensors in order to provide expanded coverage areas by simply daisy-chain wiring together the units with CAT-5 cabling.
14. Sensors shall be equipped with an automatic override for 100 hour burn-in of lamps. This feature must be available at any time for lamp replacements.
15. Wall switch sensors shall recess into single-gang switch box and fit a standard GFI opening.
16. Wall switch sensors must meet NEC grounding requirements by providing a dedicated ground connection and grounding to mounting strap. Line and load wire connections shall be interchangeable. Sensor shall not allow current to pass to the load when sensor is in the unoccupied (Off) condition.
17. Wall switch sensors shall have optional features for photocell/daylight override, vandal resistant lens, and low temperature/high humidity operation.
18. Wall switch sensors shall match wiring device color.
19. Wall switch sensors shall be the following Sensor Switch model numbers, with device color and optional features as specified:
    a. nWSD (PIR, 1 Relay)

b. nWSD PDT (Dual Technology, 1 Relay)
c. nWSD 2P (PIR, 2 Relays)
d. nWSD PDT 2P (Dual Technology, 2 Relays)
e. nWSD NL (PIR w/ Night Light, 1 Relay)
f. nWSD PDT NL (Dual Technology w/ Night Light, 1 Relay)
g. nWSD LV (PIR, No Relay)
h. nWSD PDT LV (Dual Technology w/ Night Light, No Relay)

20. Network system shall also have ceiling, fixture, recessed, & corner mounted sensors available.
21. Sensors shall have optional features for photocell/daylight override, dimming control, and low temperature/high humidity operation, all sensors shall be provided with auxiliary relay.
22. Sensors with dimming can control 0 to 10 VDC dimmable ballasts by sinking up to 20 mA of Class 2 current (typically 40 or more ballasts).
23. Sensors shall be the following Sensor Switch model numbers, with device options as specified:

Model # Series	Occup. Poles	# of Relays	Lens Type	Det. Tech.
nCM(B) 9 R	1	-	Standard	PIR
nCM(B) 9 2P R	2	-	Standard	PIR
nCMR(B) 9 R	1	1	Standard	PIR
nCMR(B) 9 2P R	2	2	Standard	PIR
nCM(B) PDT 9 R	1	-	Standard	Dual
nCM(B) PDT 9 2P R	2	-	Standard	Dual
nCMR(B) PDT 9 R	1	1	Standard	Dual
nCMR(B) PDT 9 2P R	2	2	Standard	Dual
nCM(B) 10 R	1	-	Extended	PIR
nCM(B) 10 2P R	2	-	Extended	PIR
nCMR(B) 10 R	1	1	Extended	PIR
nCMR(B) 10 2P R	2	2	Extended	PIR
nCM(B) PDT 10 R	1	-	Extended	Dual
nCM(B) PDT 10 2P R	2	-	Extended	Dual
nCMR(B) PDT 10 R	1	1	Extended	Dual
nCMR(B) PDT 10 2P R	2	2	Extended	Dual
nWV 16 R	1	-	Wide View	PIR
nWV PDT 16 R	1	-	Wide View	Dual
nHW13 R	1	-	Hallway	PIR
nCM(B) 6 R	1	-	High Bay	PIR
nCMR(B) 6 R	1	1	High Bay	PIR
nCMR(B) 6 2P R	2	2	High Bay	PIR
nCMR(B) 6 480 R	1	2	High Bay	PIR

Note: Recessed mount versions of the above ceiling (fixture) mount versions also shall be available (e.g. nCMR(B) 9 => nRMR 9)

C. Networked System Daylight (Photocell and or Dimming) Sensors
1. Photocell shall provide for an on/off set-point, and a deadband to prevent the artificial light from cycling. Delay shall be incorporated into the photocell to prevent rapid response to passing clouds.

2. Photocell and dimming sensor's set-point and deadband shall be automatically calibrated through the sensor's microprocessor by initiating an "Automatic Set-point Programming" procedure. Min and max dim settings as well as set-point may be manually entered.
3. Deadband setting shall be verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
4. Dimming sensors shall control 0 to 10 VDC dimmable ballasts by sinking up to 20 mA of class 2 current (typically 40 or more ballasts).
5. Photocell and dimming sensors shall be equipped with an automatic override for 100 hour burn-in of lamps. This feature must be available at any time for lamp replacements. (Note: This function should be performed prior to any dimming of the lamps including the "auto set-point" setting.)
6. Combination units that have all features of on/off photocell and dimming sensors shall also be available.
7. A dual zone option shall be available for On/Off Photocell, Automatic Dimming Control Photocell, or Combination units. The second zone shall be capable of being controlled as an "offset" from the primary zone.
8. Line voltage versions of the above described photocell and combination photocell/dimming sensors shall be capable of switching both 120 VAC, 277 VAC, and 347 VAC. Load ratings shall be 800 W @ 120 VAC, 1200 W @ 277 VAC, 1500 W @ 347 VAC, and ¼ HP motor load. Relays shall be dry contacts.
9. Sensor shall be the following Sensor Switch model numbers, with device options as specified:
   a. nCM(B) PC (on/off)
   b. nCM(B) ADC (dimming)
   c. nCM(B) PC ADC (on/off, 0-10 VDC dimming)
   d. nCMR(B) PC (on/off, single relay)
   e. nCMR(B) PC ADC (on/off, 0-10 VDC dimming, single relay)

   Note: Recessed mount versions of the above ceiling (fixture) mount versions also shall be available (e.g. nCMR(B) PC => nRMR PC)

D. Networked System Power (Relay) Packs
1. Power Pack shall incorporate one or more Class 1 relays and contribute low voltage power to the rest of the system. Secondary Packs shall incorporate the relay(s), shall have an optional 2nd relay, 0-10 VDC dimming output, or line voltage dimming output, but shall not be required to contribute system power. Power Supplies shall provide system power only, but are not required to switch line voltage circuit. Auxiliary Relay Packs shall switch low voltage circuits only.
2. Power Packs shall accept 120 or 277 VAC (or optionally 347 VAC), be plenum rated, and provide Class 2 power to the system.
3. All devices shall have two RJ-45 ports.
4. Every Power Pack parameter shall be available and configurable remotely from the software and locally via the device push-button.
5. Power Pack shall securely mount to junction location through a threaded ½ inch chase nipple. Plastic clips into junction box shall not be accepted. All Class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically

meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.

6. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All Class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.
7. Power (Secondary) Packs shall be available that provide up to 16 Amp switching of all load types, and be rated for 400,000 cycles.
8. Specific Secondary Packs shall be available that provide up to 5 Amps of switching as well as 0-10 VDC dimming of fluorescent ballasts.
9. Specific Secondary Packs shall be available that provide up to 5 Amps of switching and can dim 120 VAC incandescent lighting loads or 120/277 VAC line voltage dimmable fluorescent ballasts (2-wire and 3-wire versions).
10. Specific Secondary Packs shall be available that provide up to 5 Amps of switching of dual phase (208/240/480 VAC) lighting loads.
11. Specific Secondary Packs shall be available that require a manual switch signal (via a networked Wall Station) in order to close its relay.
12. Specific Secondary Packs shall be available that are UL924 listed for switching of Emergency Power circuits.
13. Power (Relay) Packs and Supplies shall be the following Sensor Switch model numbers:
    a. nPP16 (Power Pack w/ 16A relay)
    b. nSP16 (Secondary Pack w/ 16A relay)
    c. nSP16 SA (Secondary Pack w/ 16A relay, Manual On)
    d. nSP5 2P (Secondary Pack w/ two 5A relays)
    e. nSP5 D (Secondary Pack w/ 5A relay and 0-10VDC dimming output)
    f. nSP5 D ER (UL924 Listed Secondary Pack w/ 5A relay and 0-10VDC dimming output for switching emergency power circuits)
    g. nSP5 PCD 2W (Secondary Pack w/ 5A relay and incandescent dimming or 2-wire line voltage fluorescent dimming output)
    h. nSP5 PCD 3W (Secondary Pack w/ 5A relay and 3-wire line voltage fluorescent dimming output)
    i. nSP5 480 (Secondary Pack w/ 5A relay for switching 208/240/480 VAC loads
    j. nPS 80 (Power Supply)
    k. nAR 40 (Low voltage auxiliary relay pack)

E. Networked System Relay & Dimming Panels
1. Panel shall incorporate up to 4 normally closed latching relays capable of switching 120/277 VAC or up to 2 Dual Phase relays capable of switching 208/240/480 VAC loads.
2. Relays shall be rated to switch up to a 30A ballast load at 277 VAC.
3. Panel shall provide one 0-10VDC dimming output paired with each relay.
4. Panel shall power itself from an integrated 120/277 VAC supply.
5. Panel shall be capable of operating as either two networked devices or as one.
6. Panel shall supply current limited low voltage power to other networked devices connected via CAT-5.
7. Panel shall provide auxiliary low voltage device power connected wired directly to a dedicated terminal connection
8. Power (Relay) Packs and Supplies shall be the following Sensor Switch model numbers:
    a. nPANEL 4 (Panel w/ four 120/277 VAC relays and four 0-10 VDC dimming outputs)

b. nPANEL 2 480 (Panel w/ two dual phase relays (208/240/480 VAC) and two 0-10 VDC dimming outputs).

F. Networked Auxiliary Input / Output Devices
1. Devices shall be plenum rated and be inline wired, screw mountable, or have an extended chase nipple for mounting to a ½" knockout.
2. Devices shall have two RJ-45 ports
3. Communication and low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.
4. Devices shall have a dimming control output that can control 0 to 10 VDC dimmable ballasts or LED drivers by sinking up to 20 mA of current (typically 40 or more ballasts).
5. Devices shall have an input that read a 0 to 10 VDC signal from an external device.
6. Device shall have a switch input that can interface with either a maintained or momentary switch and run a switch event, or run a local/remote control profile
7. A specific I/O device shall sense state of low voltage outdoor photocells
8. Auxiliary Input/Output Devices shall be the following Sensor Switch model numbers:
   a. nIO (I/O device with dimming or contact closure input and 0-10VDC dimmng output)
   b. nIO KO (1/2 knockout mountable, I/O device with dimming or contact closure input and 0-10VDC dimmng output)
   c. nIO NLI (Input device for detecting state of low voltage outdoor photocell; sold in nIO PC KIT only)

G. Networked LED Luminaires
1. LED luminaire shall have a mechanically integrated control device.
2. LED luminaire shall have two RJ-45 ports
3. LED luminaire shall be able to digitally network directly to other network control devices (sensors, photocells, switches, dimmers)
4. LED luminaire shall provide low voltage power to other networked control devices
5. System shall be able to turn on/off LED luminaire without using a relay
6. System shall be able to maintain constant lumen output over the specified life of the LED luminarie (also called lumen compensation) by varying the input control power (and thus saving up to 20% power usage).
7. System shall indicate (via a blink warning) when the LED luminaire has reached its expected life (in hrs).
8. LED Luminaires shall be the following Lithonia model families:
   a. RTLED
   b. TLED
   c. VLED
   d. ACLED

H. Networked System Wall Switches & Dimmers
1. Devices shall recess into single-gang switch box and fit a standard GFI opening.
2. Devices shall be available with zero or one integrated Class 1 switching relay.
3. Communication and low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.
4. All sensors shall have two RJ-45 ports.
5. All devices shall provide toggle switch control. Dimming control and low temperature/high humidity operation are available options.
6. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).

7. Devices with dimming control outputs can control 0 to 10 VDC dimmable ballasts by sinking up to 20 mA of current (typically 40 or more ballasts).
8. Devices with capacitive touch buttons shall provide audible user feedback with different sounds for on/off, raise/lower, start-up, and communication offline.
9. Devices with mechanical push-buttons shall provide tactile and LED user feedback.
10. Devices with mechanical push-buttons shall be made available with custom button labeling
11. Devices with a single on button shall be capable of selecting all possible lighting combinations for a bi-level lighting zone such that the user confusion as to which of two buttons (as is present in multi-button scenarios) controls which load is eliminated.
12. Wall switches & dimmers shall be the following Sensor Switch model numbers, with device options as specified:
    a. nPOD (single on/off, capacitive touch, audible user feedback)
    b. nPOD 2P (dual on/off, capacitive touch, audible user feedback)
    c. nPODR (single on/off, one relay, capacitive touch, audible user feedback)
    d. nPODM (single on/off, push-buttons, LED user feedback)
    e. nPODM 2P (dual on/off, push-buttons, LED user feedback)
    f. nPODM DX (single on/off, single dimming raise/lower, push-buttons, LED user feedback)
    g. nPODM 2P DX (dual on/off, dual dimming raise/lower, push-buttons, LED user feedback)
    h. nPODM 4P (quad on/off, push-buttons, LED user feedback)
    i. nPODM 4P DX (quad on/off, quad dimming raise-lower, push-buttons, LED user feedback)

I. Networked System Graphic Wall Station
1. Device shall have a 3.5” full color touch screen for selecting up to 8 programmable lighting control presets or acting as up to 16 on/off/dim control switches.
2. Device shall enable configuration of lighting presets, switched, and dimmers via password protected setup screens.
3. Device shall enable user supplied .jpg screen saver image to be uploaded.
4. Device shall surface mount to single-gang switch box
5. Device shall have a micro-USB style connector for local computer connectivity.
6. Device shall have two RJ-45 ports for communication
7. Device shall be the following Sensor Switch model number:
    a. nPOD GFX

J. Networked System Scene Controllers
1. Device shall have two to four buttons for selecting programmable lighting control profiles or acting as on/off switches.
2. Device shall recess into single-gang switch box and fit a standard GFI opening.
3. Devices shall provide LED user feedback.
4. Communication and Class 2 low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.
5. All sensors shall have two RJ-45 ports.
6. Device shall have four touch sensitive buttons for selecting programmable lighting control scenes/profiles.
7. Device shall be capable of reprogramming other devices in its zone so as to implement user selected lighting scene.

8. Device shall be capable of selecting a lighting profile be run by the system's upstream Gateway so as to implement selected lighting profile across multiple zones (and not just its local zone).
9. Device shall have LEDs indicating current selection.
10. Scene Selector device shall be the following Sensor Switch model number:
    a. nPODS (4 Scene, capacitive touch)
    b. nPODM 2S (2 Scene, push-button)
    c. nPODM 4S (4 Scene, push-button)

K. Communication Bridges
1. Device shall surface mount to a standard 4" x 4" square junction box.
2. Device shall have 8 RJ-45 ports.
3. Device shall be capable of aggregating communication from multiple lighting control zones for purposes of minimizing backbone wiring requirements back to Control Gateway.
4. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply or delivered via a CAT-5 cabled connection.
5. Device shall be careful of redistributing power from its local supply and connect lighting control zones with excess power to lighting control zones with insufficient local power. This architecture also enables loss of power to a particular area to be less impactful on network lighting control system.
6. Communication Bridge devices shall be the following Sensor Switch model numbers:
    a. nBRG 8 (8 Ports)

2.4 LIGHTING CONTROL PROFILES

A. Changes to the operation of the system shall be capable of being made in real-time or scheduled via lighting control profiles. These profiles are outlines of settings that direct how a collection of devices function for a defined time period.

B. Lighting control profiles shall be capable of being created and applied to a single device, zone of devices, or customized group of zones.

C. All relays and dimming outputs shall be capable of being scheduled to track or ignore information regarding occupancy, daylight, and local user switches via lighting control profiles.

D. Every device parameter (e.g. sensor time delay and photocell set-point) shall be configurable via a lighting control profile.

E. All lighting control profiles shall be stored on the network control gateway device and on the software's host server.

F. Lighting control profiles shall be capable of being scheduled to run according to the following calendar options: start date/hour/minute, end date/hour/minute, and sunrise/sunset +/- timed offsets.

G. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.

H. Daylight savings time adjustments shall be capable of being performed automatically, if desired.

I. Lighting control profile schedules shall be capable of being given the following recurrence settings: daily, weekday, weekend, weekly, monthly, and yearly.

J. Software shall provide a graphical tool for easily viewing scheduled lighting control profiles.

2.5 MANAGEMENT SOFTWARE

A. Every device parameter (e.g. sensor time delay and photocell set-point) shall be available and configurable remotely from the software

B. The following status monitoring information shall be made available from the software for all devices for which it is applicable: current occupancy status, current PIR Status, current Microphonics Status, remaining occupancy time delay(s), current photocell reading, current photocell inhibiting state, photocell transitions time remaining, current dim level, device temperature, and device relay state(s).

C. The following device identification information shall be made available from the software: model number, model description, serial number, manufacturing date code, custom label(s), and parent network device.

D. A printable network inventory report shall be available via the software.

E. A printable report detailing all system profiles shall be available via the software.

F. Software shall require all users to login with a User Name and Password.

G. Software shall provide at least three permission levels for users.

H. All sensitive stored information and privileged communication by the software shall be encrypted.

I. All device firmware and system software updates must be available for automatic download and installation via the internet.

J. Software shall be capable of managing systems interconnected via a WAN (wide area network).

2.6 BAS COMPATIBILITY

A. System shall provide a BACnet IP gateway as a downloadable software plug-in to its management software. No additional hardware shall be required.

B. BACnet IP gateway software shall communicate information gathered by networked system to other building management systems.

C. BACnet IP gateway software shall translate and forward lighting relay and other select control commands from BMS system to networked control devices.

2.7 SYSTEM ENERGY ANALYSIS & REPORTING SOFTWARE

A. System shall be capable of reporting lighting system events and performance data back to the management software for display and analysis.

B. Intuitive graphical screens shall be displayed in order to facilitate simple viewing of system energy performance.

C. An “Energy Scorecard” shall be display that shows calculated energy savings in dollars, KWHr, or CO2.

D. Software shall calculate the allocation of energy savings to different control measures (occupancy sensors, photocells, manual switching, etc).

E. Energy savings data shall be calculated for the system as a whole or for individual zones.

F. A time scaled graph showing all relay transitions shall be presented.

G. A time scaled graph showing a zones occupancy time delay shall be presented

H. A time scaled graph showing the total light level shall be presented.

I. User shall be able to customize the baseline run-time hours for a space.

J. User shall be able to customize up to four time-of-day billing rates and schedules.

K. Data shall be made available via a .CSV file

2.8 START-UP & SUPPORT FEATURES

A. To facilitate start-up, all devices daisy-chained together (using CAT-5/6) shall automatically be grouped together into a functional lighting control zone.

B. All lighting control zones shall be able to function according to default settings once adequate power is applied and before any system software is installed.

C. Once software is installed, system shall be able to auto-discover all system devices without requiring any commissioning.

D. All system devices shall be capable of being given user defined names.

E. All devices within the network shall be able to have their firmware reprogrammed remotely and without being physically uninstalled for purposes of upgrading functionality at a later date.

F. All sensor devices shall have the ability to detect improper communication wiring and blink its LED in a specific cadence as to alert installation/startup personnel.

END OF SECTION 26 09 43

SECTION 26 12 00 – MEDIUM VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Padmounted transformers.
   2. Padmounted transformers shall be complete, continuous duty, integral assembly, grounded, tamper-resistant, weatherproof, outdoor type with liquid-immersed transformers.

B. Related Work:
   1. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Short circuit and coordination study.
   3. Section 26 05 13, MEDIUM VOLTAGE CABLES (Above 600 Volts): Medium voltage cables.
   4. Section 26 24 16, PANELBOARDS: Low voltage panelboards.
   5. Section 26 05 46.13, ELECTRIC UTILITY SYSTEMS: Manholes, handholes and duct lines for underground raceway system.
   6. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground currents.

1.3 SUBMITTALS

A. In accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL, submit the following:

B. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   2. Include electrical ratings, nameplate data, impedance, dimensions, weight, mounting details, decibel rating, termination information, temperature rise, no load and full load losses, regulation, overcurrent protection, connection diagrams, and accessories.

C. Manuals:

1. Submit simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering replacement parts.
   a. Identify terminals on wiring diagrams to facilitate installation, maintenance and operation.
   b. Indicate, on wiring diagrams, the internal wiring for each item of equipment and interconnections between the items of equipment.
   c. Approvals will be based on complete submissions of manuals together with shop drawings.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American Concrete Institute (ACI):
   1. 318-02 Building Code Requirements for Structural Concrete.

C. American National Standards Institute (ANSI):
   1. C37.47-00 High Voltage Current-Limiting Type Distribution Class Fuses And Fuse Disconnecting Switches.
   2. C57.12.25-90 Transformers-Pad-Mounted, Compartmental-Type, Self Cooled, Single-Phase Distribution Transformers with Separable Insulated High Voltage Connectors; High Voltage, 34500 Grd Y/19920 Volts and Below; Low-Voltage 240/120 Volts; 167 kVA and Smaller-Requirements.
   3. C57.12.28-96 Pad-Mounted Equipment Enclosure Integrity.
   4. C57.12.29-99 Switchgear and Transformers – Pad-Mounted Equipment – Enclosure Integrity for Coastal Environments.

D. American Society for Testing and Materials (ASTM):
   1. D3487-00Standard Specification for Mineral Insulating Oil Used in Electrical Apparatus.

E. Institute of Electrical and Electronic Engineers (IEEE):
   1. 48-96 Standard Test Procedures and Requirements for Alternating Current Cable Terminations 2.5kV Through 765kV.
   2. 386-95 Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V (ANSI/IEEE).
   3. 592-90 Standard for Exposed Semiconducting Shields on Premolded High Voltage Cable Joints and Separable Insulated Connectors.

F. National Electrical Manufacturers Association (NEMA):
   1. C57.12.26-93 Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for Use with Separable Insulated High-Voltage Connectors, High-Voltage, 34500 Grd Y/19920 Volts and Below; 2500 kVA and Smaller TR1-93 Transformers, Regulators, and Reactors.

G. National Fire Protection Association (NFPA):
   1. 70-2019 California Electrical Code (CEC).

H. Underwriters Laboratories Inc. (UL):
   1. 467 UL Standard for Safety Grounding and Bonding Equipment.

PART 2 - PRODUCTS

2.1 EQUIPMENT, GENERAL

A. Approved manufacturer is Eaton Cooper Power Series.

B. Equipment shall be in accordance with ANSI, ASTM, IEEE, NEMA, NFPA, UL, as shown on the drawings and as hereinafter specified.

C. Ratings shall not be less than shown on the drawings.

D. Provide units designed to withstand the mechanical stresses caused by rough handling during shipment in addition to the electrical and mechanical stresses that may occur during operation.

E. Completely fabricate units at the factory so that only the external cable connections are required at the job site.

F. Thoroughly clean, phosphatize and finish all the metal surfaces at the factory with a rust-resistant primer and dark green enamel finish coat, except where a different color is specified in Paint Section, INTERIOR/EXTERIOR FINISHES, MATERIALS, AND FINISH SCHEDULE. All surfaces of the unit that will be in contact with the concrete pad shall be treated with corrosion-resistant compounds and epoxy resin, or a rubberized sealing compound.

2.2 COMPARTMENTS

A. Construction:
   1. The high and low voltage compartments and the transformer compartment shall be fabricated by a single manufacturer. The compartments and the transformer tank shall be assembled as an integral unit by a single manufacturer. Enclosures shall be in accordance with ANSI C57.12.28 or ANSI C57.12.29 if installed in coastal environments.
   2. The high and low voltage compartments shall be separated with a steel barrier.
   3. The compartments shall be constructed of sheet steel (gage to meet ANSI requirements) with bracing, reinforcing gussets and jig-welding to assure rectangular rigidity.
   4. Use cadmium or zinc plated bolts, nuts and washers.
   5. Sufficient space shall be provided for equipment, cabling and terminations in the compartments.
   6. Affix the transformer instruction nameplate permanently to the unit within the low voltage compartment. Voltage ratings, kVA rating, connection configuration, impedance, date of manufacture and serial number shall be shown on the nameplate.

B. Doors:
   1. Provide a separate door for each compartment with provision for a single padlock to secure the compartment area. The high voltage compartment door shall be prevented mechanically from opening, unless the low voltage door is opened and penta head bolt is removed.
   2. The secondary compartment door shall have a one-piece steel handle and incorporate three-point locking mechanisms to assure a secure and tight door closing. Provide each compartment door with open-position doorstops and tamperproof hinges. The hinge assembly shall be made of corrosion-resistant material welded in place.

2.3 BIL RATING

A. 25 kV class equipment shall have a minimum 125 kV BIL rating.

2.4 DEAD FRONT CONSTRUCTION

A. No exposed live parts, including the cable terminations, shall be accessible within the high voltage compartment.

B. Make connection to the high voltage switch(es) through 600 ampere externally clamped universal bushing wells mounted within the transformer tank and bushing inserts. Provide a parking stand for each cable that terminates within the high voltage compartment.

2.5 HIGH VOLTAGE PREFORMED TERMINATIONS

A. Terminate the high voltage cables in the high voltage compartment with load break premolded rubber elbow connectors. Elbow connectors shall have a minimum of 0.125 inch semi-conductive shield material covering the housing. Each connector shall be tested - prior to shipment from the factory.

B. Ground metallic cable shields with a device designed for the purpose. It shall consist of a solderless connector enclosed in watertight rubber housing covering the entire assembly. The grounding device and elbow connector are to be of the same manufacturer to insure electrical integrity of shielded parts.

C. Premolded parts shall be suitable for submersible applications.

D. Elbow connectors shall be rated as follows:
   1. Voltage: 21 kV phase-to-phase.
   2. BIL: 125 kV.
   3. AC withstand: 34 kV, 60 Hz for 1 minute.
   4. DC withstand: 65 kV (field test rating).
   5. Corona voltage: 11 kV minimum.
   6. Continuous current: 200 amperes RMS.
   7. Short time current: 10,000 amperes for 12 cycles.

8. Fault closure: 10,000 amperes RMS symmetrical for 10 cycles (after 10 loadmake/loadbreak operations at 200 amperes and 21 kV contact voltage).

E. Interchangeability: The separable connector system shall include the loadbreak elbow, the bushing insert, and bushing well. Separable connectors shall comply with the requirements of IEEE 386, and shall be interchangeable between suppliers. Loadbreak elbow and bushing insert shall be from the same manufacturer.

F. Allow sufficient slack in high voltage cable, ground, and drain wires to permit elbow connectors to be moved to their respective parking stands.

G. Provide insulated cable supports to relieve any strain imposed by cable weight or movement.

2.6 LOW VOLTAGE EQUIPMENT

A. Where applicable, mount the transformer secondary main molded case circuit breaker, panelboard, low voltage bushings, and hot stick in the low voltage compartment. Mount the main breaker off of the transformer tank to allow sufficient ventilation and assure that the heat from the transformer tank will not be transmitted through conduction. Circuit breakers shall be of the ambient compensating type, and have interrupting ratings for the available fault current.

B. Tin plate the low voltage neutral terminal and isolate from the transformer tank. Provide a removable ground strap sized in accordance with the CEC and connect between the neutral and ground pad.

2.7 TRANSFORMERS

A. Transformers shall be three-phase and single-phase, liquid-immersed, isolated winding, and self cooled by natural convection.

B. The kVA ratings shown on the drawings are for continuous duty without the use of cooling fans.

C. Temperature rises shall not exceed the NEMA TR1 standards of 65 degrees C by resistance, and 80 degrees C hot spot at rated kVA.

D. Transformer insulating material shall be Type FR3 oil and shall be in accordance with ASTM.

E. Transformer impedance shall be not less than 4.5 percent for sizes 150 kVA and larger.

F. Sound levels shall conform to NEMA TR1 standards.

G. Primary and Secondary Windings for Three-phase Transformers:
   1. Shall have copper windings.
   2. Primary windings shall be delta connected.
   3. Secondary windings shall be wye connected, except where otherwise indicated on the drawings. Provide isolated neutral bushings for secondary wye connected transformers.
   4. Secondary leads shall be brought out through pressure-tight epoxy bushings.

H. Primary windings shall have four 2-1/2 percent full capacity voltage taps; two taps above and two taps below rated voltage.

I. Core and Coil Assemblies:
   1. Cores shall be grain-oriented, non-aging, silicon steel to minimize losses.
   2. Core and coil assemblies shall be rigidly braced to withstand the stresses caused by rough handling during shipment, and stresses caused by any possible short circuit currents.
   3. Coils shall be continuous winding type without splices except for taps.
   4. Coil and core losses shall be optimum for the most efficient operation.
   5. Primary, secondary and tap connections shall be brazed or pressure type.
   6. Provide end fillers or tie downs for coil windings.

J. The transformer tank, cover, and radiator gage thickness shall not be less than that outlined in ANSI.

K. Accessories:
   1. Provide standard NEMA features, accessories, and the following:
      a. No-load tap changer (Provide warning sign).
      b. Lifting, pulling and jacking facilities.
      c. Globe-type valve for oil filtering and draining, including sampling device.
      d. Pressure relief valve.
      e. Liquid level gage and filling plug.
      f. A grounding pad in the high and low voltage compartments.
      g. A diagrammatic nameplate and operating instructions enclosed by a transparent cover located in the low voltage compartment.
      h. Dial type liquid thermometer with a maximum reading pointer and an external reset.
      i. Hot stick. Securely fasten hot stick within low voltage compartment.
   2. The accessories shall be made accessible within the compartments without disassembling trims and covers.
   3. Bay-O-Net Fusing (current sensing, dual sensing, dual element, high amperage overload).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install the equipment in accordance with the CEC, as shown on the drawings, and as recommended by the equipment manufacturer.

B. Foundations:
   1. Provide foundations of reinforced concrete, Type C, 3000 psi minimum, 28 day compressive strength, and comply with the ACI 318.
   2. Locate the top of foundation pads 6” above the adjacent finished grade, unless otherwise shown on the drawings. Refer to drawings for size, location, and structural steel reinforcing required.
   3. Grade the adjacent terrain so that surface water will flow away from the foundation.
   4. Anchor the transformers with cadmium or zinc plated bolts, nuts and washers. Bolts shall not be less than 1/2" diameter.

C. Grounding
   1. Ground each padmounted transformer in accordance with the requirements of the CEC. Install 3/4" diameter by 10’ long copper-clad ground rods, driven 10’ below grade to maintain a maximum resistance of five ohms to ground. Thermite weld the cable to the ground rods.
   2. Connect the ground rod to the ground pads in the high and low voltage compartments, and to the secondary (and primary) neutral with not less than a 2/0 AWG bare copper conductor.
   3. Refer to the section of the specifications describing GROUNDING for testing.
   4. Independently connect cable shield grounding devices ground wires to ground with sufficient slack to permit elbow connector operation. Connect elbow connectors with a No. 14 AWG bare copper drain wire from its grounding eye to the related cable shield grounding device ground wire. Do not connect drain wires in any manner that will permit circulating currents, or cable fault currents, to pass through them.
   5. Pad mounted equipment shall be sealed with caulking between bottom of metal housing and the concrete pad or slab to prevent entrance of dust and debris.

3.2 SPARE PARTS

A. Deliver the following spare parts for the project to the Owner two weeks prior to final inspection:
   1. Six stand-off insulators.
   2. Six insulated protective caps.
   3. One spare set of high voltage fuses for each size fuse used in the project.

3.3 INSTRUCTIONS

A. The contractor shall instruct School District maintenance personnel, for not less than a 4-hour period, on the maintenance and operation of the equipment on the date requested by the IOR.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 13 00 – MEDIUM VOLTAGE SWITCHGEAR (ABOVE 600 VOLTS)

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection and testing of the high voltage switchgear.

1.2 RELATED WORK

A. Section 26 05 46.13, ELECTRIC UTILITY SERVICE.

B. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

C. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Short circuit and coordination study.

D. Section 26 05 13, MEDIUM VOLTAGE CABLES (ABOVE 600 VOLTS): Medium voltage cables and splices.

E. Section 26 05 19, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).

F. Section 26 24 16, PANELBOARDS: Requirements for panelboards.

G. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

1.3 QUALITY ASSURANCE

A. Factory Testing:
   1. Thoroughly test the switchgear at the factory with the circuit breakers in the connected position in their cubicles. The factory tests shall be in accordance with IEEE C37.09 and shall include the following tests:
      a. Design Tests
      b. Production Tests
      c. Conformance Tests: These tests shall also include testing as required in ANSI C37.55, C37.57 and NEMA C37.54.
   2. Furnish six (6) copies of certified manufacturer's factory test reports to the Engineer prior to shipment of the switchgear to ensure that the switchgear has been successfully tested as specified.
   3. The Owner shall have an option to witness the factory tests. All expenses of the Owner’s Representative's trips to witness the testing will be paid by the Owner. Notify 30 days in advance of testing.

B. Field Testing:

1. Field tests shall be in accordance with IEEE C37.09 and shall include the following:
   a. Tests After Delivery
   b. Field Tests

1.4 SUBMITTALS

A. In accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL, submit the following:

B. Shop Drawings:
1. Shop drawings shall not be submitted until the Electrical System Protective Device Study has been submitted and approved.
2. Provide detailed drawings with sufficient information, clearly presented, to determine compliance with drawings and specifications.
3. Prior to fabrication of switchgear, submit (6) six copies of the following data for approval:
   a. Complete electrical ratings.
   b. Circuit breaker sizes.
   c. Interrupting ratings.
   d. Safety features.
   e. Accessories and nameplate data.
   f. One line diagram of the primary distribution system.
   g. Elementary and interconnection wiring diagrams.
   h. Technical data for each component.
   i. Dimensioned exterior views of the switchgear.
   j. Dimensioned section views of the switchgear.
   k. Floor plan of the switchgear.
   l. Foundation plan for the switchgear.
   m. Provisions and required locations for external conduit and wiring entrances.
   n. Dimensions and approximate design weights.
4. Obtain and submit written approval from the local power company, that the equipment and material interface with the customer meets with their requirements and approval.

C. Manuals:
1. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.
   a. Include complete interconnection diagrams that show all components of the switchgear line-up.
   b. Include complete diagrams of the internal wiring for each of the items of equipment.
   c. The diagrams shall identify the terminals to facilitate in the installation, maintenance and operation.
   d. Approvals will be based on complete submissions of manuals together with shop drawings.

D. Test Reports:
1. Submit six copies of certified conformance test reports for approval. Reports shall include, but not be limited to, interrupting, short time, momentary, BIL, high potential, fault close, and endurance performance.
2. Submit four copies of the certified factory design and production test reports for approval.
3. Two weeks prior to the project final inspection or phase inspection, submit four copies of the certified field test reports and data sheets to the Engineer

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Concrete Institute (ACI):
1. ACI 318-00 Building Code Requirements for Structural Concrete.

C. American National Standards Institute (ANSI):
1. C37.47-00 High Voltage Current-Limiting Type Distribution Class Fuses and Fuse Disconnecting Switches.
2. C37.55-89 Switchgear-Metal-Clad Switchgear Assemblies-Conformance Test Procedures.
3. C37.57-90 Switchgear-Metal-Enclosed Interrupter Switchgear Assemblies Conformance Testing.
4. C37.85-89 Switchgear-Alternating-Current High-Voltage Power Vacuum Interrupters-Safety Requirements for X-Radiation Limits.
5. C39.1-81 Electrical Analog Indicating Instruments.

D. Institute of Electrical and Electronics Engineers (IEEE):
1. C37.04-99 Standard Rating Structure for AC High-Voltage Circuit Breakers
2. C37.09-99 Standard Test Procedure for AC High-Voltage Power Circuit Breakers Rated on a Symmetrical Current Basis.
3. C37.20.2-99 Standard for Metal-Clad Switchgear.
4. C37.48-97 Guide for Application, Operation and Maintenance of High Voltage Fuses, Distribution Enclosed Single Pole Air Switches, Fuse Disconnection Switches and Accessories.
5. C37.90-89 Standard for Relays and Relay Systems Associated with Electric Power Apparatus.
6. C57.13-93 Standard Requirements for Instrument Transformers.

E. National Electrical Manufacturers Association (NEMA):
1. C37.06.1-00 Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.
2. C37.54-87 Switchgear - Indoor Alternating Current High-Voltage Circuit Breakers Applied as Removable Elements in Metal-Enclosed Switchgear Assemblies - Conformance Test Procedures.
3. LA 1-92.Surge Arrestors.
4. SG 4-00 Alternating-Current High-Voltage Circuit Breakers.

F. National Fire Protection Association (NFPA):
   1. 70-2019 California Electrical Code (CEC).

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. The switchgear shall be in accordance with NEMA SG-4, IEEE C37.20.2, the California Electrical Code as minimum requirements, and shall be as shown on the drawings and as specified.

B. Indicating instruments shall be in accordance with ANSI C39.1.

C. Relays and relay systems shall be in accordance with IEEE C37.90.

D. Instrument transformers shall be in accordance with IEEE C57.13.

E. The switchgear line-up shall be a complete, grounded, continuous-duty, integral assembly, metal clad, dead-front, dead-rear, self-supporting, weatherproof, outdoor type switchgear assembly with metal housing. Incorporate devices shown on the drawings and everything required to fulfill the operational and other requirements shown on the drawings.

F. Ratings shall be not less than shown on the drawings. Short circuit ratings shall be not less than 40ka.

G. Switchgear shall conform to the arrangements and details of the drawings and space designed for installation.

H. Coordinate the components of the switchgear line-up electrically and mechanically. Coordinate all requirements with the power company supplying electrical service to the switchgear so the incoming power supply feeder and revenue metering installations will conform to the requirements of the power company.

I. Switchgear shall be designed to withstand the mechanical stresses caused by rough handling during shipment in addition to the electrical (short circuit) and mechanical stresses, which will occur during operation of the station.

J. Interlocking shall be provided as shown on the drawings and as required for the safety of personnel and safe operation of the equipment.

K. Switchgear shall be assembled, connected and wired at the factory so that only external circuit connections are required at the construction site. Split the structure only as required for shipping and installation. Circuit breakers and accessories shall be packaged and shipped separately unless otherwise approved. Packaging shall provide adequate protection against rough handling during shipment.

L. All non-current carrying parts shall be grounded per applicable articles of the California Electrical Code. Refer to Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL for additional requirements.

2.2 HOUSING

A. The equipment and structure shall have the following features:
   1. Frames and enclosures:
      a. The assembly shall be braced with reinforcing gussets and jig welds as required to assure rectangular rigidity.
      b. The enclosure shall be steel, leveled and not less than the gauge required by NEMA and ANSI Standards.
      c. Die-pierce the holes for connecting adjacent structures to insure proper alignment and to allow for future additions.
      d. All bolts, nuts, and washers shall be cadmium-plated steel.
   2. Cubicles:
      a. An individual cubicle shall be supplied for each circuit breaker and each future circuit breaker indicated. Cubicles shall also be provided for auxiliaries, revenue metering, and transitions as indicated on the drawings.
         1) Compartment each cubicle so that the circuit breaker, buses, and cable terminations are in separate compartments with steel partitions or barriers of approved and properly installed insulation.
         2) Each cubicle furnished with a circuit breaker (active or spare) shall be fully equipped as noted on drawings and specified below.
         3) Each cubicle noted as space for future circuit breaker shall be fully equipped for positioning and connecting the breakers. Provide all equipment required to implement the future breaker installation, except the relays and meters on the cubicle doors and the associated current transformers.
      b. The cubicles shall be fabricated by a single manufacturer and shall be coordinated for their installation.
      c. Conveniently locate test blocks within each cubicle for circuit breaker wiring connections.
   3. Cubicle doors:
      a. The doors shall permit convenient removal and interchanging of the circuit breakers between cubicles. The doors shall be capable of a swing approaching 180 degrees and shall be provided with intermediate doorstops.
      b. Each door shall include suitable handles and padlocking provisions. Concealed or semi-concealed hinges shall be provided to attach the doors. Weld the hinges to the equipment structure and to the cubicle doors.
      c. The following equipment shall be mounted on the door of circuit breaker cubicles:
         1) Draw out, induction type relays.
         2) A breaker control switch.
         3) Breaker-position-indicator lamps energized by the station battery.
         4) Indicating ammeters and voltmeters and associated selector switches.
         5) Install any additional items indicated on the drawings.

B. Outdoor Rated and Protected Enclosure:
   1. Where indicated on the drawings, provide an outdoor, weatherproof, protected enclosure, fabricated and coordinated with the switchgear to form an integral enclosure.
   2. The roof of the enclosure shall slope to allow for adequate run-off of moisture.

3. The entire area between the floor and foundation, including feeder conduits, shall be enclosed by structural steel or steel sheets.
4. The enclosure shall include proper ventilation. All ventilation openings shall be provided with suitable filters and screens. Provide thermostatically controlled exhaust fan with CFM sufficient to limit the temperature rise to 10 degrees F above ambient. Thermostat shall close contacts at 32 degrees C (90 degrees F). Provide motor starter with H-O-A switch adjacent to the wall-mounted thermostat.
5. Enclosure doors:
   a. The doors shall be safety type, steel with concealed or semi-concealed hinges for attachment. Weld the hinges to the equipment structure.
6. Cubicle heaters:
   a. Install a thermostatically controlled electric strip heater within each circuit breaker cubicle and cable termination compartment to limit excessive humidity during adverse weather conditions. Thermostat shall be set and marked with manufacturer's recommended setting.
   b. Heater and thermostats and associated control wiring shall be pre-wired at the factory. Properly fuse the wiring and protect to prevent terminal overheating.

C. Finish:
1. All metal surfaces shall be thoroughly cleaned, phosphatized and factory primed prior to applying baked enamel or lacquer finish.
2. Outdoor Switchgear:
   a. Interior finish shall be light gray.
   b. Exterior finishes shall be as specified in the Painting Section of plans and specification, INTERIOR/EXTERIOR FINISHES, MATERIALS, AND FINISH SCHEDULE.
   c. The underside of the switchgear and enclosure shall be treated with corrosion resistant compounds, epoxy resin or rubberized sealing compound. //

2.3 BUS

A. Bus Bars and Interconnections:
1. Provide copper bus, fully rated for the amperage shown on the drawings. All ground buses shall be copper.
2. Fully insulate and totally enclose the buses within the bus compartment of the switchgear cubicle.
3. Mount the buses on appropriately spaced insulators and brace to withstand the available short circuit currents.
4. The bus and bus compartment shall be designed so that the acceptable NEMA Standard temperature rises are not exceeded.
5. Install a ground bus the full length of the switchgear assembly. Bus size shall be 2" by 1/4".

B. Insulation: The insulation shall be a high flame-retardant, self extinguishing, high track-resistant material that complies with the NEMA Standard 65 degree C temperature rise.

C. Control Bus: Extend the control buses to all of the circuit breaker cubicles including spare and spaces for future circuit breakers.

2.4 CIRCUIT BREAKERS

A. Breakers that have the same ratings shall be interchangeable with other breakers in that line-up.

B. The circuit breakers shall be in accordance with IEEE C37.04, NEMA C37.06.1 and NEMA SG-4. Breakers shall have the following features:

1. Drawout, vacuum interrupter type.
   a. Vacuum:
      1) Three independent sealed high vacuum interrupters.
      2) Protect the interrupter contacts from moisture and contaminated atmospheres.
      3) Readily accessible contact wear indicator for each interrupter.
      4) Provisions for slow closing (testing).
      5) Breaker total interrupting time of 3 cycles.
      6) Maintenance free interrupter.
      7) Contact surfaces to be of special alloys (such as copper chrome) to reduce effect of chopping.
      8) Provide each phase of each breaker with appropriate surge arrester for application voltage. Select surge arresters to minimize risk of damage to external electrical and electronic equipment.
      9) Vacuum interrupters shall meet the safety requirements of ANSI C37.85.
2. Operating mechanism:
   a. The mechanism shall operate in a quick-make, quick-break manner and shall be charged by a small universal motor to provide stored-energy for breaker operation. Breaker tripping, closing, and indicating lamps shall be DC operated.
   b. The speed of the contacts during the operation shall be independent of the control voltage and the operator's movements.
   c. Equip the mechanism for manual opening and closing of the contacts during loss of normal control power and provide capability for slow manual operation during inspection of the contact wiping action.
3. Drawout rails:
   a. Design the rails to guide the breakers to their disconnected, test, and connected positions. Provide a positive stop at each of the positions by a levering mechanism.
   b. The breaker shall maintain contact with ground in all positions through flexible connections and ground shoes.
   c. Make provisions for padlocking the breaker in the test and disconnected position.
4. Power line and load disconnecting contact fingers and springs:
   a. The contact fingers shall be silver-plated, full-floating, self-aligning, self-coupling, and designed for cleaning action during engaging and disengaging movements.
   b. Provide adequate flexibility between stationary and movable components to assure proper meeting of the contact fingers, while also providing adequate pressure on the contact surfaces.
   c. Mount the contacts on the breaker so that they can be conveniently inspected.
5. The stationary contacts for the line and load breaker contact fingers shall be isolated from the breaker compartment by shutters when the breaker is removed from the connected position.
6. The control and auxiliary contacts of the breaker shall be silver plated, multi-contact, self-coupling, plug and socket type. The contacts shall connect the circuits through terminal blocks that shall be conveniently mounted on the breaker for visual inspection.
7. Mechanical interlocks:

a. Shall prevent the breaker from movement, except when the breaker contacts are in the open position.
b. Shall prevent the breaker from closing the contacts while in the connected position, except when the power line and load disconnecting contacts are completely connected.

C. The interrupting ratings of the breakers shall be not less than 250 MVA.

2.5 CURRENT TRANSFORMERS

A. Provide encapsulated type current transformers or approved equal. The transformers shall have a mechanical and one-second thermal rating in RMS amperes of not less than the momentary and interrupting rating of the breaker at rated voltage.

B. Provide transformer ratios as shown on the drawings. Accuracies shall be coordinated with the associated relays and meters by the switchgear manufacturer to assure proper operation at the selected pick up and operating current ratings.

2.6 POTENTIAL TRANSFORMERS

A. The potential transformers shall be encapsulated, drawout, disconnecting type and shall be properly protected by primary current-limiting fuses.

B. When the transformers are withdrawn from the compartment the primary terminals shall be grounded.

C. The transformer ratios and accuracies shall be coordinated with the associated relays and meters by the switchgear manufacturer.

2.7 CONTROL POWER TRANSFORMERS

A. The control power transformers shall be encapsulated, drawout, disconnecting type and shall be properly protected by primary current-limiting fuses.

B. The ratings of the transformer shall be as indicated on the drawings.

C. Refer to the drawings for rating and capacity of the circuit breaker equipped panelboard served by the control power transformer.

D. Equip the control power transformer compartment door with indicating lights and nameplates to indicate when the control power is energized.

2.8 OTHER EQUIPMENT

A. Cable Terminations:
1. Cable terminations shall conform to the requirements in Section 26 0513, MEDIUM VOLTAGE CABLES (ABOVE 600 VOLTS).

2. Coordinate cable terminations with the switchgear being furnished.

B. High Voltage Lightning Arresters:
1. Lightning arresters shall be valve type with wet process porcelain insulators. Supports that hold the porcelain in compression shall be rustproof steel. Arresters shall be in accordance with NEMA LA 1.
2. Provide each ungrounded conductor of each incoming circuit with an arrester.
3. Unless the class of the arrester is specifically shown on the drawings, the switchgear manufacturer shall provide the class arrester required to protect the equipment. Provide a suitable dielectric barrier to isolate the arresters from the switchgear compartment.

C. Panelboards:
1. Requirements for panelboards shown to be installed in the switchgear shall be as shown on the drawings and in Section 26 2416, PANELBOARDS.

2.9 AUXILIARIES

A. Install all additional components required for proper operation of the switchgear.

2.10 SWITCHGEAR WIRES

A. Switchgear control wires shall not be less than No. 14 AWG copper 600 volt, Class B, Stranded SIS. Install wiring complete at the factory, adequately bundled and protected. All conductors across hinges, and all conductors for interconnection between shipping units shall be Class C stranded. Conductors shall be sized in accordance with the CEC. Provide separate control circuit fuses in each breaker compartment and locate for ease of access and maintenance.

2.11 TEST CABINET

A. The test cabinet shall facilitate the convenient testing of the power circuit breakers and shall be installed where indicated on the drawings.

2.12 IDENTIFICATION SIGNS AND MIMIC BUS

A. Permanently identify each cubicle of the switchgear assembly by a sign which clearly indicates the enclosed equipment or breaker designation.

B. Provide signs of laminated black phenolic resin with a white core and engraved lettering of not less than 1/4" high.

C. Provide an approved mimic bus on the front of each switchgear assembly, either factory painted, plastic, or metal strips. Secure strips in place by plated screws. Strips shall be secured flat and free of waves. Plastic tape shall not be used. Use symbols similar to a single line diagram (refer to drawings).

2.13 SINGLE LINE DIAGRAM

A. An as-built single line diagram, clearly identified, shall be laminated or mounted under plexiglas, installed in a frame and mounted on a wall adjacent to the switchgear assembly.

B. Deliver an additional six spare copies (same as at the switchgear unit) of the one line diagram to the Engineer.

2.14 VOLTAGE WARNING SIGN

A. Mount on each entrance door of the outdoor switchgear and switchgear room, approximately five feet above grade or floor, a clearly lettered high voltage sign for warning personnel. The sign shall be attached with rustproof metal screws and as described in Section 26 05 53 IDENTIFICATION OF ELECTRICAL SYSTEMS.

2.15 ACCESSORIES

A. Furnish all accessories to the Owner as recommended by the switchgear assembly manufacturer to facilitate the convenient maintenance and operation of the assembly.

2.16 AS-LEFT RELAY SETTING AND FUSE RATINGS

A. Coordinate relay settings of the high voltage switchgear in accordance with Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY.

B. The settings shall be calibrated and set in the field by an authorized representative of the switchgear manufacturer.

C. Post a durable copy of the "as-left" relay settings and fuse ratings in a convenient location within the switchgear room and assembly. Deliver six additional copies of the settings and fuse ratings to the Owner. Furnish this information prior to the activation of the switchgear.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install the switchgear in accordance with the CEC, manufacturer's recommendations and instructions.

B. Anchor the individual cubicles to the concrete floor by cadmium plated bolts, nuts and washers as detailed on drawings.

C. All floor mounted switchgear and panelboards shall be sealed with caulking between bottom of metal housing and the concrete pad or slab to prevent entrance of dust and debris.

D. All openings in switchgear and panelboards that are unused shall be sealed with bolts and washers. Use caulking where holds or openings cannot be sealed by way of a washer, or bolts or conduit seals.

3.2 FOUNDATION

A. The concrete shall have (3000 psi) compressive strength in a minimum of 28 days, and comply with the American Concrete Institute Publication 318, "Building Code Requirements for Structural Concrete".

B. Locate the top of the foundation six inches above the adjacent grade, unless otherwise indicated on the drawings.

C. Grade the adjacent terrain away from the switchgear to allow water to run away from the structure.

D. Use cadmium plated bolts, nuts and washers, not less than 1/2" in diameter, to fasten the structure to the foundation.

3.3 TECHNICAL SERVICES DURING INSTALLATION AND FIELD TESTING

A. An authorized representative of the switchgear manufacturer shall technically supervise and participate during all of the field adjustments and tests.

B. Prior to the final inspection for acceptance, a technical representative from Pacific Gas and Electric Company shall witness the testing of the equipment to assure the proper operation of the individual components and confirm proper operation/coordination with their company's equipment and eliminate any electrical and mechanical defects.
   1. When any defects are detected, make corrections and repeat all tests as requested by the Engineer at no additional cost to the Owner.

3.4 INSTRUCTIONS AND FINAL INSPECTION

A. A complete set of operating instructions for the switchgear shall be laminated or mounted under plexiglas and installed in a frame in the switchgear room, or on the wall of switchgear assembly.

B. Conduct a final inspection, in the presence of the Owner's representative, to assure that the switchgear operates properly in all respects.

C. Furnish the services of a factory-trained engineer for two, 4-hour training periods for instructing personnel in the maintenance and operation of the equipment, on the dates requested by the IOR.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 13 02 - SWITCHES, MEDIUM VOLTAGE (ABOVE 600 VOLTS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Medium voltage switches.

B. Related Work:
   1. Section 26 13 00, MEDIUM VOLTAGE SWITCHGEAR (ABOVE 600 VOLTS).
   2. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   3. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Short circuit and coordination study.
   4. Section 26 05 13, MEDIUM VOLTAGE CABLES (ABOVE 600 VOLTS): Medium voltage cables and splices.
   5. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

1.3 SUBMITTALS

A. In accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL, submit the following:

B. Shop Drawings:
   1. Provide detailed drawings with sufficient information, clearly presented, to determine compliance with drawings and specifications.
   2. Provide information such as complete electrical ratings, dimensions and approximate design weights, mounting details, materials, required clearances, cable terminations, fuse sizes and class, interrupting ratings, wiring and connection diagrams, front, side and rear elevations, sectional views, safety features, accessories and nameplate data.

C. Manuals:
   1. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets, wiring diagrams and information for ordering replacement parts.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American National Standards Institute (ANSI):
1. C37.47-00 High Voltage Current-Limiting Type Distribution Class Fuses and Fuse Disconnect Switches.
2. C37.58-90 Conformance Test Procedures for Indoor AC Medium-Voltage Switches for Use in Metal-Enclosed Switchgear.

C. Institute of Electrical and Electronics Engineers (IEEE):
1. C37.20.3-01 Metal-Enclosed Interrupter Switchgear.
2. C37.48-97 Guide for Application, Operation and Maintenance of High Voltage Fuses, Distribution Enclosed Single Pole Air Switches, Fuse Disconnecting Switches and Accessories.

D. National Electrical Manufacturers Association (NEMA):
1. C37.22-97 Preferred Ratings and Required Capabilities for Indoor AC Medium-Voltage Switches Used in Metal-Enclosed Switchgear.
2. SG 6-00 Power Switching Equipment.

E. National Fire Protection Association (NFPA):
1. 70-2019 California Electrical Code (CEC).

PART 2 - PRODUCTS

2.1 HIGH VOLTAGE AIR BREAK SWITCHES, SEPARATELY ENCLOSED

A. Shall be in accordance with ANSI, IEEE, NEMA, NFPA, as shown on the drawings and have the following features:
1. Air break, three-pole gang-operated, rated load interrupter type.
2. Copper blades.
3. A separate door for the fuse section. A mechanical interlock shall prevent opening the door unless the switch blades are open, and closing the switch if the door is open.
4. Phase barriers for the full length of the blades and fuses for each pole.
5. Protective shield to cover the cable connections on the line terminals.
6. Quick-make, quick-break, stored energy type operation mechanism.
7. External manual operating handle with lock-open padlocking provisions.
8. When the switches are open, the fuses shall be de-energized.
9. Current limiting, power type fuses.
10. Enclosures:
    a. NEMA 3R type shown on the drawings for the switches.
    b. Doors:
        1) Concealed or semi-concealed hinges shall be used to attach doors. Weld hinges to the enclosure and door.

2) Mechanically interlocked to prevent opening unless the switch blades are open.
3) Three point door locking mechanism, suitable handles and padlocking provisions.
4) Safety-glass window for viewing the switch blades.
5) Door stops for the open position.

c. Finish:
1) All metal surfaces shall be thoroughly cleaned, phosphatized, primed and painted at the factory.
2) Final finish shall be enamel, lacquer or powder coating. Enamel and powder coatings shall be oven baked. Color shall be light gray.

B. Minimum switch fault close and momentary current rating shall be as required by single line diagram or by electrical system protective device study.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install the switches in accordance with the CEC, manufacturer's instructions and recommendations and as shown on the drawings.

B. Anchor the units with rustproof bolts, nuts and washers not less than 1/2” diameter.

C. All floor mounted switchgear shall be sealed with caulking between bottom of metal housing and the concrete pad or slab to prevent entrance of dust and debris.

3.2 SPARE PARTS

A. Two weeks prior to the final inspection, provide one (1) set of spare fuses for each fused switch installed on this project.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 22 00 – LOW VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Dry type general purpose transformers rated 600 volts and below.

B. Related Work:
   1. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.
   3. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 SUBMITTALS

A. Submit in accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

B. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   2. Include electrical rating, impedance, dimensions, weight, mounting details and materials, decibel rating, terminations, temperature rise, no load and full load losses, and connection diagrams.
   3. Complete nameplate data including manufacturer’s name and catalog number.

C. Manuals:
   1. Submit, simultaneously with the shop drawings, companion copies of complete operating and maintenance manuals including technical data sheets and wiring diagrams.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. National Fire Protection Association (NEPA):
   1. 70-2019 California Electrical Code (CEC)

C. National Electrical Manufacturers Association (NEMA):
   1. ST 20 Dry-Type Transformers for General Applications
   2. TP-1 Energy Efficient Transformers
   3. DOE – 2019 Transformers

PART 2 - PRODUCTS

2.1 GENERAL PURPOSE DRY TYPE TRANSFORMERS

A. Unless otherwise specified, dry type transformers shall be in accordance with NEMA, CEC and as shown on the drawings. Transformers shall be UL listed or labeled. All transformers shall comply with NEMA TP-1 energy efficiency standards as adopted by the State of California. Efficiency shall be tested in accordance with NEMA TP2. Approved manufacturer is Square D.

B. Dry type transformers shall have the following features:
   1. Copper wound.
   2. Self-cooled by natural convection, isolating windings, indoor, dry type. Autotransformers shall not be accepted unless otherwise stated.
   3. Rating and winding connections shall be as shown on the drawings.
   4. Ratings shown on the drawings are for continuous-duty without the use of cooling fans.
   5. Insulation systems:
      a. Transformers 30 KVA and larger: UL rated 220 degree C system having an average maximum rise by resistance of 115 degree C in a maximum ambient of 40 degree C.
      b. Transformers below 30 KVA: Same as for 30 KVA and larger or UL rated 115 degree C system having an average maximum rise by resistance of 80 degree C in a maximum ambient of 40 degree C.

   6. Core and coil assemblies:
      a. Rigidly braced to withstand the stresses caused by short circuit currents and rough handling during shipment.
      b. Cores shall be grain oriented, non-aging, silicon steel.
      c. Coils shall be continuous windings without splices except for taps.
      d. Coil loss and core loss shall be optimum for efficient operation. NEMA TP-1 type.
      e. Primary and secondary tap connections shall be brazed or pressure type.
      f. Coil windings shall have end fillers or tie downs for maximum strength.
      g. Terminals shall be rated 75 degrees C minimum.

7. Certified sound levels determined in accordance with NEMA, that do not exceed the following:

Transformer Rating	Sound Level Rating
0 - 9 KVA	40 dB
10 - 50 KVA	45 dB
51 - 150 KVA	50 dB
151 - 300 KVA	55 dB
301 - 500 KVA	60 dB

8. Nominal impedance shall be as permitted by NEMA.
9. Single phase transformers rated 15 KVA through 25 KVA shall have two, 5 percent full capacity taps below normal rated primary voltage. All transformers rated 30 KVA and larger shall have two, 2-1/2 percent full capacity taps above, and four, 2-1/2 percent full capacity taps below normal rated primary voltage.
10. Core assemblies shall be grounded to their enclosures by adequate flexible ground straps.
11. Enclosures:
    a. Temperature rise at hottest spot shall conform to NEMA Standards, and shall not bake and peel off the enclosure paint after the transformer has been placed in service.
    b. Ventilation openings shall prevent accidental access to live components.
    c. Thoroughly clean and paint at the factory with manufacturer's prime coat and standard finish.
12. Standard NEMA features and accessories including ground pad, lifting provisions and nameplate with the wiring diagram and sound level indicated on it.
13. Dimensions and configurations shall conform to the spaces designated for their installations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the CEC, and as shown on the drawings.

B. Install the transformers with adequate clearance at a minimum 6 inches or more from wall and adjacent equipment for air circulation to remove the heat produced by transformers and as recommended by the manufacturer to achieve U.L. listing.

C. Install transformers on vibration pads designed to suppress transformer noise and vibrations.

D. Use flexible metal sealtight conduit to contain the conductors from the transformer to the raceway system.

E. Transformers shall be secured to meet CBC seismic zone 4 requirements.

END OF SECTION

SECTION 26 24 12 - MICROPROCESSOR-BASED METERING EQUIPMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawing and general provisions of this contract, including general and supplementary conditions and Division 01 specification sections, apply to this section.

1.2 RELATED WORK:

A. Section: 26 13 00, MEDIUM VOLTAGE SWITCHGEAR.

B. Section: 26 24 13, SERVICE AND DISTRIBUTION SWITCHBOARD.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Eaton products

2.2 MICROPROCESSOR-BASED METERING EQUIPMENT

A. Power Xpert Meter Series, PXM4000:

1. Where indicated on the drawings, provide a microprocessor based line of Power Quality Meter(s), designated (PQM), equal to Eaton PXM4000 series meters.
2. A complete PQM combination meter base and/or display shall have the following minimum listings and/or certifications:
   a. Safety: UL 61010-1, EN 610101.
   b. Accuracy: ANSI C12.20 Class 0.2, IEC/EN60687 0.2 for revenue meters.
   c. EMC: FCC Part 15 Subpart B Class A immunity.
   d. IEC Standards: 50081-2, 61000-3, 61000-4, and 61326.
3. The PQM shall be supplied suitable for standard 120/240 Vac or 110/250 Vdc inputs as required or indicated on the drawings.
4. Current inputs for each channel shall be from standard instrument current transformers.
   a. The analog current input shall be converted to 4096 samples per cycle with a delta-sigma converter digitally filtered down to 512 samples per cycle for anti-aliasing.
   b. Meter burden shall be less than 10 milliohms.
   c. Overload withstand capability shall be a minimum of 500A for 1 second, non-repeating.
   d. Input range capability shall be 0.005 to 20 amperes.
5. Voltage inputs for each channel shall allow for connection into circuits with the following parameters:
   a. Input range of 600V L-L, 347V L-N direct connected.
   b. PT primary input of 120 volts to 500,000 volts.
   c. Nominal full-scale value of 700 volts rms.

d. Input impedance of 2 mega ohms.
e. The analog voltage input shall be converted to 4096 samples per cycle by means of a delta sigma converter and digitally filtered down to 512 samples per cycle for anti-phasing.

6. The PQM shall be capable of monitoring, displaying, and communicating the below true rms minimum information where applicable with the accuracy as indicated of read or calculated values based on 3 to 300% full scale. The PQM shall be suitable for installation in single phase, two or three wire systems or in three phase, three or four wire systems
   a. AC current (amperes) in A, B and C phase, 3-phase average, Neutral (N) and Ground (G). A total of five (5) current inputs shall be provided. Accuracy of all current inputs shall be 0.05% reading, +/- 0.01% of full scale. Provide neutral and ground current transformers. The 5 ampere current inputs shall withstand 40 amperes continuous and 300 amperes for 1 second. Current transformer ratios shall be selectable.
   b. AC voltage (volts) for A-B, B-C and C-A, phase average, A-N, B-N and C-N, average phase to N, and N to G. Accuracy of all voltage inputs shall be +/- 0.1% reading, +/-0.05% maximum of full scale. Capable of metering up to 600 volt without external Potential Transformers (PTs) and up to 500 kV with appropriate PTs.
   c. Real Power (Watts), Reactive Power (vars), Apparent Power (VA), for each phase and system. Accuracy +/- 0.10% reading and +/- 0.0025% full scale. Forward/Reverse indication shall be provided.
   d. Accumulated, Incremental and conditional measurement for Real Energy (WH), Reactive Energy (VARH), Apparent Energy (VAH) for each phase and system. Accuracy +/- 0.10% reading and +/- 0.0025% full scale. Forward/Reverse and Net difference indication shall be provided.
   e. Frequency (Hz) Accuracy +/- 0.01 hertz.
   f. Demand values including present, running average, last complete interval and peak for System Current (Amperes). Demand values including present, running average, last complete interval, peak and coincident with peak kVA and kW demand for System Real Power (Watts), System Reactive Power (vars), and System Apparent Power (VA).
   g. Power Factor for both Displacement only 60-cycle fundamental Watts to VA and Apparent total Watts to total vars including harmonics for A, B and C phase and 3 phase average. Accuracy +/- 0.10% at unity PF and +/-0.30% at 0.5 PF.
   h. Current percent Total Harmonic Distortion (THD) in A, B and C phase and N.
   i. Voltage percent THD in A-B, B-C and C-A phase, A-N, B-N and C-N.
   j. K-Factor (sum of the squares of harmonic currents times the square of their harmonic numbers).
   k. Transformer Derating Factor (1.414 divided by the Crest Factor).
   l. Crest Factor (ratio of peak current to rms current).
   m. Nines (9’s) availability data.
   n. Power Quality Index
7. The PQM shall provide the following sampling capabilities:
   a. A/D technology, sampling at 4096 samples per cycle.
   b. Over-sampling and quantizing filtering to eliminate false signal noise.
   c. Waveform recorded at (512 standard samples-PXM 4000/6000) (100,000 high rate samples-PXM 8000) per cycle.
8. The PQM shall provide the following advanced analysis features:

a. Calculation of harmonic magnitudes and phase angle for each phase voltage and current through the 85th harmonic.

b. Waveforms shall be available in non-volatile memory and retrievable via file transfer protocol (ftp) in COMTRADE file format over the Internet network.

c. Historical Trending: Historical trend logging for graphical viewing from the Local PX-D display or from an embedded WEB server. The graphical views of historical data shall support both pan and zoom functions. All standard metering parameters shall be logged as part of the standard meter functionality including minimum, maximum and average for each metered parameter. The minimum and maximum readings shall be based on 200ms calculations. The averages shall be calculated over the user selected time interval period. Minimum storage capacity for standard trend plots shall be as follows:

1. Five-minute intervals for 48 hours (2 days).
2. Fifteen-minute intervals for 192 hours (8 days)
3. One-hour intervals for 28 days
4. Eight-hour intervals for 56 weeks
5. One-week intervals for 44 months
6. Data storage available in 8GB-PXM 8000 only.

9. Time of Use Monitoring: Time of use monitoring shall include:

a. Four rate periods for time of use revenue metering.
b. Total rate independent of time of use.
c. Up to 4 rate schedules (weekdays and weekends).

d. Energy Profile: Energy profile data shall include recording of real and reactive energy forward, reverse, net and absolute sum as well as apparent energy (KVAH). Up to eight (8) status inputs shall be configurable as energy accumulators for counting KYZ pulse inputs. These readings shall be stored over a configurable interval from 1 to 60 minutes as well as in daily and weekly totals. Storage capacity shall be as follows:

1. Sixty-two (62) days of fifteen (15) minute interval energy and pulse interval data. (Fixed interval capacity shall equal 5,952 intervals configurable from 1 to 60 minutes).
2. Three hundred and seventy-two (372) days of 1 day accumulated energy and pulse interval data.
3. Two Hundred and eight (208) weeks of one (1) week accumulated energy and pulse interval data.

e. Event Triggers: The PX-M shall have a quantity of five (5) types of configurable event triggers consisting of 1) Out of limits, 2) Demand overload, 3) ITIC, 4) Sub-Cycle disturbance and 5) Fast Transient. These triggers shall permit pickup, reset and pickup delay to be user configurable. When a trigger occurs, actions shall include Performance monitoring (Nines (9s) analysis, Capturing Waveform, Capture all metered parameters, and ability to send by email and/or activate a relay output. The meter graphic display PX-D shall flash an LED to annunciate the alarm condition and an audible alarm shall be available. The following trigger options shall be included:

1. Out of limits – one hundred and five (105) triggers.
2. Demand overload – Ten (10) triggers.
3. Sub-cycle disturbance – dV/dt and absolute.

f. Event Logging: The PX-M or embedded WEB Server shall allow the user to view a list of triggered events along with any captured parameters, event details, and triggered waveforms. In

addition, a separate event log shall include logging of activities including acknowledged triggers, new minimum and maximum events, and systems operations, such as resets. The size of each event log shall be virtually unlimited based only on the memory option selected.

g. Sag/Swell and Waveform recording: Sixty (60) cycles of waveform shall be recorded at 512 samples per cycle including 30 cycles of pre and post event data. The embedded WEB server shall be capable of supporting viewing of all triggered waveforms one channel at a time and shall include the ability to zoom and to scroll horizontally using a slider bar. Waveforms shall be stored in non-volatile flash memory using industry standard COMTRADE format. Waveforms shall have the capability to be automatically sent out as COMTRADE attachments to an email following an event, or shall be retrievable from a ftp directory structure from the meter's memory.

h. Minimum and Maximum values for the following parameters:
   1. Voltage L-L and L-N
   2. Current per phase
   3. Apparent Power Factor and Displacement Power Factor
   4. Real, Reactive, and Apparent total Power
   5. THD voltage L-L and L-N
   6. THD Current per phase
   7. Frequency

9. The PQM shall have a digital Input/Output (I/O) card which shall include:
   a. Eight (8) digital inputs – self sourced 24 Vdc. These shall be interrupt driven, allowing for 1ms accuracy of digital events time stamps when utilizing local NTP server. Inputs shall be configurable for demand synch, and pulse counting. Inputs selected for pulse counting shall be scalable. Interval by interval pulse recordings shall be maintained in the PX-M/PX-B profile memory and shall be capable of being displayed graphically.
   b. Three (3) relay outputs – 5A maximum form C continuous, 380Vac maximum, 125Vdc maximum. Outputs shall be suitable for KYX or alarm annunciation. Relay outputs shall have the following minimum ratings:
      1. Make: 30A, 30 Vdc, 120-240 Vac.
      2. Break: 5A, 30 Vdc, 120-240 Vac.
      3. Resistive load: 0.5A, 125Vdc; 0.25A, 250 Vdc.
      4. Mechanical Operations: 1,000,000 no-load and100,000 under rated voltage and current.
      5. Output Relay when event triggered shall be capable of operating in timed, normal or latched mode.
   c. Two (2) solid state outputs – 80 mA maximum continuous, 30 Vdc maximum.

10. The PQM shall be provided with multiple communications ports and protocols, including the following capability:
    a. RS-485 remote display port
    b. RS-485 Modbus RTU
    c. RJ-45 10/100 baseT Local Ethernet Configuration Port for local WEB server connection
    d. HTML web pages
    e. File transfer protocol (ftp)

11. The graphical display shall utilize a simple "twist and click" navigation control dial to easily navigate the menus, select links to related pages, ad to drill down into increasing levels of further

details. A “back” key shall be provided for easy navigation to higher level screens. The graphical display shall have the following features:

a. Backlight LCD remote graphics display with 320 x 240 pixels.
b. Capable of being mounted to the Meter base unit or remote mounting of display up to 2000 ft away with capability of displaying up to 16 base units or complete Meters.
c. A set of screens including real time data, trend lots, waveform views and ITIC plot.
d. Allow basic device setup and password protected resets.
e. An audible alarm to annunciate alarm conditions.

12. The WEB server shall provide the user with remote WEB access to all the metered, trend and waveform information. The WEB server shall include real time monitored information in both numeric and graphical visual formats.
13. A reset button shall be provided on the PX-M and PX-B to be able to reset communications to factory defaults. Reset capabilities shall be provided in conjunction with various lockable dip switch settings
14. The meter shall be capable of providing the graphically display of the following Main Meter Menu Screens:
    a. Meter Screen providing:
        1. Volts: L-L and L-N, and average
        2. Frequency
        3. Current and average phase A, B, and C, N & G
    b. Power Screen providing:
        1. Energy
        2. Demand
        3. Power Factor
    c. Quality Screen providing:
        1. Total Harmonic Distortion (THD) of volts and current
        2. Percent Nines (9s) reliability
    d. Events screen providing:
        1. Latest events
        2. Enabled Triggers
        3. Historical Events
        4. Calendar view of Events
        5. Events Timeline screen
    e. Set-up screen providing:
        1. View set-up
        2. Edit set-up
        3. Login
        4. Logout
15. A tool bar for screen selection which is always present and viewable shall be provided along the bottom of the graphical display. Selection of one of the main screens shall be by turning the navigation knob and highlighting the desired screen. Once selected, pressing the knob shall make the selection.

PART 3 EXECUTION

3.1 Installation

A. Contractor shall provide and install all metering equipment in accordance with manufacturers approved shop drawings.

B. It is the intent of these specifications and plans to include all work included required for proper and complete installation of the metering system.

3.2 Manufacturers Services

A. Upon completion of the installation, contractor shall notify manufacturer that system is available for final review.

B. Manufacturer shall provide complete shop drawings specific to this project for the metering system for contractor to use as basis for installation.

C. Manufacturer shall provide a minimum of 8 hours of in service training for metering system to Owner's staff.

END OF SECTION

SECTION 26 24 16 – PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Panelboards.
   2. Manufacturer shall provide certification that the equipment supplied under this Section has been reviewed and certified by OSHPD to meet the current criteria for special seismic certification in compliance with 2019 CBC 1705A.12.13 and OSHPD CAN 2-1705A.12.13. Include seismic companion anchorage requirements from the testing and as approved by the manufacturer. The manufacturer shall provide an approved label on the equipment enclosure stating that the equipment has been awarded a certificate of compliance for special seismic certification. The label shall include OSHPD special seismic certification pre-approval (OSP) number when relevant.
   3.

B. Related Work:
   1. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 05 73 OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Requirements for the over current protective devices to be installed to ensure proper equipment and personnel protection.
   3. Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
   4. Section 26 05 19, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.
   5. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. Underwriters Laboratories, Inc. (UL):
   1. No. 50 Enclosures for Electrical Equipment
   2. No. 67 Panelboards
   3. No. 489 Molded Case Circuit Breakers and Circuit Breaker enclosures

C. National Fire Protection Association (NFPA):
   1. No. 70-2019 California Electrical Code (CEC)

D. National Electrical Manufacturers Association (NEMA):
   1. No. PB-1 Panelboards.
   2. No. AB-3 Molded Case Circuit Breakers and Their Application.

PART 2 - PRODUCTS

2.1 PANELBOARDS

A. Panelboards shall be in accordance with UL, NEMA, NEC, CEC and as shown on the drawings. Approved manufacturer is Eaton.

B. Panelboards shall be standard manufactured products. All components of the panelboards shall be the product and assembly of the same manufacturer. All similar units of all panelboards to be of the same manufacturer.

C. All panelboards shall be dead front safety type. Arrange sections for easy removal without disturbing other sections.

D. All panelboards shall be completely factory assembled with molded case circuit breakers. All factory wiring shall be checked for correct tightness and visually inspected to insure that bussing and terminations have not become loose in transit to job site.

E. Panelboards shall have main breaker or main lugs, bus size, voltage, phase, top or bottom feed, and flush or surface mounting as scheduled on the drawings. Refer to single line diagram and panel schedules on drawings. Terminals shall be minimum 75 degree rated. Back fed main circuit breakers are not allowed. Main circuit breakers shall be vertically mounted.

F. Panelboards shall have the following features:
   1. Nonreduced size solid copper bus bars, and connection straps bolted together and rigidly supported on molded insulators. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of branch circuit devices.
   2. Full size neutral bar, mounted on insulated supports.
   3. Ground bar with sufficient terminals for all grounding wires. Buses braced for the available short circuit current.
   4. All breakers and phase bus connections shall be arranged so that it will be possible to substitute a 2-pole breaker for two single pole breakers, and a 3-pole breaker for three single pole breakers, when trip is 30 amps or less and frame size is 100 amperes or less, without having to drill and tap the main bus bars at bus straps. Where used for heating and air conditioning, and refrigeration equipment, use only HACR type U.L. listed circuit breakers.
   5. Design interior so that protective devices can be replaced without removing adjacent units, main bus connectors, and without drilling or tapping.
   6. Where designated on panel schedule as "space", include all necessary bussing, device support and connections. Provide blank cover for each space.
   7. Series rated panelboards are not permitted.

8. Label all panels in accordance with Section 26 05 53, IDENTIFICATION OF ELECTRICAL SYSTEMS.
9. Panel spare conduit: Provide (1) ¾ inch spare conduit stubbed to accessible ceiling space and/or interstitial space below floor for every (5) spaces and spares indicated on panel schedules.

G. Panelboards serving as building mains shall be “service entrance rated” and UL Listed as “service equipment”.

2.2 CABINETS AND TRIMS

A. Cabinets:
1. Provide galvanized steel cabinets to house panelboards. Cabinets for outdoor panels shall be factory primed and suitably treated with a corrosion-resisting paint finish meeting UL standard for outdoor applications.
2. All ventilated openings in panelboards and switchboards, shall be furnished with dust filters to prevent entrance of dust and debris.
3. Cabinets for panelboards may be of one piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.
4. Provide necessary hardware for "in" and "out" adjustment of panel interior.
5. Cabinets for two section panelboards shall be arranged side by side, and shall be the same height. Flush mounted cabinets should be 1 1/2" apart and coupled by conduit nipple.
6. Gutter size in panel boxes, on all sides, shall be in accordance with the CEC. Penetrations through gutter to live area of the panelboard shall incorporate approved non-metallic-grommet type of insulation to protect wire passing through.

B. Trims:
1. Fabricate trim of sheet steel consisting of frame with door attached by concealed hinges. Provide flush or surface trim as shown on the drawings.
2. Flush trims shall overlap the box by at least 3/4" all around.
3. Surface trim shall have the same width and height as the box.
4. Flush or surface trims shall not have ventilating openings.
5. Secure trims to back boxes by indicating trim clamps.
6. Provide a welded angle on rear of trim to support and align trim to cabinet.
7. Provide separate trims for each section of multiple section panelboards. Trims and doors of sections shall be of the same height.

C. Doors:
1. Provide doors with flush type latch and manufacturer's standard lock. Doors over 48 inches in height shall have a vault handle and a three-point catch, arranged to fasten door at top, bottom, and center.
2. In making switching devices accessible, doors shall not uncover any live parts.
3. Provide concealed hinges welded to the doors and trims.
4. For lighting or power contactors incorporated in panelboards, provide separate doors for the contactors.
5. Provide keyed alike system for all panelboards.
6. Provide a directory card, metal holder, and transparent cover. Permanently mount holders on inside of doors.

D. Painting:

1. Thoroughly clean and paint trims and doors at the factory with primer and manufacturer's standard finish.

2.3 MOLDED CASE CIRCUIT BREAKERS FOR PANELBOARDS

A. Breakers shall be UL listed and labeled, in accordance with the CEC, as shown on the drawings, and as specified.

B. Circuit breakers in panelboards shall be bolt on type on phase bus bar or branch circuit bar.
   1. Molded case circuit breakers for lighting and appliance branch circuit panelboards shall have minimum interrupting rating as indicated or as dictated by Section 26 05 73 OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY.
   2. Molded case circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for 100 ampere frame or less. Magnetic trip shall be adjustable from 3 times to 10 times for breakers with 600 ampere frames and higher. Factory setting shall be HI, unless otherwise noted.

C. Breaker features shall be as follows:
   1. Integral housing of molded insulating material.
   2. Silver alloy contacts.
   3. Arc quenchers and phase barriers for each pole.
   4. Quick-make, quick-break, operating mechanisms.
   5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
   6. Electrically and mechanically trip free.
   7. An operating handle which indicates ON, TRIPPED, and OFF positions.
      a. Line connections shall be bolted.
      b. Interrupting rating shall not be less than the maximum short circuit current available at the line terminals as indicated on the drawings, and as shown on the electrical system protective device study as required in Section 26 05 73 OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY. The interrupting rating shall not be less than the minimum identified requirement.
   8. An overload on one pole of a multipole breaker shall automatically cause all the poles of the breaker to open.

2.4 SEPARATELY ENCLOSED MOLDED CASE CIRCUIT BREAKERS

A. Where separately enclosed molded case circuit breakers are shown on the drawings, provide circuit breakers in accordance with the applicable requirements of those specified for panelboards.

B. Enclosures are to be of the NEMA types shown on the drawings. Where the types are not shown, they are to be the NEMA type most suitable for the environmental conditions where the breakers are being installed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with CEC, as shown on the drawings, and as specified.

B. Locate panelboards so that the present and future conduits can be conveniently connected. Coordinate the sizes and layout of cabinets within the designated spaces. All equipment must be dimensioned in order to physically fit in the spaces provided and to comply with all code required clearances.

C. Install a typewritten schedule of circuits in each panelboard. Include the room numbers (as finally described by the Owner) and items served on the cards. Obtain final room numbers from Architect prior to creating schedule.

D. Mount the panelboard so that maximum height of the top circuit breaker above finished floor shall not exceed 78 inches.

E. For panelboards located in areas accessible to the public, paint the exposed surfaces of the trims, doors, and boxes with finishes to match surrounding surfaces after the panelboards have been installed.

F. Circuit numbers shall correspond to the approved panel schedule. Provide as-built drawings showing the actual circuit numbers being used for each device on each branch circuit if changes are required.

G. Verify depth of all flushmounted enclosures in walls to be certain wall depth will accommodate panel depth prior to installation.

H. All openings in switchgear and panelboards that are unused shall be sealed with bolts and washers. Use caulking where holes or openings cannot be sealed by way of a washer, or bolts or conduit seals.

I. Contractor shall include the services of an independent testing company to test GFI circuit breakers in distribution and main panelboards.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Wiring devices.

B. Related Work:
   1. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
   3. Section 26 05 19, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
   4. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

PART 2 - PRODUCTS

2.1 RECEPTACLES

A. General: All receptacles shall be listed by Underwriters Laboratories, Inc.
   1. Mounting straps shall be plated steel, with break-off plaster ears and shall include a self-grounding feature (this feature does not substitute for a grounding conductor terminated on grounding strap of device). Terminal screws shall be brass, brass plated or a copper alloy metal.

   2. Receptacles shall be of a screw terminal type, “pressure type quick wire” terminations are not allowed.
   3. Duplex receptacles shall be premium grade single phase, 20 ampere, 120 volts, 2-pole, 3-wire, and conform to the NEMA 5-20R configuration in NEMA WD 6. The duplex type shall have bussing break-off feature for two-circuit operation. The ungrounded pole of each receptacle shall be provided with a separate terminal.

   4. Wiring device color selection to be provided by Architect. Contractor to verify device color with Architect prior to procurement.

   5. Controlled receptacles; installed per requirements of 2016 BUILDING ENERGY EFFICIENCY STANDARDS / Efficiency Standards, California Code of Regulations, Title 24, Part 6. SECTION 130.5 (d) – ELECTRICAL POWER DISTRIBUTION SYSTEMS as Circuit Controls for 120-Volt Receptacles and / or Controlled

Receptacles. Shall be provided with an approved means of including a permanent and durable marking identifying the controlled receptacles or circuits to differentiate them from uncontrolled receptacles or circuits. Where shown on associated floor plans, and or required by the Standards; a duplex noted to be controlled shall be 'split-wire', so the top outlet shall be switched and the bottom outlet shall be unswitched. A double duplex (fourplex) noted to be controlled: one of the duplex receptacles shall be controlled and the other duplex receptacle shall be unswitched.

6. Duplex Receptacles on Emergency Circuit: Receptacle bodies shall be red in color. Wall plates shall also be powder coat painted red finish. Cover shall be labeled with panel and circuit number.
7. Ground Fault Interrupter Duplex Receptacles: Shall be an integral unit suitable for mounting in a standard outlet box.
   a. Ground fault interrupter shall be commercial grade and consist of a differential current transformer, solid state sensing circuitry and a circuit interrupter switch. It shall be rated for operation on a 60 Hz, 120 volt, 20-ampere branch circuit. Device shall meet CEC requirements. Device shall have a minimum nominal tripping time of 1/30th of a second. Devices shall meet UL 943.
8. Isolated Ground Type Duplex Receptacles:
   a. Shall be provided with orange dot or triangle, color to be selected by architect.
   b. Shall be commercial grade and 20 amp 120 volt, UL listed as “Isolated Ground”.
9.
10. Ground Fault Interrupter Duplex Receptacles: Shall be an integral unit suitable for mounting in a standard outlet box.
    a. Ground fault interrupter shall be commercial grade and consist of a differential current transformer, solid state sensing circuitry and a circuit interrupter switch. It shall be rated for operation on a 60 Hz, 120 volt, 20-ampere branch circuit. Device shall meet CEC requirements. Device shall have a minimum nominal tripping time of 1/30th of a second. Devices shall meet UL 943.

B. Receptacles; 20, 30 and 50 ampere, 250 volts: Shall be complete and match with appropriate cord grip plug. Devices shall meet UL 231.

C. Weatherproof Receptacles: Shall consist of a listed cast aluminum weather resistant duplex receptacle, mounted in box with a gasketed, weatherproof, cast, while in use cover plate and cap receptacle opening. The cap shall be permanently attached to the cover plate by a spring-hinged flap.

2.2 SWITCHES AND DIMMERS

A. Toggle switches shall be totally enclosed tumbler type with bodies of phenolic compound. Toggle handles color to match receptacle device color unless otherwise specified.
   1. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self grounding mounting strap with break-off plasters ears and be of a screw terminal type.
   2. Shall be color coded for current rating, listed by Underwriters Laboratories, Inc., and meet the requirements of NEMA WD 1, Heavy-Duty and UL 20.
   3. Ratings:
      a. 120 volt circuits: 20 amperes at 120-277 volts AC.
      b. 277 volt circuits: 20 amperes at 277 volts AC.
   4. The switches shall be mounted on the strike plate side of doors.

5. Incorporate barriers between switches with multi-gang outlet boxes where required by the CEC.
6. All toggle switches shall be of the same manufacturer.

2.3 WALL PLATES

A. Wall plates for switches and receptacles shall be nylon.

B. Standard NEMA design, so that products of different manufacturers will be interchangeable. Dimensions for openings in wall plates shall be accordance with NEMA WD1.

C. For receptacles or switches ganged together, wall plates shall be a single ganged plate.

D. Wall plates for data, telephone or other communication outlets shall be as specified in the associated specification.

E. Surface mounted boxes, NEMA1, shall be industrial grade raised galvanized steel covers. In shop areas all receptacles shall be dust proof and or waterproof where applicable.

F. Waterproof device covers shall be cast iron, 4-corner screw type, for FS and FD type mounting. Device covers shall be zinc galvanized finish. Weatherproof covers shall be lockable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Switches installed in hazardous areas shall be explosion proof type in accordance with the CEC and as shown on the drawings.

B. Installation shall be in accordance with the CEC, NECA “Standard of Installation”, and as shown as on the drawings.

C. Ground terminal of each receptacle shall be bonded to the outlet box with an approved green bonding jumper, and also be connected to the green equipment grounding conductor.

D. General: Devices shall be of the type specified herein. All devices shall be installed with “pigtailed” leads from the outlet box. No device shall be used in the “feed through” application. Screw terminals shall be used to connect all devices to the circuit and shall be grounded by means of a ground wire where grounding terminals are provided in the device.

E. Installation: Devices and plates shall be installed in a “plumb” condition and must be flush with the finish surface of the wall where boxes are recessed.

F. Mounting heights: All control and convenience devices shall comply with California Code of Regulations Title 24 and ADA with respect to accessibility requirements. Mounting heights are indicated on plans.

G. Install receptacles with the ground down.

H. Install switches with the off position down.

I. Clean debris from outlet boxes.

J. Provide extension rings as required to bring outlet boxes flush with finished surface or casework.

K. Test each receptacle device for proper polarity.

END OF SECTION

SECTION 26 43 00 – SURGE PROTECTION DEVICES (SPD)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. SPD for service entrance.

1.3 SUBMITTALS

A. Submit all related SPD Specifications, Drawings, maintenance manuals, installation instructions, and UL 1449, third edition, listed surge suppression ratings of specified protection modes.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: ISO-9001 certification or SPD manufacturer's complete quality control and documentation procedures of firms regularly engaged in the manufacturer of SPD product for Category-C3 (ANSI/IEEE C62.41) and whose product have been in satisfactory service for not less than 5 years.

B. Provide local support for the SPD.

C. Warrant the service entrance SPD for 5 years for complete parts and factory provided on site labor. Warrant the distribution panel SPD for 1 year.

D. Both the service entrance and distribution panel SPD of the same manufacturer.

1.5 CODES AND STANDARDS

A. Listed per UL 1449, third edition, and complimentary listed per UL 1283 as an RFI/EMI filter.

B. Comply with ANSI/IEEE (C62.1 or C62.11) and C62.45 test procedures for Category-C3 established in C62.41 (1991).

C. Comply with NEMA as applicable to construction and NEC 280 for installation and NEC 110.9/110.10 for overcurrent protection.

D. Design and tested to survive the following 8x20 microsecond surge currents following IEEE Test Procedures and wait times established in C62.1/C62.11 and C62.45:

Wye Systems	Delta Systems
Line to Ground: 10 x 25 KA	Line to Line: 10 x 25 KA
Line to Neutral: 10 x 25 KA	Line to Ground: 10 x 25 KA
Neutral to Ground: 10 x 25 K	

E. The individual protection mode designed and tested to survive 1250 Category-C3 (10KA) surge currents as described in IEEE C62.41 (1991).

PART 2 - PRODUCTS

2.1 SPD FOR SERVICE ENTRANCE

A. Install SPD devices at service entrances of each building and as shown on plans.

B. Wye systems shall have suppression elements between each phase conductor and the system neutral, between each phase conductor and the system ground and between the neutral conductor and ground.

C. Each phase shall have a minimum of two modules. Fuse the surge modules at a minimum rating of 10 amp and a current limit rating of 200,000 AIC. Modules and fuses field replaceable.

D. Provide visible indication of proper SPD connection and operation. The indicator consists of an LED array. Use no single LED or neon indicators.

E. Equip the SPD device with an audible alarm that shall actuate when any part of the surge circuitry has been damaged. Provide a silence button with the alarm.

F. The SPD shall exhibit Sine Wave Tracking circuitry and shall provide high frequency noise filtering up to 40dB attenuation (100KHZ to 100MHZ).

G. SPD shall meet or exceed the following criteria:
1. Minimum single impulse current rating (l-N + l-G): 100,000 amp per phase.
2. Incorporate hybrid circuitry.
3. UL 1449, third edition, (ANSI C62.41-1991 Category-C) clamping voltage shall not exceed the following:

Voltage	L-N	L-G	N-G
120/208	400 volt	400 volt	400 volt
277/480	800 volt	800 volt	800 volt

4. The Category-C3 clamping voltage ANSI/IEEE C.62-41-1991 (20KV-1.2/50 microseconds, 10KA-8.20 microseconds shall not exceed the following:

Voltage	L-N	L-G	N-G
120/208	550 volt	550 volt	550 volt
277/480	975 volt	975 volt	975 volt

H. Provide full redundant protection for each phase that consists of solid-state components and shall operate bi-directionally.

I. Maximum Continuous Operating Voltage of the SPD: Greater than 110 percent of the nominal system voltage.

J. Provide an internal disconnect (3-pole, UL listed).

K. Manufacturers: Eaton, Square D.

PART 3 - EXECUTION

3.1 SERVICE ENTRANCE

A. Install one SPD at each utility service entrance and as indicated on Drawings. Follow manufacturer's installation instructions.

B. Install SPD on the load side of the service entrance. Provide breaker for disconnect in service entrance equipment, size breaker to manufacturers installation instructions.

C. Provide 6AWG stranded copper conductor or larger conductors between SPD and point of attachment. Keep the conductors short and straight as possible. Provide 36-inch maximum lead length of connecting conductors.

D. Bond SPD's ground to the service entrance ground.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 51 00 – INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Interior lighting systems, including luminaires, drivers, lamps and emergency lighting equipment.

B. Related Work:
   1. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings, and boxes for raceway systems.
   3. Section 26 05 19, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low voltage power and lighting wiring.
   4. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
   5. Section 26 56 00, SITE LIGHTING.
   6. Section 26 56 70, LIGHTING ACCEPTANCE TESTING.

1.3 SUBMITTALS

A. Submit in accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

B. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   2. Include electrical ratings, dimensions, mounting, details, materials, terminations, wiring and connection diagrams, photometric data, ballasts, luminaires, lamps and controls.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM).

C. American National Standards Institute (ANSI).

D. Aluminum Association Inc. (AA).

E. Illuminating Engineering Society of North America (IESNA).

F. National Electrical Manufacturers Association (NEMA).

G. National Fire Protection Association (NFPA).

H. Underwriters Laboratories, Inc. (UL).

1.5 DEFINITIONS

A. Lighting terminology used herein is defined in IES

B. Exception: The term “driver” is used herein to cover both drivers and power supplies, where applicable.

C. Clarification: The term “LED light source(s)” is used herein per IES to cover LED package(s), module(s), and array(s).

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment shall be in accordance with CEC, UL, ANSI, and as shown on the drawings and specified.

2.2 LIGHTING FIXTURES (LUMINAIRES)

A. Shall be in accordance with NFPA 70, UL 1598 and shall be as shown on drawings and as specified. All luminaires shall have been certified to the California Energy Commission by its manufacturer to comply with the efficiency standards as per California Code of Regulations Title 24, Part 6, Section 111 referencing the Appliance Efficiency Regulations in Title 20. Post certification with building permit.

B. Sheet Metal:
   1. Shall be formed to prevent warping and sagging. Housing, trim and lens frame shall be true, straight (unless intentionally curved) and parallel to each other as designed.
   2. Wireways and fittings shall be free of burrs and sharp edges and shall accommodate internal and branch circuit wiring without damage to the wiring.
   3. When installed, any exposed fixture housing surface, trim frame, door frame and lens frame shall be free of light leaks; lens doors shall close in a light tight manner.
      a. Hinged door closure frames shall operate smoothly without binding when the fixture is in the installed position, and latches shall function easily by finger action without the use of tools.

C. Recessed fixtures shall be of the type approved for the ceiling and insulation conditions and appropriate for the installation location. Insulation must be held back from the fixture to provide manufacturers' recommended clearances for proper operation. Thermal tripping shall be the installer's responsibility to correct. Where installed in fire rated ceilings, coordinate installation of fire rated enclosures around the ceiling penetrations. Fixtures shall contain the proper through wiring capacity for that which is shown on the plans.

D. Recessed fixtures shall be provided with the appropriate trims and hardware compatible with the ceiling type shown. Plaster frames are required where plaster or gypsum board ceilings are encountered.

E. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by captive screws, chains, captive hinges or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.

F. Metal Finishes:
1. The manufacturer shall apply standard finish (unless otherwise specified) over a corrosion resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping or shearing processes shall be finished in a similar corrosion resistant manner to match the adjacent surface(s). Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking.
2. Interior light reflecting finishes shall be white with not less than 85 percent reflectances, except where otherwise specified on the drawing.
3. Exterior finishes shall be as shown on the drawings.

G. Provide all lighting fixtures with a specific means for grounding metallic wireways and housings to an equipment grounding conductor.

H. Light Transmitting Components for Fixtures:
1. Shall be 100 percent virgin acrylic plastic or water white, annealed, crystal glass.
2. Flat lens panels shall have not less than 1/8 inch of average thickness. The average thickness shall be determined by adding the maximum thickness to the minimum unpenetrated thickness and dividing the sum by 2.
3. Unless otherwise specified, lenses, diffusers and louvers shall be retained firmly in a metal frame by clips or clamping ring in such a manner as to allow expansion and contraction of the lens without distortion or cracking.

I. Recessed LED fixtures shall be manufactured specifically for LED lamps with ballasts or drivers integral to the fixture. Assemblies designed to retrofit fixtures are prohibited except when described in this fashion. Fixtures shall be designed for lamps as specified.

J. Provide fixtures with a U.L. listing for shower or shower rating above shower or tub areas.

2.3 LED LUMINAIRE REQUIREMENTS

A. General Requirements:
1. Luminaire shall have an external label per ANSI C136.15
2. Luminaire shall have an internal label per ANSI C136.22.
3. Luminaires shall start and operate in -20°C to +40°C ambient.

4. LED light source(s) and driver(s) shall be RoHS compliant.

2.4 LED DRIVER

A. Driver
1. Rated case temperature shall be suitable for operation in the luminaire operating in the ambient temperatures as indicated.
2. Shall accept the voltage or voltage range indicated, and shall operate normally for input voltage fluctuations of plus or minus 10 percent. Consistent with NEMA SSL 1.
3. Shall have a minimum Power Factor (PF) of 0.90 at full input power and across specified voltage range.

B. Electromagnetic interference
1. Shall have a maximum Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.
2. Shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.

C. The following shall be in accordance with corresponding sections of ANSI C136.37
1. Wiring and grounding
2. All internal components shall be assembled and pre-wired using modular electrical connections.
3. Mounting provisions
4. Terminal blocks for incoming AC lines
5. Latching and hinging
6. Ingress protection

2.5 LAMPS

A. LED LIGHT SOURCE
1. Minimum Color Rendering Index (CRI): 60.
2. Correlated Color Temperature (CCT)
   a. CCT shall be as listed in Table 1 below:

Table 1. Allowable CCT

Manufacturer-Rated Nominal CCT (K)	Allowable LM-79 Chromaticity Values Measured CCT (K)
2700	2580 to 2870
3000	2870 to 3220
3500	3220 to 3710
4000	3710 to 4260
4500	4260 to 4746
5000	4745 to 5311
5700	5310 to 6020
6500	6020 to 7040

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation and furnishing of lighting fixtures shall be in accordance with the CEC, manufacturer's instructions and as shown on the drawings or specified. Fixtures damaged in transit and storage prior to completion shall be replaced at Contractor's expense.

B. Align, mount and level the lighting fixtures uniformly.

C. Avoid interference with and provide clearance for equipment. Where the indicated locations for the lighting fixtures conflict with the locations for equipment, change the locations for the lighting fixtures by the minimum distances necessary as approved by the Architect. The Architectural reflected ceiling plan will take precedence over electrical plans.

D. For suspended lighting fixtures, the mounting heights shall provide the clearances between the bottoms of the fixtures and the finished floors as shown on the drawings.

E. Lighting Fixture Supports:
   1. Contractor shall provide support for all of the fixtures independent of suspended ceilings. Supports may be anchored to channels of the ceiling construction, to the structural slab or to structural members within a partition, or above a suspended ceiling.
   2. Shall maintain the fixture positions after cleaning and relamping.
   3. Shall support the lighting fixtures without causing the ceiling or partition to deflect.
   4. Hardware for recessed fluorescent fixtures:
   5. Fixtures shall be supported as detailed on drawings and as required by DSA standards.
   6. Installation: Fixtures shall be securely mounted on ceilings and walls with appropriate fastening devices. "Lay-in" type T-bar fixtures shall be secured with #12 gauge safety "earthquake wires" as described by California Code of Regulations Title 24 Part 2, Chapter 47. "Tech screws" will be required for fastening to the T-bar system in addition to safety wire. Surface mounted fluorescent fixtures shall be solidly screwed or clipped into framing above drywall with 4-#10 sheet metal screws into each fixture. Provide steel framing for screw supports behind all surface mounted lighting fixtures weighing more than 15 lbs.
   7. Surface mounted lighting fixtures:
      a. Fixtures shall be bolted against the ceiling independent of the outlet box at four points spaced near the corners of each unit. The bolts shall be minimum ¼-20 bolt, secured to structural ceiling. Non-turning studs may be attached to the building structure by 12 gauge safety hangers.
   8. Fixtures mounted in open construction shall be secured directly to the building structure with approved bolting and clamping devices.
   9. Single or double pendent mounted lighting fixtures:
      a. Each stem shall be supported by an approved outlet box, mounted swivel joint and canopy which holds the stem captive and provides spring load (or approved equivalent) dampening of fixture oscillations. Outlet box shall be supported vertically from the building structure and be allowed to swing to a 45 degree angle.
   10. Outlet boxes for support of lighting fixtures (where permitted) shall be secured directly to the building structure with approved devices or supported vertically in a hung ceiling from the building structure with a nine gauge wire hanger, and be secured by an approved

device to a main ceiling runner or cross runner to prevent any horizontal movement relative to the ceiling.

F. Furnish and install the specified lamps for all lighting fixtures as part of this project.

G. Coordinate between the electrical and ceiling trades to ascertain that approved lighting fixtures are furnished in the proper sizes and installed with the proper devices (hangers, clips, trim frames, flanges), to match the ceiling system being installed.

H. Bond lighting fixtures and metal accessories to the grounding system as specified in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

I. At completion of project, replace all fixtures which have failed. Clean all fixtures, lenses, diffusers and louvers that have accumulated dust/dirt during construction.

J. Wallmount fixtures in walkway areas shall not project more than 4 inches from wall when projection occurs lower than 80 inches.

END OF SECTION

SECTION 26 56 00 – SITE LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of exterior luminaires, controls, poles and supports.

1.2 RELATED WORK

A. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

B. Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings, and boxes for raceway systems.

C. Section 26 05 19, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low voltage power and lighting wiring.

D. Section 26 05 46.13, ELECTRIC UTILITY SYSTEMS: Underground handholes and conduits.

E. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

F. Section 26 51 00, INTERIOR LIGHTING.

G. Section 26 56 70, LIGHTING ACCEPTANCE TESTING.

1.3 SUBMITTALS

A. Submit in accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

B. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   2. Include electrical ratings, dimensions, mounting, details, materials, required clearances, terminations, wiring and connection diagrams, photometric data, ballasts, poles, luminaires, effective projected area (EPA), lamps and controls.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM).

C. American Concrete Institute (ACI).

D. American National Standards Institute (ANSI).

E. Aluminum Association Inc. (AA).

F. Illuminating Engineering Society of North America (IESNA).

G. National Electrical Manufacturers Association (NEMA).

H. National Fire Protection Association (NFPA).

I. Underwriters Laboratories, Inc. (UL).

1.5 DELIVERY, STORAGE, AND HANDLING

A. Poles: Do not store poles on ground. Store poles so they are at least one foot above ground level. Do not remove factory-applied pole wrappings until just prior to installation of pole.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment shall be in accordance with CEC, UL, ANSI, and as shown on the drawings and specified.

2.2 POLES

A. General:
   1. Poles shall be steel as specified in fixture schedule and as shown on the drawings. Finish shall be as approved by the Architect. Assume custom color for bidding.
   2. The pole and arm assembly shall be designed for wind loading of 100 miles per hour, with an additional 30 percent gust factor, supporting luminaire(s) having the effective projected areas indicated per manufacturer data.
   3. Poles shall anchor-bolt type designed for use with underground supply conductors. Poles shall have handhole with a minimum clear opening of 2.5” x 5”. Handhole cover shall be secured by stainless steel captive screws.
   4. Provide a steel grounding stud opposite hand hole openings.

B. Provide a base cover matching the pole in material and color to conceal the mounting hardware pole-base welds and anchor bolts.

C. Hardware: All necessary hardware shall be 300 series tamperproof stainless steel.

2.3 FOUNDATIONS FOR POLES

A. Foundations shall be cast-in-place concrete.

B. Foundations shall support the effective projected area of the specified pole, arm(s), and luminaire(s) under wind conditions previously specified in this section.

C. Place concrete in spirally wrapped treated paper forms for round foundations, and construct forms for square foundations.

D. Rub-finish and round all above-grade concrete edges to approximately 1/4” radius unless otherwise detailed.

E. Concrete shall have 3000 psi minimum 28 day compressive strength.

F. Anchor bolt assemblies and reinforcing of concrete foundations shall be as shown on the drawings and meet ACI 318. Anchor bolts shall be in a welded cage or properly positioned by the tie wire to stirrups.

G. Install a copperclad ground rod, not less than 3/4” diameter by 10’ long in pullbox adjacent to each fixture. Where rock or layered rock is present, drill a hole not less than 2” in diameter and 6’ deep, backfill with tamped fine sand and drive the rod into the hole. Bond the rod to the pole with not less than number 6 AWG bare copper wires. The method of bonding shall be approved for the purpose.

H. After leveling of pole grout base solid between plate and footing with dry pack concrete for vibration reduction.

2.4 LUMINAIRES

A. UL 1598 and ANSI C136.17. Luminaries shall be weatherproof, heavy duty, outdoor types designed for efficient light utilization, adequate dissipation of lamp and ballast heat and safe cleaning and relamping.

B. Light emitting diode (LED)-based solid state lighting (SSL) products shall be factory tested in accordance to the International Engineering Society (IES) LM-79 recommendations and meet ANSI C78.377-2008 standards.

C. LED light sources shall be factory tested in accordance to IES LM-80 recommendations.

D. LED-based SSL product shall incorporate an external heat sink, integral to the luminaire.

E. IESNA HB-9 and RP-8 light distribution pattern types shall be as indicated on the drawings.

F. Incorporate associated drivers within the luminaire housing.

G. Lenses shall be frame-mounted heat-resistant, borosilicate glass, prismatic refractors. Attach the frame to the luminaire housing by hinges or chain.

H. Pre-wire internal components to terminal strips at the factory.

I. Bracket mounted luminaries shall have leveling provisions and clamp type adjustable slip-fitters with locking screws.

J. Materials shall be rustproof. Latches and fittings shall be non-ferrous metal.

K. LED-based SSL luminaires shall be manufactured specifically for LED lamps with drivers integral to the luminaire housing.

L. Shall be listed by either U.L. or equal listing agency and comply with IEEE C.62.41-1991, Class A operation.

M. Provide a minimum power factor of 0.9.

N. Minimum operating temperature appropriate for outdoor environments.

O. Shall operate at a frequency greater than or equal to 120Hz.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lighting in accordance with the CEC, as shown on the drawings, and in accordance with manufacturer's recommendations.

B. Poles:
   1. Provide pole foundations with galvanized steel anchor bolts, threaded at the top end and bent 1.57 rad 90 degrees at the bottom end. Provide galvanized nuts, washers, and ornamental covers for anchor bolts. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath and the end of conduit elbow. Adjust poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location.
   2. After the poles have been installed, shimmed and plumbed, grout the spaces between the pole bases and the concrete base with non-shrink concrete grout material. Provide a plastic or copper tube, of not less than 3/8" inside diameter, through the grout tight to the top of the concrete base for moisture weeping.

C. Foundation Excavation: Depth shall be as indicated on drawings. Dig holes large enough to permit the proper use of tampers to the full depth of the hole. Place backfill in the hole in 6" maximum layers and thoroughly tamp. Place surplus earth around the pole in a conical shape and pack tightly to drain water away.

3.2 GROUNDING

A. Ground noncurrent-carrying parts of equipment including metal poles, luminaries, mounting arms, brackets, and metallic enclosures as specified in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or alloyed connectors suitable and listed for this purpose.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 56 70 - LIGHTING ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
1. A Certificate of Acceptance will be required to be filed (by the Contractor) with and approved by the enforcement agency prior to receiving a final occupancy permit. The Certificate of Acceptance will indicate that the Contractor has demonstrated acceptance requirements of the plans and specifications, that current requirements for installation certificates are met, and that currently required operating and maintenance information (as well as the Certificate of Acceptance) were provided to the building Owner.
2. Testing, evaluation and calibration of lighting controls equipment provided, installed and connected in Division 26.
3. Documentation of test results, completion of “Certificate of Acceptance” and “Certificate of Installation” forms and filing with the enforcement agency for approval.
4. Specific Jobsite Conditions:
   a. Acceptance testing must be tailored for each specific design, job site, and climactic conditions. While the steps for conducting each test remain consistent, the application of the tests to a particular site may vary. The Contractor shall review the construction documents and include all required time, material, testing equipment, etc. as required to complete the requirements of this section.

B. Related Work:
1. Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.
2. Section 26 51 00, INTERIOR LIGHTING.
3. Section 26 56 00, SITE LIGHTING.
4. Section 26 09 43, NETWORK LIGHTING CONTROLS.
5. Section 26 09 00, CONTROLS AND INSTRUMENTATION.
6. Section 26 09 23, OCCUPANCY SENSORS.

1.3 REFERENCES

A. Acceptance Testing Criteria: 2019 Building Energy Efficiency Standards Non-Residential Compliance Manual.

1.4 SYSTEM DESCRIPTION

A. Performance Requirements:

1. All material, equipment, labor and technical supervision to perform tests, calibrations and documentation specified herein.

B. Scope of Testing, Evaluation and Calibration (as applicable):
1. Automatic (master) time switches.
2. Occupancy sensors.
3. Automatic daylighting controls.
4. Photo electric sensors.
5. Daylighting controls.
6. Outdoor astronomical time switches.
7. Area controls.

1.5 SUBMITTALS

A. Test Reports:
1. Written record of all tests and completion of forms included in this section.
2. At completion of project, assemble a final test report. Submit report to the enforcement agency and the Owner prior to final occupancy to include:
   a. Summary of project.
   b. Description of systems and equipment tested.
   c. Visual inspection report.
   d. Description of tests.
   e. Test results.
   f. Conclusions and recommendations.
3. Report shall be bound in booklet form, include on the Contractor's letterhead the title of the report and the systems tested.

B. Constructability Plan Review
1. The Contractor shall review the construction drawings and specifications to understand the scope of the acceptance tests and raise critical issues that might affect the success of the acceptance tests prior to starting construction. Any constructability issues associated with the lighting system should be forwarded to the design team for review/modifications prior to equipment procurement and installation. The Contractor shall submit on company letterhead, with the lighting control equipment required by Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL, 1.4B, a letter confirming that the constructability review has been completed and their company has reviewed and is prepared to complete the lighting acceptance testing required by this section. The lighting acceptance testing shall be included in this letter at the time of equipment submittals.

PART 2 - PRODUCTS

2.1 FORMS

A. Lighting acceptance testing forms and verification procedures for lighting systems that require acceptance testing can be downloaded from the following website: http://www.energy.ca.gov/title24/2013standards/nonres_compliance_forms/

B. These completed forms will be the deliverable product to the enforcement agency and Owner as described in 1.4 of this section.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Tests:
1. Contractor's Responsibilities:
   a. Perform all required tests required by this section.
   b. Schedule testing with building Owner.
   c. Provide window/skylight masking material required to simulate dark conditions of test during evening hours.
   d. Calibration of equipment such as light meters, photo electric controls, etc.
   e. Programming of time switches (interior/exterior lighting) for operations as directed by the Owner.

3.2 ADJUSTING

A. Final Settings: The Contractor shall be responsible for implementing all final settings and adjustments on controls equipment as required for a complete and operating system.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 77 00 – ASSISTIVE LISTENING SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide assisted listening systems as described herein.

1.2 SUBMITTALS

A. Submit in accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

PART 2 - PRODUCTS

2.1 Assisted Listening Systems

A. Provide and install complete, ADA compliant Assisted Listening Systems as follows:
   1. The campus shall have (as a minimum):
      a. Portable system (Listen LS-88) consisting of a hard suitcase-style carrying case and containing:
         1) (1) LT-84-01 ListenIR Transmitter/Radiator Combo
         2) (2) LR-4200 IR Intelligent DSP IR Receiver
         3) (2) LA-430 Intelligent Ear Phone/Neck Loop Lanyard
         4) (2) LA-401 Universal Ear Speaker
         5) (1) LA-277 Conference Microphone
         6) (1) LA-338 Table Top Tripod
         7) (1) LA-346 Carrying Case
         8) (1) LA-423 4-port USB Charger
      b. The portable systems shall be located in an owner-approve space and be available for check out. Refer to Architectural specifications for signage requirements at conference rooms and assembly areas.

B. The entire system shall be of one manufacturer and shall carry a 2-year (minimum) warranty. The system shall be as manufactured by Listen Technologies or engineer approved equal.

C. For the fixed and portable systems, the quantity of wireless headsets on-site shall satisfy the ADA requirement of 4% of the occupancy in the largest conference room and/or assembly area. Refer to architectural sheets for occupancy loads/types. For each of the fixed ALS systems, the quantity of wireless headsets and neckloops shall also satisfy the ADA requirement of 4% of the occupancy in each classroom where a fixed ALS is installed.

D. In accordance with California Building Code, Assistive Listening Devices shall comply with all requirements set forth in 11B-706.
   1. Receivers required for use with an Assistive Listening System shall include a 1/8-inch (3.2mm) standard mono jack.

2. Receivers required to be hearing-aid compatible shall interface with telecoils in hearing aids through the provision of neckloops.
3. Assistive listening systems shall be capable of providing a sound pressure level of 110dB minimum and 118dB maximum with a dynamic range on the volume control of 50dB.
4. The signal-to-noise ratio for internally generated noise in assistive listening systems shall be 18dB minimum.
5. Peak clipping shall not exceed 18dB of clipping relative to the peaks of speech.

E. In accordance with California Building Code, Assistive Listening Devices shall comply with all signage requirements set forth in 11B-216.10
   1. Each assembly area required to provide assistive listening systems (portable or fixed) shall provide signs informing patrons of the availability of the assistive listening system. The sign shall include wording that states “Assistive-Listening System Available” and shall be posted in a prominent place at or near the assembly area entrance. Assistive listening signs shall comply with California Building Code (CBC) Section 11B-703.5 and shall include the International Symbol of Access for Hearing Loss complying with CBC Section 11B-703.7.2.4.

PART 3 - EXECUTION

3.1 COMMISSIONING

A. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, and servicing of the system. Provide a minimum of 2 hours training. Operators Manuals and Users Guides shall be provided at the time of this training.

B. Schedule training with Owner through the Architect, with at least seven days advance notice.

END OF SECTION

SECTION 26 91 15 - ELECTRICAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. General requirements that apply to implementation of commissioning of electrical equipment.

B. Related work:
1. 01 91 13 General Commissioning Processes lists Division 26 commissioned systems, and lists other commissioning sections in these Specifications.

1.2 RESPONSIBILITIES

A. Division 26 Contractors: Participate in the Commissioning process as a commissioning team member as described in Section 01 91 13 and in the Commissioning Plan

1.3 SUBMITTALS

A. Division 26 Contractors shall provide submittal documentation relative to commissioning as required in Section 01 30 00 Administrative Requirements.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. Refer to Section 01 91 13 Part 2 for Division 21, 22 and 23 requirements.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS REQUIREMENTS

A. Refer to Section 01 91 13 and the Commissioning Plan for information on meetings, functional testing, operations & maintenance data, training requirements, and other commissioning activities.

3.2 TESTING REQUIREMENTS

A. This section specifies the functional testing requirements for Division 16 systems and equipment. From these requirements, the Commissioning Provider will develop testing procedures in accordance with Section 01 91 13 and the Commissioning Plan. The test procedures for each piece of equipment or system will contain the information below.

1. Contractors responsible for installation, burn-in, and other testing must be completed with these tasks prior to commissioning testing.
2. Contractor responsibilities for executing functional tests.
3. A list of equipment & components being tested
4. Functions, modes, and testing conditions
5. Required monitoring
6. Acceptance criteria
7. Sampling strategies allowed

B. Sample lighting equipment testing requirements follow as an appendix to this Section.

END OF SECTION

SECTION 26 24 13 - SERVICE AND DISTRIBUTION SWITCHBOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Service and distribution switchboard where shown on the contract drawings and specified herein.
   2. Terms distribution switchboard and distribution panel are used interchangeably on the documents.

1.3 QUALITY ASSURANCE

A. Conform to applicable Codes and NEMA, ANSI and IEEE Standards.

1.4 SUBMITTALS

A. Conform to applicable provisions of Section 01 33 00 of Division 01, Submittals and of Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

B. Shop Drawings shall show and contain the following information:
   1. Plans showing top and bottom of switchboards.
   2. Front, rear and side elevations of switchboards.
   3. Schematic Wiring Diagrams showing the following:
      a. One-line diagram with each circuit numbered.
      b. Schedule showing circuit number, description and rating of protective device(s).
      c. Complete short circuit with standability of bus.
   4. One-half inch equal to one-foot scale drawings of electrical rooms or areas overall dimensions for equipment layout including space available for conduits and protective devices.

C. Manufacturer shall provide certification that the equipment supplied under this Section has been reviewed and certified by OSHPD to meet the current criteria for special seismic certification in compliance with 2013 CBC 1708A.4 and OSHPD CAN 2-1708A.4. Include seismic companion anchorage requirements from the testing and as approved by the manufacturer. The manufacturer shall provide an approved label on the equipment enclosure stating that the equipment has been awarded a certificate of compliance for special seismic certification. The label shall include OSHPD special seismic certification pre-approval (OSP) number when relevant.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Each switchboard shall be U.L. listed deadfront, deadrear, completely self-supporting, with the required number of vertical sections bolted together to form one floorstanding switchboard. Construction shall be NEMA Class II with line and load and main bus connections accessible from the front. Provide switchboards of 800 amperes or greater rating with line and load insulated bus bars. Overcurrent protective devices shall be grouped in convertible type construction. Vertical sections shall have full height bussing and where space for future devices is indicated on the Drawings all the necessary mounting hardware shall be furnished. Switchboards shall include all protective devices and other equipment indicated on the Contract Drawings with the necessary interconnections, instrumentation, and control wiring. Bus shall be solid copper. Bus bars shall be solid copper and mounted on supports of high impact-resistant, non-tracking insulating material, and braced to withstand the maximum available fault current as indicated on the Contract Drawings. Other ratings shall be as indicated on the Contract Drawings. Series-connected or "integrated equipment" short circuit ratings shall not be applied in lieu of, or to comply with, short circuit and interrupting capacity ratings indicated on the Drawings. Switchboards shall be as manufactured by Eaton.

B. Distribution sections shall contain circuit breakers, with shunt trips, ground fault protection, and other accessories, as indicated on the Drawings, as well as provisions for metering. Each disconnecting means shall be provided with a means for individual padlocking. Switches shall be heavy-duty, quick-make and quick-break, and horsepower rated through 500 HP. Switches rated over 600 amperes shall be bolted pressure contact type. Ratings of disconnecting means and overcurrent protective devices shall be as indicated on the Drawings.

C. Finish: Interior finish shall be a gray lacquer or enamel; exterior finish shall be a gray baked-on enamel or lacquer. Apply all finish coatings over a rust-inhibiting metal primer.

D. Identification: Each switchboard shall have an engraved laminated plastic nameplate identifying the switchboard as designated and located on the Contract Drawings, and indicating voltage, phase, and number of system conductors. For example, "Switchboard MS 277/480V. 3Ø 4W. Lettering shall be white on black finish and 2” high minimum. Nameplates shall be affixed by a minimum of two escutcheon pins or screws. Each device on the switchboard shall be provided with an engraved plastic nameplate as specified in Section 26 05 53, IDENTIFICATION OF ELECTRICAL SYSTEMS.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Switchboard(s) shall be securely bolted to the flooring or structure. Final attachment means shall be in compliance with the seismic requirements of governing authority. Shop Drawings indicating the bolt down requirements shall be provided by the manufacturer along with all necessary calculations and shall be submitted with the Shop Drawings of the switchboard equipment. Refer to other Sections of the Specifications related to seismic requirements.

B. Switchboard(s) shall be installed on a level floor, with shims provided where necessary to attain both horizontal and vertical "plumb" conditions.

C. Switchboard(s) equipment shall be protected during construction in such a manner to prevent plaster, paint, dust, etc. from defacing the finish of equipment. Prior to final acceptance of the equipment, the interior of the equipment shall be cleaned of all foreign materials and debris. Any blemishes or defects on the exterior of the equipment shall be repaired by painting the equipment with paint supplied by the manufacturer of the equipment to match the factory finishes.

D. All floor mounted switchgear and panelboards shall be sealed with caulking between bottom of metal housing and the concrete pad or slab to prevent entrance of dust and debris.

E. All openings in switchgear and panelboards that are unused shall be sealed with bolts and washers. Use caulking where holes or openings cannot be sealed by way of a washer, or bolts or conduit seals.

F. All ventilated openings in panelboards and switchboards shall be furnished with dust filters to prevent entrance of dust and debris.

G. No operating handles in any switchboard shall be located above 6’- 6” above finish floor. Code clearances on all sides of the switchboard equipment shall be maintained.

H. Switchboards shall be mechanically grounded to the grounding system.

I. Furnish ammeters, voltmeters, current and potential transformers, test blocks, control switches, fuses and circuit breakers, and other devices as indicated on the Drawings. Meters shall be switchboard type semi-flush mounted, with phase selector switches. The height of all devices shall comply with Code and utility company requirements with the switchboard installed on a 2” high concrete pad.

J. For solidly grounded "wye" services of more than 150 volts to ground, but not exceeding 600 volts phase to phase, provide ground fault protection of equipment for each service disconnecting means for services rated 1000 amperes or more, without a single main disconnecting means. Provide ground fault protection of equipment for other systems as indicated on the Drawings.

K. Ground fault sensors shall be zero sequence type unless indicated otherwise on the drawings. Trip settings shall be as indicated on the drawings or as directed by the Engineer.

L. Protection: Keep switchboards covered during construction operations. Clean interior and exterior after all connections are completed. Factory connections shall be checked and re-torqued tight as required. Damage shall be field or factory repaired to a condition acceptable to the Engineer at no added cost to the Owner.

M. Operational Test of the ground fault protection system using the primary current injection method shall be performed by qualified personnel with suitable testing/recording equipment in the presence of the Owner. Provide the Owner with a "Certified Test Report" including test parameters.

3.2 ACCEPTANCE TESTING OF SWITCHGEAR AND SWITCHBOARD ASSEMBLIES

A. General:
1. Inspect for physical damage.
2. Compare equipment nameplate information with latest single line diagram and report discrepancies.
3. Inspect for proper alignment, anchorage and grounding.
4. Check tightness of accessible bolted bus joints by calibrated torque wrench method. Refer to manufacturer's instruction for proper foot pound levels.
5. Key interlock systems shall be physically tested to insure proper function.
   a. Closure attempt shall be made on locked open devices. Opening attempt shall be made on locked closed devices.
   b. Key exchange shall be made with devices operated in off-normal positions.
6. All doors, panels and sections shall be inspected for paint, dents, scratches.

END OF SECTION

SECTION 27 13 00 - INTERCOMMUNICATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Telecommunications Cabling at the new or remodeled buildings for the project. Backbone and horizontal cabling comprised of copper and fiber cabling, and support systems are covered under this document.
   2. The Horizontal (workstation) Cabling System shall consist of a minimum of two (2) 4-pair Unshielded Twisted Pair (UTP) Copper Cables to each work area outlet unless otherwise noted for specific locations. The cables shall be installed from the Work Area Outlet to the Telecommunications Room (TR) located on the same floor, and routed to the appropriate rack serving that area and terminated as specified in this document.
   3. All cables and related terminations, support and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the Telecommunications contractor as detailed in this document.
   4. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types will be provided as an attachment to this document. If the bid documents are in conflict, this specification shall take precedence. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

1.3 REGULATORY REFERENCES

A. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the local Electrical Code and present manufacturing standards.

B. All materials shall be UL Listed and shall be marked as such. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

C. All modular jacks, patch cords, consolidation point, and patch cords performance shall be verified (not just tested) by a third party to be category 6 component and channel compliant.

D. The cabling system described in this is derived from the recommendations made in recognized telecommunications industry standards. The following documents are incorporated by reference:
   1. ANSI/TIA/EIA - 568-C.0, Generic Telecommunications Cabling for Customer Premises
   2. ANSI/TIA/EIA - 568-C.1, Commercial Building Telecommunications Cabling Standard.
   3. ANSI/TIA/EIA - 568-C.2, Balanced Twisted Pair Cabling Components, Addendum 1 –
   4. ANSI/TIA/EIA - 568-C.3, Optical Fiber Cabling Components
   5. ANSI/TIA/EIA – 569-A, Commercial Building Standard for Telecommunications Pathways and Spaces, February, 1998.
   6. ANSI/TIA/EIA – 606-A, Administration Standard for Telecommunications Infrastructure of Commercial Buildings, February, 2002.
   7. ANSI/TIA/EIA – 607-A, Commercial Building Grounding and Bonding Requirements for Telecommunications, August, 1994.
   8. ANSI/ TIA/EIA – 758, Customer-Owned Outside Plant Telecommunications Cabling Standard, April 1999.
   9. BICSI - TDMM, Building Industries Consulting Services International, Telecommunications Distribution Methods Manual (TDMM) – 10th Edition, 2003.
   10. National Fire Protection Agency (NFPA – 70), National Electrical Code (NEC) –2002.

E. If this document and any of the documents listed above are in conflict, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.

F. This document does not replace any code, either partially or wholly. The contractor must be aware of local codes that may impact this project.

1.4 APPROVED CONTRACTOR

A. The Telecommunications Contractor must be a Certified Installer for the products and/or system being supplied. A copy of certification documents must be submitted with the quote in order for such quote to be valid. The Telecommunications contractor is responsible for workmanship and installation practices in accordance with said certification. At least (1) for every (3) members of the copper installation and termination crew must be certified to a Technician Level of training by the product manufacturer or BICSI. At least (1) for every (5) members of the optical fiber installation and termination crew must be certified by the product manufacturer or other approved organizations in Optical Fiber installation and termination practices.

1.5 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations necessary to complete the installation of this structured cabling system in compliance with the specifications and drawings. The Telecommunications contractor will provide and install all of the required material to form a complete system.

B. The work shall include, but not be limited to the following:

1. Furnish and install a complete telecommunications wiring infrastructure as described on the plans and in these specifications.
2. Furnish, install, and terminate all UTP and Optical Fiber cable.
3. Furnish and install all wall plates, jacks, patch panels, and patch cords.
4. Furnish and install all required cabinets and/or racks as required and as indicated.
5. Furnish any other material required to form a complete system.
6. Perform link testing (100% of horizontal and/or backbone links) and certification of all components.
7. Furnish test results of all cabling to the owner on disk and paper format, listed by each closet, then by workstation ID.
8. Adhere and comply with all requirements of the product certification programs.
9. Provide owner training and documentation. (Testing documentation and As-built drawings).

1.6 SUBMITTALS

A. Submit in accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

B. Under the provisions of this request for proposal, prior to the start of work the telecommunications contractor shall:
   1. Submit copies of the certification of the company and names of staff that will be performing the installation and termination of the installation to provide proof of compliance of this spec.
   2. Submit proof from manufacturer of contractor’s good standing in manufacturer’s program.
   3. Submit appropriate cut sheets and samples for all products, hardware and cabling.

C. Work shall not proceed without the Owner's approval of the submitted items.

D. The telecommunications contractor shall receive approval from the Owners on all substitutions of material. No substituted materials shall be installed except by written approval from the Owner.

1.7 QUALITY ASSURANCE

A. The telecommunications contractor shall staff the project with qualified personnel. All products shall be new and in good condition.

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery and receipt of products shall be at the site described in the Scope Section.

B. Cable shall be stored according to manufacturer's recommendations as a minimum. In addition, cable must be stored in a location protected from vandalism and weather. If cable is stored outside, it must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage

location will be below 40 degrees F., the cable shall be moved to a heated (50 degrees F. minimum) location. If necessary, cable shall be stored off site at the contractor's expense.

C. If the telecommunications contractor wishes to have a trailer on site for storage of materials, arrangements shall be made with the Owner.

1.9 DRAWINGS

A. It shall be understood that the electrical details and drawings provided with the specification package are diagrammatic. They are included to show the intent of the specifications and to aid the telecommunications contractor in bidding the job. The telecommunications contractor shall make allowance in the bid proposal to cover whatever work is required to comply with the intent of the plans and specifications.

B. The telecommunications contractor shall verify all dimensions at the site and be responsible for their accuracy.

C. Prior to submitting the bid, the telecommunications contractor shall call the attention of the Engineer to any materials or apparatus the telecommunications contractor believes to be inadequate and to any necessary items of work omitted.

PART 2 - PRODUCTS

2.1 EQUIVALENT PRODUCTS

A. The Owner and engineer have selected specific products that achieve the desired level of performance and preference. The project has been designed around said products. Proposed substitutions must demonstrate equivalent performance in all areas to the satisfaction of the Owner and must be submitted for review at least 10 days prior to bid. The Owner shall not be required to entertain substitutions submitted after bid.

2.2 WORK AREA OUTLETS

A. Work area cables shall each be terminated at their designated work area location in the connector types described in the subsections below. Included are modular telecommunication jacks. These connector assemblies shall snap into a faceplate.

B. The Telecommunications Outlet Assembly shall accommodate:
   1. A minimum of two (2) modular jacks.
   2. Additional accommodations for specific locations as noted in the plans for optical fiber and/or additional copper cables as necessary.
   3. A blank filler will be installed when extra ports are not used.
   4. All modular jacks shall have their circuit number on the faceplate identifier strip.
   5. Multiple jacks that are identified in close proximity on the drawings (but not separated by a physical barrier) may be combined in a single assembly. The telecommunications

contractor shall be responsible for determining the optimum compliant configuration based on the products proposed.

6. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation. Prior to installation, the telecommunications contractor shall submit the proposed configuration for each outlet assembly for review by the Owner.
7. The modular jack shall incorporate printed label strip on the dust cap module for identifying the outlet. Printed labels shall be permanent and compliant with ANSI/TIA/EIA–606-A standard specifications. Labels shall be printed using a printer such as a Brady hand held printer. Hand printed labels shall not be accepted.

C. Faceplates: The faceplates shall:
1. Be as appropriate to fit the modular jack used.
2. Be UL listed and CSA certified.
3. Be constructed of high impact, ABS plastic UL 94V-0 construction (except where noted otherwise).
4. Shall match the faceplate color used for other utilities in the building or match the color of the raceway if installed in surface raceway.
5. Be compliant with the above requirements along with the following when incorporating optical fiber:
   a. Be a low profile assembly,
   b. Incorporate a mechanism for storage of cable and fiber slack needed for termination,
   c. Position the fiber optic couplings to face downward or at a downward angle to prevent contamination and,
   d. Incorporate a shroud that protects the optical couplings from impact damage.
6. Be available as single-gang or dual-gang.
7. Provide easy access for adds, moves, and changes by front removal of jack modules.
8. Possess recessed designation windows to facilitate labeling and identification.
9. Include a clear plastic cover to protect labels in the designation window.
10. Have mounting screws located under recessed designation windows.
11. Comply with ANSI/TIA/EIA-606-A work area labeling standard.
12. Allow for the UTP modules to be inverted in place for termination purposes.
13. Be manufactured by an ISO 9001 registered company.

D. Voice / Data Jacks
1. Voice/Data jacks shall be 8-position modular jacks and shall be Category 6 performance as defined by the references in this document including ANSI/TIA/EIA-568-C.2. All pair combinations must be considered, with the worst-case measurement being the basis for compliance. Modular jack performance shall be third-party verified by a nationally recognized independent testing laboratory.
2. The modular jack shall use dual reactance modular contact array.
3. The modular jack shall be both component, link and channel compliant to category specifications in ANSI/TIA/EIA-568-C.
4. The modular jack’s performance shall be third-party verified to ANSI/TIA/EIA-568-C Category 6 specifications.
5. The modular jack shall have low emission IDC contacts.
6. The modular jack shall use standard termination practice using 110 impact tool.
7. The modular jack shall be backwards compatible to Category 3, 5, and 5e.
8. The modular jack shall be center tuned to category 6 test specifications.

9. Dust covers shall be used on each termination.

2.3 110 COPPER TERMINATION BLOCK

A. The voice cross connect shall be a passive connection between the horizontal termination blocks and the backbone termination blocks. The wall mount frames shall be field terminated kits including all blocks, connecting blocks, and designation strips. Management rings shall be mounted between vertical columns of blocks to provide management of cross-connect wire. Backbone and horizontal blocks shall use 4-pair connecting blocks. Blocks shall be oriented so that backbone terminations are located on the left and horizontal frames are located on the right of the termination field when facing the frame assembly.

B. 110 Block Kits shall:
1. Include both the wiring block in a 50, 100 and 300 pair (as applicable) footprint and the connecting block.
2. Be manufactured using fire retardant molded plastic.
3. Support termination of 22-24 AWG solid conductor.
4. Contain back openings for the feed through of cable.
5. Meet category 6 component compliance and be verified by a third-party nationally recognized independent testing laboratory.
6. Have color-coded tips on the wiring block and color-coding on the connector blocks for installation identification.
7. Use standard termination practice requiring a single conductor 110 impact tool.
8. Termination hardware shall maintain the paired construction of the cable to facilitate minimum untwisting of the wires.
9. Be backwards compatible to category 3, 5 and 5e.
10. Be labeled in compliance with ANSI/TIA/EIA-606-A labeling specifications using permanent labels and LabelMo software (or other labeling software/printer).
11. Be manufactured by an ISO 9001 registered company.

C. 110 Cross-Connect System Backboard Channels shall:
1. Be available in 300 and 900 pair sizes.
2. Allow the mounting of 110 100-pair blocks without legs.
3. Include bottom trough and grounding bar.
4. Be wall mountable.
5. Be of cold roll steel construction.
6. Be manufactured by an ISO 9001 registered company.

D. 110 Wall Mount Vertical Trough shall:
1. Be available in single channel or dual channel configurations.
2. In dual channel configuration shall be used to provide separation for different wiring media.
3. Be available in 300 pair and 900 pair sizes.
4. Be wall mountable.
5. Be used with wall mountable backboard channels. Acceptable configurations include a 300 pair and a 900 pair.
6. Be of cold roll steel construction.
7. Be manufactured by an ISO 9001 registered company.

2.4 MODULAR PATCH PANELS

A. The Modular Patch Panels shall:
1. Meet category 6 component compliance and be verified by a third-party nationally recognized independent testing laboratory.
2. Use low emission IDC contacts.
3. Use dual reactance technology to enhance the signal-to-noise ratio.
4. Require standard termination practices using a 110 impact tool.
5. Use a single piece IDC housing designed to accept larger Category 6 conductors.
6. Support both T568B and T568A wiring.
7. Include easy to follow wiring labels.
8. Include label fields.
9. Allow for the use of icons.
10. Include full length metal rear cable management.
11. Be available in standard or high density.
12. Be backward compatible to category 3, 5 and 5e.
13. Be center tuned to category 6 test specifications.

2.5 RACKS

A. All racks and wire management shall be of one manufacturer or designed specifically to work together. The equipment rack shall provide vertical cable management and support for the patch cords at the front of the rack and wire management, support, and protection for the horizontal cables inside the legs of the rack. Waterfall cable management shall be provided at the top of the rack for patch cords and for horizontal cables entering the rack channels for protection and to maintain proper bend radius and cable support. Wire management shall also be mounted above each patch panel and/or piece of equipment on the rack. The rack shall include mounting brackets for cable tray ladder rack to mount to the top of the rack. Velcro cable ties shall be provided inside the rack channels to support the horizontal cable. Rack shall be black in color to match the patch panels and cable management.

B. Free-Standing Rack
1. Free-standing rack shall:
   a. Provide the necessary strain relief, bend radius and cable routing for proper installation of high performance cross connect products, meeting all specifications of ANSI/TIA/EIA-568-C.
      1) Rear channels to securely route distribution cables.
      2) Vertical management “cage” to protect patch cords while allowing easy access for moves, adds and change with individual 1-rack unit fingers and double hinged door.
      3) Include speednuts to reduce assembly time.
   b. Have top cable trough with waterfall and built in patch/horizontal cable distribution separator.
   c. Have EIA hole pattern on front and rear.
   d. Have rack units stamped on the front, on both sides allowing numbering from top-to-bottom or bottom-to-top.
   e. Be available with a 10.5” or 16.25” channel depth.
   f. Be available with hook and loop straps for securing bulk cables inside the vertical U-channels.

g. Assemble as 19” (483 mm) or 23” (584 mm) with no additional hardware.
h. Be available with three styles of vertical patch cord management: interbay with latches, cable management rings, or fingerduct with covers.
i. Provide floor and ceiling access for cable management and distribution.
j. Provide pre-drilled base for floor attachment of rack.
k. Be available in a 7 foot version (45 rack units) or an 8 foot version (51 rack units).
l. Be available in standard color of black.
m. Be manufactured by an ISO 9001 registered company.

C. Wall Mounted Rack
1. Wall mount rack shall:
a. Provide the necessary strain relief, bend radius and cable routing for proper installation of high performance cross connect products, meeting all specifications of ANSI/TIA/EIA-568-C.
b. Have top cable trough to route patch and distribution cables between racks.
c. Have EIA hole pattern on front and rear.
d. Rack height shall be specified as 7 ft / 2.13 m (44 rack units) or 4.0 ft/1.22 m (22 rack units).
e. Be available with a 6.5” (165 mm) or 14” (356 mm) channel depth.
f. Be available with hook and loop straps for securing cables inside the vertical U-channels.
g. Be available with vertical cable management rings for cord routing organization and strain relief.
h. Be available with vertical U-channels to protect and conceal distribution cables.
i. Provide floor and ceiling access for cable management and distribution.
j. Have wall mount braces with locator posts for easy wall mounting.
k. Have side access points that allow for access to manage/install distribution cables in the vertical channels.
l. Be available in standard color of black.
m. Be manufactured by an ISO 9001 registered company.

2.6 HORIZONTAL DISTRIBUTION CABLE

A. All horizontal data station cable and voice cable shall terminate on modular patch panels (copper or fiber), 110 cross-connecting blocks (copper), or patch/splice cabinets (fiber) in their respective Telecommunications Room or Equipment Room as specified on the drawings.

B. 100 OHM Category 6 UNSHIELDED TWISTED PAIR CABLE (UTP)
1. Physical Characteristics:
a. Shall be plenum rated and meet applicable requirements of ANSI/ICEA S-80-576. All 4 pairs must be insulated with F.E.P. No 2 x 2 or 3 x 1 constructions will be allowed.
b. The diameter of the insulated conductor shall be .023 in. maximum.
c. Shall consist of (4) twisted pairs.
d. Shall be suitable for the environment in which they are to be installed.
e. The color coding of pairs shall be:

Pair 1	Pair 2	Pair 3	Pair 4
W-BL; BL	W-O; O	W-G; G	W-BR; BR

f. The overall diameter of the cable shall be 0.2150”nominal.

g. The ultimate breaking strength measured in accordance with ASTM D 4565 shall be 400 N minimum.
h. Cable shall withstand a bend radius of 1” at -20 degrees Celsius without jacket or insulation cracking.
i. Cable shall be third party verified to meet ANSI/TIA/EIA-568-C.2.

2. Transmission Characteristics:
   a. DC resistance of any conductor shall not exceed 9.38 Ohms per 100m max. at 20°C. Measured in accordance with ASTM D 4566.
   b. The mutual capacitance of any pair at 1 kHz for 100m of cable shall not exceed 4.4 Nf.
   c. DC resistance unbalance between any two conductors of any pair shall not exceed 3% when measured at or corrected to 20°C in accordance with ASTM D 4566.
   d. The capacitance unbalance to ground at 1 kHz of any pair shall not exceed 330 pF per 100m.
3. Cable shall be Berk-Tek LANmark-1000 UTP (Plenum) or approved equal.
4. Cable installed underground/below slab in conduit shall be Berk-Tek LANmark-6 OSP (wet location) or approved equal.

2.7 FIBER OPTIC CABLE

A. Indoor/Outdoor Optical Fiber Non-Conductive Plenum (OFNP) Loose Tube With Laser Enhanced 62.5/125 Optical Fibers
   1. Each Multimode Fiber shall be:
      a. Graded-index optical fiber wave-guide with nominal 62.5/125µm-core/cladding diameter.
      b. The fiber shall comply with the latest revision of ANSI/EIA/TIA-4920000.
      c. Attenuation shall be measured in accordance with ANSI/EIA/TIA-455-46, 53 or 61.
      d. Information transmission capacity shall be measured in accordance with the latest revision of ANSI/EIA/TIA-455—204.
      e. The measurements shall be performed at 23 degrees C +/- 5 degrees.
      f. Maximum attenuation dB/Km @ 850/1300 nm: 3.5/1.0.
      g. Bandwidth 200 MHz-km @ 850nm.
      h. Bandwidth 500 MHz-km @ 1300nm.
      i. Optical Fiber shall be laser optimized and guarantee Gigabit Ethernet distances of 500m/1000m for 850nm and 1300nm respectively
   2. Physical Characteristics:
      a. Shall be suitable for use in both outdoor and indoor applications without the use of a transition at the building entrance.
      b. Shall be suitable for use in risers, plenums and horizontal applications.
      c. Shall have a dry water blocking system for cable core and buffer tubes.
      d. Shall be available with a fiber strand count range from 6 to 144.
      e. Shall have a 3.0 mm sub-unit diameter.
      f. Shall have and be marked with an UL-OFNP and OFN FT6 Flame Rating.
      g. Shall comply with the requirements of ICEA S-83-596 & ANSI/ICEA S-87-640.
      h. Strength members shall be dielectric and may be either fiberglass or aramid yarn.
      i. Suitable for underground or aboveground conduits.

j. Loose Tube fibers shall be color coded in accordance with EIA / TIA 598 with an overall blue jacket.
k. Shall have a ripcord for overall jacket.
l. Suitable for operation between -40° to +75° C.
m. Shall be UV resistant.
n. Shall be of an all dielectric design.

3. Design Make:
   a. Berk-Tek Adventum optical fiber cable with GIGAlite 62.5/125 micron fiber or approved equal.

B. Indoor/Outdoor Optical Fiber Non-Conductive Plenum (OFNP) Loose Tube With Laser Enhanced 50/125 Optical Fibers

1. Each Multimode Fiber shall be:
   a. Graded-index optical fiber wave-guide with nominal 50/125µm-core/cladding diameter.
   b. The fiber shall comply with the latest revision of ANSI/EIA/TIA-4920000.
   c. Attenuation shall be measured in accordance with ANSI/EIA/TIA-455-46, 53 or 61.
   d. Information transmission capacity shall be measured in accordance with the latest revision of ANSI/EIA/TIA-455—204.
   e. The measurements shall be performed at 23 degrees C +/- 5 degrees.
   f. Maximum attenuation dB/Km @ 850/1300 nm: 3.5/1.5.
   g. Bandwidth 700 MHz-km @ 850nm.
   h. Bandwidth 500 MHz-km @ 1300nm.
   i. Optical Fiber shall be laser optimized and guarantee Gigabit Ethernet distances of 750m/600m for 850nm and 1300nm respectively
2. Physical Characteristics:
   a. Shall be suitable for use in both outdoor and indoor applications without the use of a transition at the building entrance.
   b. Shall be suitable for use in risers, plenums and horizontal applications.
   c. Shall have a dry water blocking system for cable core and buffer tubes.
   d. Shall be available with a fiber strand count range from 6 to 72.
   e. Shall have a 3.0 mm sub-unit diameter.
   f. Shall have and be marked with an UL-OFNP and OFN FT6 Flame Rating.
   g. Shall comply with the requirements of ICEA S-83-596 & ANSI/ICEA S-87-640.
   h. Strength members shall be dielectric and may be either fiberglass or aramid yarn.
   i. Suitable for underground or aboveground conduits.
   j. Loose Tube fibers shall be color coded in accordance with EIA / TIA 598 with an overall dark blue jacket.
   k. Shall have a ripcord for overall jacket.
   l. Suitable for operation between -40° to +75° C.
   m. Shall be UV resistant.
   n. Shall be of an all dielectric design.
   o. Shall have a maximum installation tension of 300 lbs for cables without dielectric strength member and 600 lbs for cables with dielectric strength members.
3. Design Make:
   a. Berk-Tek Adventum optical fiber cable with GIGAlite 50/125 micron fiber or approved equal.

2.8 FIBER OPTIC CONNECTORS

A. ST Fiber Optic Connectors
   1. Each field-terminated ST Fiber Connector shall:
      a. Be a pre-polished fiber connector with a fiber stub or a field polish fiber connector.
      b. Be available in singlemode and multimode (62.5 um and 50 um) versions.
      c. Have a domed zirconia ferrule.
      d. Have a PC polish.
      e. Accept a nominal fiber diameter of 125 micrometers.
      f. Have a typical insertion loss of 0.3 dB for multimode and 0.2 dB for singlemode.
      g. Have repairable tips.
      h. Have an insertion loss change of less than 0.2 dB after 500 reconnects.
      i. Be stable over an operating range of –40C to +75 degrees C.
   2. Design Make:
      a. Nexans ST/Ortronics ST Fiber Optic Connectors or approved equal.

B. LC Fiber Optic Connectors
   1. Each LC Fiber Connector shall:
      a. Be a pre-polished fiber connector with a fiber stub or field-polish fiber connector.
      b. Be available in single mode and multimode versions.
      c. Have a domed zirconia ferrule.
      d. Be a PC polish type connector.
      e. Accept a nominal fiber diameter of 125 micrometers.
      f. Have a typical insertion loss of 0.1 dB for multimode and 0.1 dB for single mode.
      g. Have repairable tips.
      h. Have an insertion loss change of less than 0.2 dB after 500 reconnects.
      i. Be stable over an operating range of –40C to +75 degrees C.
   2. Design Make:
      a. Nexans/Ortronics LC Fiber Optic Connectors or approved equal.

C. SC Fiber Optic Connectors
   1. Each SC Fiber Connector shall:
      a. Be a pre-polished fiber connector with a fiber stub or a field-polish fiber connector.
      b. Be available in single mode and multimode versions.
      c. Have a domed zirconia ferrule.
      d. Be a PC polish or pre-polished type connector.
      e. Accept a nominal fiber diameter of 125 micrometers.
      f. Have a typical insertion loss of 0.1 dB for multimode and 0.1 dB for single mode.
      g. Have repairable tips.
      h. Have an insertion loss change of less than 0.2 dB after 500 reconnects.
      i. Be stable over an operating range of –40C to +75 degrees C.
   2. Design Make:
      a. Nexans/Ortronics SC Fiber Optic Connectors or approved equal.

2.9 COPPER CABLE PROTECTION UNITS

A. All copper circuits shall be provided with protection between each building with an entrance cable protector panel. All building-to-building circuits shall be routed through this protector. The protector shall be connected with a #6 AWG copper bonding conductor between the

protector ground lug and the TC ground point. Approved manufacturer of protection units is Porta Systems.

2.10 PATCH CORDS

A. The contractor shall provide factory terminated and tested UTP and optical fiber patch cords and equipment cords for the complete cabling system. The UTP patch cables shall meet the requirements of ANSI/TIA/EIA-568-B for patch cord testing.

B. Copper (UTP) patch cords shall:
1. Use 8-position connector with impedance matched contacts and designed using dual reactance.
2. Be constructed of 100 ohm, 4 pair stranded conductor, unshielded twisted pair copper per the requirements of the ANSI/TIA/EIA-568-B.2 and ANSI/TIA/EIA-568-B.2–1 standard.
3. Meet TIA category 6 component specifications in ANSI/TIA/EIA-568-B.2-1
4. 100% factory tested to meet category 6 performance and
5. ETL or any other nationally recognized 3rd party verification
6. Be center tuned to category 6 performance specifications by using paired bi-level contact array.
7. Be capable of universal T568A or T568B wiring schemes.
8. Modular connector shall maintain the paired construction of the cable to facilitate minimum untwisting of the wires.
9. Have a performance marking indelibly labeled on the jacket (by the manufacturer).
10. Have the ability to accept color-coded labels and icons to comply with ANSI/TIA/EIA-606-A labeling specifications.
11. Have “snagless” protection for the locking tab to prevent snagging and to protect locking tab in tight locations and provide bend relief.
12. Be available in three standard colors.
13. Be available in 3 foot, 5 foot, 7 foot, 9 foot, and 15 foot standard lengths.
14. Be backwards compatible to Category 3, 5 and 5e.
15. Be manufactured by an ISO 9001 registered company.

C. Optical Fiber patch cords shall:
1. Contain two (2) multi-mode optical fibers.
2. Use multi-mode, graded-index fibers with a 62.5 micron core.
3. Be capable of transmission at both 850 nm and 1300 nm wavelengths.
4. Include listing of actual loss of patchcord when packaged.
5. Be manufactured in standard lengths of 1 m (3.27 ft), 2 m (6.56 ft), 3 m (9.84 ft), 4 m (13.11 ft), 7 m (22.95 ft), and 10 m (32.79 ft), and special ordered in any other lengths.
6. Be manufactured by an ISO 9001 registered company.

2.11 GROUNDING AND BONDING

A. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor. The TBB shall be installed independent of the building’s electrical and

building ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA/EIA-607 Telecommunications Bonding and Grounding Standard.

B. The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding bus bar (TMGB). Each telecommunications room shall be provided with a telecommunications ground bus bar (TGB). The TMGB shall be connected to the building electrical entrance grounding facility. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.

C. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, ungrounded conduits, etc. entering or residing in the TR or ER shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors.

D. All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.

2.12 FIRESTOP

A. A firestop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Firestop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.

B. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly firestopped.

C. Firestop systems shall be UL Classified to ASTM E814 (UL 1479) and shall be approved by a qualified Professional Engineer (PE), licensed (actual or reciprocal) in the state where the work is to be performed. A drawing showing the proposed firestop system, stamped/embossed by the PE shall be provided to the Owner’s Technical Representative prior to installing the firestop system(s).

PART 3 - EXECUTION

3.1 WORK AREA OUTLETS

A. Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturer’s bend radius. In hollow wall installations where box-eliminators are used, excess wire can be stored in the wall. No more

than 12” of UTP and 12” of fiber slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

B. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-C.0 document, manufacturer's recommendations and best industry practices.

C. Pair untwist at the termination shall not exceed 12 mm (one-half inch).

D. Bend radius of the horizontal cable shall not be less than 4 times the outside diameter of the UTP cable.

E. The cable jacket shall be maintained to within 25mm (one inch) of the termination point.

F. Data jacks, unless otherwise noted in drawings, shall be located in the bottom position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the right-most position(s).

G. Voice jacks shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).

3.2 HORIZONTAL DISTRIBUTION CABLE INSTALLATION

A. Cable shall be installed in accordance with manufacturer’s recommendations and best industry practices.

B. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

C. Cable raceways shall not be filled greater than the ANSI/TIA/EIA-569-A maximum fill for the particular raceway type or 40%.

D. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

E. Where transition points, or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

F. The cable’s minimum bend radius and maximum pulling tension shall not be exceeded.

G. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60 inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

H. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

I. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

J. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.

K. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

L. Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606-A. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.

M. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.

N. Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.

O. Cables installed underground or below slab shall be suitable for use in wet locations and outdoors in duct or conduit. If wet location cable is exposed in the building after exiting the wet area, it must transition to an appropriate category dry cable within 50 feet (15M) of exiting conduit.

3.3 HORIZONTAL COPPER TERMINATION AND INSTALLATION

A. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-C standard, manufacturer's recommendations and best industry practices.

B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).

C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

D. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

E. The cable jacket shall be maintained as close as possible (within 25mm – 1 inch) to the termination point.

F. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.4 OPTICAL FIBER TERMINATION HARDWARE

A. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

B. Each cable shall be individually attached to the respective splice enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

C. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

D. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

E. A maximum of 12 strands of fiber shall be spliced in each tray.

F. All spare strands shall be installed into spare splice trays.

3.5 BACKBONE CABLE INSTALLATION

A. Backbone cables shall be installed separately from horizontal distribution cables

B. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

C. Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits

D. Where backbone cables are installed in an air return plenum, riser rated cable shall be installed in metallic conduit.

E. Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.

F. All backbone cables shall be securely fastened to the sidewall of the TR on each floor.

G. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.

H. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.

I. Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

3.6 RACKS

A. Racks shall be securely attached to the concrete floor using a minimum 3/8” hardware or as required by local codes.

B. Racks shall be placed with a minimum of 36-inch clearance from the walls on all sides of the rack. When mounted in a row, maintain a minimum of 36 inches from the wall behind and in front of the row of racks and from the wall at each end of the row.

C. All racks shall be grounded to the telecommunications ground bus bar in accordance with Section 9.0 of this document.

D. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.

E. Wall mounted termination block fields shall be mounted on 4’ x 8’ x .75” void free plywood. The plywood shall be mounted vertically 12” above the finished floor. The plywood shall be painted with two coats of white fire retardant paint.

F. Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame 18” from the finished floor.

3.7 FIRESTOP SYSTEM

A. All firestop systems shall be installed in accordance with the manufacturer’s recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cable system acceptance.

3.8 GROUNDING SYSTEM

A. The TBB shall be designed and/or approved by a qualified PE, licensed in the state that the work is to be performed. The TBB shall adhere to the recommendations of the ANSI/TIA/EIA-607 standard, and shall be installed in accordance with best industry practice.

B. Installation and termination of the main bonding conductor to the building service entrance ground shall be performed by a licensed electrical contractor.

3.9 IDENTIFICATION AND LABELING

A. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the successful contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme. Labeling shall follow the guidelines of ANSI/TIA/EIA-606-A.

B. Outside Plant cables passing through a pull box or vault shall have a cable label that is water and mud proof.

C. All label printing will be machine generated by Ortronics LabelMo, or similar software, using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.

3.10 TESTING AND ACCEPTANCE

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-B. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.
2. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the Certification Program Information Manual provided by the product manufacturer and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

B. Copper Link Testing

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category performance.
2. Horizontal cabling shall be tested using a Level III test unit for category 6 performance compliance.
3. The basic tests required are:
   a. Wire Map
   b. Length
   c. Attenuation
   d. NEXT (Near end crosstalk)
   e. Return Loss
   f. ELFEXT Loss
   g. Propagation Delay
   h. Delay skew
   i. PSNEXT (Power sum near-end crosstalk loss)
   j. PSELFEXT (Power sum equal level far-end crosstalk loss)
4. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.

5. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-C Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.
6. Category 6 Performance Shall meet the link requirements outlined below for a 90-meter, 4-connector permanent link.

Frequency (MHz)	Maximum Insertion Loss (dB)	Minimum NEXT (dB)	Minimum PSNEXT (dB)	Minimum ELFEXT (dB)	Minimum PSELFEXT (dB)	Minimum Return Loss (dB)
1.0	2.1	69.0	64.0	65.3	62.3	21.0
4.0	4.0	67.0	62.5	53.2	50.2	21.0
10.0	6.3	60.6	46.0	45.3	42.3	21.0
20.0	9.0	55.6	51.0	39.2	36.2	21.0
31.25	11.3	52.4	47.7	35.4	32.4	19.1
62.5	16.4	47.4	42.6	29.3	26.3	16.1
100.0	21.2	43.9	39.1	25.3	22.3	14.0
155.0	26.6	40.7	35.8	21.4	18.4	12.1
200.0	31.5	38.8	33.9	19.2	16.2	11.0
250.0	36.0	37.1	32.4	17.3	14.3	10.0

C. Fiber Testing
1. All fiber testing shall be performed on all fibers in the completed end-to-end system. Testing shall consist of an end-to-end power meter test performed per EIA/TIA-455-53A. The system loss measurements shall be provided at 850 and/or 1300 nanometers for multimode fibers and 1310 and/or 1550 nanometers for single mode fibers. These tests also include continuity checking of each fiber.
2. Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm (or 1310 and 1550 nm for singlemode) in both directions.
3. Test set-up and performance shall be conducted in accordance with ANSI/EIA/TIA-526-14 Standard, Method B.
4. Where links are combined to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. ONLY LINK TEST IS REQUIRED. The contractor can optionally install patch cords to complete the circuit and then test the entire channel. The test method shall be the same used for the test described above. The values for calculating loss shall be those defined in the ANSI/TIA/EIA Standard.
5. Attenuation testing shall be performed with an approved hand held tester from an industry recognized test equipment manufacturer.

3.11 SYSTEM DOCUMENTATION

A. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Engineer for approval. Documentation shall include the items detailed in the sub-sections below.

B. Documentation shall be submitted within ten (10) working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor, etc.). This is inclusive of all test result and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the request of the Engineer, the telecommunications contractor shall provide copies of the original test results.

C. The Engineer may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

3.12 TEST RESULTS

A. Test documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words “Project Test Documentation”, the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

B. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-C including applicable TSB’s and amendments. The appropriate Level III tester shall be used to verify Category 6 cabling systems.

C. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. The telecommunications contractor must furnish this information in electronic form CD-ROM). If needed, provide manufacturers software require to read the test results.

D. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

PART 4 - WARRANTY AND SERVICES

4.1 WARRANTY

A. The manufacturer shall provide the warranty directly to the end-user.

B. An Extended Product Warranty shall be provided which warrants functionality of all components used in the system for a minimum of 20 years from the date of registration. The

Extended Product Warranty shall warrant the installed horizontal and/or backbone copper, and both the horizontal and the backbone optical fiber portions of the cabling system.

C. The Application Assurance Warranty shall cover the failure of the wiring system to support the applications that are designed for the link/channel specifications of ANSI/TIA/EIA–568-C.0. These applications include, but are not limited to, 10BASE-T, 100BASE-T, 1000BASE-T, 155Mb/sATM, and 1Gb/s ATM.

D. The contractor shall provide a warranty on the physical installation.

4.2 FINAL ACCEPTANCE AND SYSTEM CERTIFICATION

A. Completion of the installation, in-progress and final inspections, receipt of the test and as-built documentation, and successful performance of the cabling system for a two-week period will constitute acceptance of the system. Upon successful completion of the installation and subsequent inspection, the end user shall be provided with a numbered certificate, from the product manufacturer, registering the installation.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 274116 – PRODUCTION AV SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes: Services as listed herein and related to the furnishing, installation, and commissioning of audio, video and communications equipment.
B. Related Documents: The Conditions of the Contract and Division 01 – General Requirements apply to this section as fully as if repeated herein.
C. Related Sections: Coordinate with the following sections in carrying out this work:

1. Section 11 61 33 – Stage Rigging Systems
2. Section 11 61 83 – Production Lighting Control Systems
3. Section 26 05 35 – Production Systems Electrical Installation
4. Division 26 – Electrical

1.2 REFERENCES:

A. Comply with all national, state and local regulations and the procedures and requirements of the local authorities. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
B. Equipment shall be provided in accordance with the related trade and regulatory guidelines including but not limited to UL/ETL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
C. Labor shall be provided in accordance with applicable labor regulations and practices.

1.3 DEFINITIONS:

A. Refer to the General Conditions for definitions.
B. Architect: For the scope in this Section, authorized personnel representing Owner and the Theater Consultant.

1.4 SYSTEM DESCRIPTION:

A. Black Box Theatre

1. Audio- Reinforcement

a. The reinforcement audio system is comprised of a digital mixer for events requiring a live operator, and an automatic mixing system for events that do not require a live operator. The digital mixer shall also be provided with expansion cards and accessories, as well as a rolling road case with doghouse as indicated in the equipment list and Drawings.

b. Remote input devices with accessories as indicated shall be provided.
c. The internal programming of the DSP is under the scope of this work and shall be submitted for approval during the shop drawing process. The contractor is responsible to provide standard & customary DSP blocks, including necessary EQ, protection limiting, etc.
d. The system will use a digital audio snake, utilizing Dante protocol.
e. The DSP/matrix shall be capable of providing multiple inputs & outputs. All DSP programming is the responsibility of the AV contractor. DSP programming shall be carried out by a factory-certified programmer.
f. Dedicated network switches and associated patchbays shall be provided to support audio network systems.
g. One media player with theatre-specific functionality shall be provided for events requiring audio playback.
h. A rack-mounted Apple Macintosh computer with Apple keyboard and mouse shall be provided for multi-channel audio recording and playback. The computer shall be configured per audio playback software manufacturer recommendation. The computer shall have the following minimum options (or better at time of purchase):
    1) Apple M1 chip with 8-core, 8-GPU, and 16-core Neural Engine
    2) 16.0 GB unified memory
    3) 1.0 TB SSD hard drive
    4) 10GB Ethernet
    5) Wired Mouse & Keyboard
    6) Mac and Windows OS installed (via Parallels)
    7) Software & accessories per equipment list

i. Four channels of wireless microphone shall be provided with handheld transmitters, complete with antenna combiner, remote-mount active antennas, and accessories as noted.
j. The reinforcement and playback loudspeaker system is comprised of a left/right system with subwoofers. Connection points for patchable amplifiers are provided.
k. Provide all required mounting hardware and engineering for all AV devices, and coordinate exact mounting conditions with architect, structural engineer & general contractor.
l. Audio, data, and loudspeaker patchbays and patchcords shall be provided. See patchbay section below.
m. Equipment racks and accessories shall be provided as shown on the drawings. See equipment rack section below for additional information.
n. UPS units shall be provided as indicated.
o. A motorized, sequencing breaker panel shall be provided under electrical. It is in the scope of this section to program the sequencing panel and configure both hard button (at booth) and touchscreen controls to properly sequence the circuits up and down.
    1) All equipment shall shut down when the system is powered down, except for the control processor and associated network switch.

2. Video - Presentation

a. A presentation video switching and routing system with scaling shall be provided to handle signals from all video devices, including on-stage laptop computer inputs, DVD/blu-ray, and other inputs as indicated on the Drawings. All input and output devices shall use CATx cable as the means of transport to the control booth. The switcher shall be fully HDCP compliant and support EDID.
b. Video scalers shall be properly configured to accept any common aspect ratio or resolution and modify the image for proper viewing on the projection screen. This function shall be automatic and require no additional configuration from user.
c. Provide projector, lens, mount and complete installation for video projector.
d. The projection screen shall be provided with the following:
    1) Motorized
    2) External Low Voltage Control Unit (LVC-IV)
    3) 1.6:1 aspect ratio
    4) Front projection surface with black backing per equipment list
    5) Black Case
    6) Additional black drop shall be provided as necessary to allow the bottom of the screen to hang at 4’-0” above floor in regular use.
    7) An extra 12” of black drop beyond that required shall be provided to accommodate unforeseen field conditions.
    8) Sized as indicated in the 274116-A equipment list.

e. Control booth video monitoring shall be via HDCP-compliant HDMI and SDI rack-mount monitor/receiver.
f. A production SDI video router shall be provided for routing SDI signals throughout the facility. Control shall be possible via the front of the router and remote-control panels. Additional control system macros may be required. Refer to Control System Programming and Client preferences.
g. Video patchbays and patchcords for 12G-SDI video shall be provided. See patchbay specification section below.
h. A fixed-mount color SDI camera shall be provided for a fixed stage shot. The stage shot shall feed a QAM modulator via SDI router for back-of-house feed. Both shall be normalled to the stage manager panel locations on the video patchbay.
i. A modulated television (MATV/CATV) system shall be provided, in conjunction with the building-wide system. Two HD modulators and integrated streaming engine shall be provided. Coordinate channel selection with any incoming campus CATV services.
j. The ability to mute the program video via CATV modulator shall be provided from the touchpanel. The modulator shall be switched (via IP control) to the CV input, which has a video black signal present.
k. Dual 7” LCD panels shall be provided in the portable stage manager’s rack and control booth racks, for viewing fixed camera SDI video signals.
l. Rackmount 16”-19” video monitors shall be provided at the main racks and control booth racks for both SDI Multiview monitoring as well as for KVM or presentation monitoring. This monitor shall be located for standing operation. Provide a wired keyboard and mouse at operable distance below the monitor.
m. Provide backboxes for flat panel displays as noted in the drawings.

3. Video - Broadcast

a. A compact broadcast video switcher shall be provided with local and modular I/O. The switcher shall be capable of format conversion and frame synchronization, graphics/text layering, effects, Multiview, stereo audio input and output, as well as AV-over-IP source and endpoint distribution. The switcher shall have a 10GBE live stream output.
b. The switcher shall be mounted in the equipment racks, with local monitoring, as well as having remote monitoring and control capabilities. The video and USB monitoring shall be over IP and patchable at any AV panel location.
c. A compact video switcher control surface shall be provided for remotely controlling video switcher functions.
d. Three PTZ cameras with SDI and AV-over-IP outputs shall be provided. Provide mounts as shown in the drawings.
e. Modular AV-over-IP to SDI converters shall be provided for sending and receiving SDI video through the video router, as indicated.
f. A sync generator shall be included as well as required accessories. Sync should be sent to all Black Box devices that can accept sync and reference signals.
g. A 46” LCD monitor (Multiview) and wired keyboard/mouse shall be provided for use with KVM extensions to the video operator position.
h. A streaming encoder with YouTube/Facebook/etc capabilities shall be provided.
i. An SD-card recording device with media shall be provided.
j. Provide a complete Winsted E-SOC work surface & rack system as indicated in the drawings. The system should generally include the following items:
    1) One Base unit w/ continuous laminate work surface w/ “comfort edge”
    2) Two 6RU turret-style rack cabinets
    3) One pull-out keyboard shelf
    4) Versa-trak system
    5) One 46” multiview LCD monitor mount
    6) Two Loudspeaker shelves
    7) Caster wheel option
    8) Removable access panels to allow access to wall and in-wall panels & power connections located behind furniture system from front side. This is required so the furniture system doesn’t need to be moved to access wall connections otherwise obscured.
    9) Covers, doors, rack rails, stringers, data/power cable management, and other accessories as needed for a complete system.
    10) Laminate finishes shall be selected from the manufacturer’s standard line. Submit options for review.

4. Assistive Listening

a. An ADA-compliant FM-based assistive listening system shall be provided.
b. Receivers and accessories will be provided under separate package.

5. Production Intercom

a. A two-channel production intercom system shall be provided to allow communications between the control booth and stage platform/backstage areas.
b. The production intercom main station shall be capable of firing an outboard relay, in conjunction with the program override/duck system.

c. The production intercom station shall be capable of outputting a line-level signal from a microphone mounted on the front panel.
d. All intercom connections shall be homerun and terminated at a WAGO-style DIN-rail terminal strip with internal bussing. Wire jumper bussing between blocks is not acceptable.

6. Program/Paging

a. A program listen and back-of-house (BOH) / front-of-house (FOH) paging system shall be provided. The program listen system shall be fed either from a shotgun microphone mounted in the hall, or directly from the mixing console. The selection of source shall happen automatically in the DSP unit, based on a gate. If no signal is available from the console, the input source will change to the shotgun microphone. The selection shall also be available from the control system, using an “auto”, “console” or “shotgun” selector.
b. All GPIO connections shall be made as shown on the drawings.
c. A panel with momentary, non-latching, illuminated control buttons shall be provided, allowing for MUTE functions at FOH and BOH, as well as activation of the HOUSE PAGE function.
   1) The mute buttons shall illuminate RED to provide system-wide status of the mute function.
   2) The house page button shall illuminate GREEN to provide status of the house page function. This button shall also have a safety cover to prevent accidental activation.
   3) When the “house page” is pressed at the same time as the “announce” button on the intercom base station, the audio from the intercom base station microphone shall be routed to the paging loudspeakers in the theatre.

d. An announcement recorder / player shall be provided as part of the main DSP unit, with remote triggering from the house manager’s station.
   1) Triggering shall be from the house manager’s panel touchscreen. When busy, the touchscreen button shall reflect status.
   2) The contractor shall provide a recording of chimes for initial use as the audience recall.
   3) The contractor shall show the user how to manage recordings via the system software.

e. A program override system shall be provided. Each support space is fed via individual 70V amplifier channel and includes a local networked controller for volume and source select. When a page is active, the system shall allow any BOH page to be heard, regardless of local volume level. Additional paging controls such performed from the main control touchpanels for the theatre, as required by the Consultant or Client.
f. A paging loudspeaker shall be provided, at locations indicated on the Drawings. The loudspeaker shall activate when both “announce” (intercom unit) and “house page” (custom panel) are pressed at the same time.
g. A custom portable stage manager’s panel shall be provided, with remote intercom station and paging, custom button panel and rack-mounted light. A multi-pin extension cable, using Wirework G-BLOCK product with the “Broadway Latching System” option shall be provided.

h. A house manager panel shall be provided at locations shown in the drawings. From the panel, the house manager may activate the audience recall playback device, make a voice page to the lobby, control volume at all FOH zones, play music in the lobby zones from a portable device, and communicate with the stage personnel via production intercom.

7. Control System

a. A touch screen-based control system shall be provided for control over all applicable AV devices.
b. Color touchscreens shall be provided at locations shown on the drawings.
c. The control system shall connect via IP to the architectural lighting system for preset recall. Coordinate with theatrical lighting contractor for necessary information.
d. All control system programming is the responsibility of the AV contractor, and shall be submitted during the shop drawing phase for approval.

8. Control System Programming – Main Theatre

a. Touchpanels shall be configured with the most often-used device functions. Do not attempt to put every possible device function on the touchpanel.
b. The touchpanel shall be configured to work in two modes: manual and automatic.
   1) When in manual mode, all functions shall be “single function” buttons.
   2) A password must be entered to access manual mode.
   3) In manual mode, access to advanced controls shall be possible, such as:
      a) Automixer, Wireless Mic, Video Source & Main System Volume
      b) System On/Off
      c) Projector On/Off/Mute
      d) Projection Screen Up/Down/Stop
      e) Subwoofer mix/separate select (for aux-fed subs)
      f) CATV Modulator Audio/Video Mute
      g) Architectural Lighting Preset Recall (coordinate with 116183)
      h) Program audio feed (auto, console, shotgun mic)
      i) Audience Recall Chime
      j) Lobby Flat Panel Display Power, Input & Tuner
      k) Other functions as required
   4) In Automatic mode, the user shall choose either “presentation with audio and video” or “presentation with audio only”. After choosing, the system shall activate the appropriate macros to enable the system to display the chosen source. In either event, the automix jacks and wireless microphones shall be active.
   5) Volume controls for “video playback” and “mic level” shall be always accessible.
   6) A projector mute function shall be provided, utilizing the projector’s mechanical dowser (if available). If no mechanical dowser is available, mute image.

c. Touchpanel programming is the responsibility of the contractor. An outline has been made above but does not include all functions required. The contractor is responsible to design a graphic user interface using the following guidelines:

1) In automatic mode, use must be able to complete any function within two button presses.
2) More important functions shall be more prominent on the interface.
3) Like functions shall appear at the same place on every screen.
4) Nesting menus are not allowed.

d. The base template for the touchpanel shall be from the stock manufacturer's line, with customization as necessary. The template colors shall be modified to match School colors, and the splash screen shall show the School's logo.

9. Control System Programming – House Manager

a. Touchpanels shall be configured with the most often-used device functions. Do not attempt to put every possible device function on the touchpanel.
b. Provide the following controls:
1) Lobby & Restroom Volume & audio feed select
2) Paging volume
3) Chime volume
4) Audience Recall Chime, programs 1-4
5) Lobby Flat Panel Display Power, Input & Tuner
6) Other functions as required

c. Touchpanel programming is the responsibility of the contractor. An outline has been made above but does not include all functions required. The contractor is responsible to design a graphic user interface using the following guidelines:
1) User must be able to complete any function within two button presses.
2) More important functions shall be more prominent on the interface.
3) Like functions shall appear at the same place on every screen.
4) Nesting menus are not allowed.

d. The base template for the touchpanel shall be from the stock manufacturer's line, with customization as necessary. The template colors shall be modified to match School colors, and the splash screen shall show the School's logo.

B. Drama Classroom

1. Audio

a. The reinforcement audio system is comprised of a rack mounted DSP with local i/o, playback devices, and wall-mounted powered speakers.
b. One media player with theatre-specific functionality shall be provided for events requiring audio playback. The media player shall accept SD/USB drives, Bluetooth, as well as have a 3.5mm stereo aux input.
c. The playback loudspeaker system is comprised of two portable powered speakers, each with yokes, two theatre-style c-clamps and one safety cable, and power/signal cables.
d. Provide all required mounting hardware and engineering for all AV devices mounted overhead.

C. Recording Studio

1. Editing & Recording

    a. A rack-mounted Apple Mac Studio with Apple keyboard and mouse shall be provided for multi-channel audio recording and playback. The computer shall be configured per audio playback software manufacturer recommendation. The computer shall have the following minimum options (or better at time of purchase):
        1) Apple M1 Ultra chip with 20-core, 48-GPU, and 32-core Neural Engine
        2) 64.0 GB unified memory
        3) 1.0 TB SSD hard drive
        4) 10GB Ethernet
        5) Wired Mouse & Keyboard
        6) Mac and Windows OS installed (via Parallels)
        7) Software & accessories per equipment list

    b. The computer configuration shall meet or exceed the software manufacturer's requirements.
    c. The computer server shall include a rackmount system with integrated PCie interfaces.
    d. Provide an Avid PCie interface for connection to a proprietary digital audio interface.
    e. A Solid-state drive dock with detachable drives shall be provided and connected to the computer via Thunderbolt.
    f. Provide networked audio control surfaces to remotely manage DAW software and plugins. Include a wireless tablet interface with a control surface dock for wireless remote control of associated software. Coordinate wireless access point for dedicated wireless remote-control with Telecom/Electrical.

2. Audio

    a. Provide 16-channels of mic preamps with Dante and connect to av network switches, as indicated.
    b. An Avid ProTools interface shall be provided with a variety of analog and digital audio connectivity, as required.
    c. A surround sound audio monitoring system shall be provided, as indicated in the drawings. The LCR/sub channels shall be integrated into furniture. Monitor routing and control shall be provided by Protools hardware interface.
    d. Audio interfacing devices, such as distribution amplifiers, combining networks, and isolation transformers shall be provided.
    e. 110ohm audio patchbays shall be provided with normalling capabilities, as required.
    f. Provide 2-way talkback system that operates independent of the production devices. Control room input shall be via desktop PTT microphone, studio input shall be via dedicated wall-mount microphone. Provide ceiling speakers & dual-zone mixer/amp with volume control in the control room.

3. Musician Monitoring

    a. Provide wall mounted audio monitors in the live room for playback monitoring/listening to performers.

b. Provide a discrete personal monitoring system that operates via networked digital audio streams over Dante. The system shall be capable of up to 16 individual mixes controllable from personal monitoring mix stations. A minimum of (4) user stations shall be provided, each with a stand and associated accessories, as required.

4. Utility

a. A series of utility items, such as distribution amplifiers, sync/clock/PTP/NTP generators, timeclocks, midi/usb interfaces, etc, shall be provided as indicated in the equipment list.
b. Ethernet switches with adjacent RJ45 patch bays shall be provided.
c. Acoustically isolated equipment racks with front & rear access shall be provided with accessories as indicated in part 2 of this specification.
d. A power distribution system shall be provided, along with a UPS and accessories as noted.
e. A “RECORD” light system shall be provided, complete with necessary power supply activation relay and accessories. The system shall be configured to record-ready (yellow) on arm and fully activate on record (red). Provide a rack-mount button for activation, in the control furniture, as a back-up to the automated record-ready/record system triggered by DAW midi.
f. Provide UPS at the equipment racks and at the control desk. Computer, switchers, and control devices should be placed on the UPS to provide sufficient time to safely save and shut down.
g. A motorized, sequencing breaker panel shall be provided under electrical. It is in the scope of this section to program the sequencing panel and configure both hard button control to properly sequence the circuits up and down.
    1) All equipment shall shut down when the system is powered down, except for the control processor and associated network switch.

5. Video

a. HDMI over fiber cables shall be used to connect the production computer HDMI/TB outputs to monitors located at the control desk, control desk wall, and live room wall. The operator shall designate what screen goes to each monitor from the production computers display management, as needed. Thunderbolt docks/hubs/adapters shall be used to expand the I/O options on the production computer.
    1) Assume the highest and most stable bandwidth requirements when selecting Thunderbolt docks/hubs, as well as any other adapters.

b. Two large format monitors shall be wall mounted facing the audio operator, as indicated in the drawings.
    1) Provide mounting/integration of large format video displays, as required.

c. One large format video monitor shall be in the Live Room
    1) Provide mounting/integration of large format video displays, as required.

d. Two video monitors with monitor arms shall be mounted at the control desk for local operator use

6. Provide a complete Argosy furniture & rack system as required by the drawings. The system should generally include the following items:

    a. Black Trim
    b. (3) G-Series Speaker Platforms
    c. (2) 7500 Series Monitor Arm

D. Band & Choral Rooms

1. The music classroom system is comprised of a main AV switcher and signal transport unit located at the equipment rack, along with a control panel located near the front of the room.
2. Provide video projector with lens and ceiling mount.
3. Provide motorized projection screen and install complete.
4. A rack-mounted media player shall be provided with Bluetooth, USB/SD, and 3.5mm stereo auxiliary inputs.
5. Install an owner-provided BYOD device and connect complete.
6. The system will provide local inputs for connecting HDMI laptop computers. Laptop computers & portable video players will be provided by owner.
7. Provide a rack-mount DSP/matrix for playback functions, along with local I/O on a rack panel.
8. Loudspeakers are active wall-mount type. Mount as required to clear lighting and other obstructions, while providing even audio coverage in the student seating area.
9. Provide a simple audio recording system, with hanging mics, a mixer, and USB/Flash recorder.
10. Provide a pull-out rack for all equipment. Coordinate with casework to confirm proper fit.
11. Provide and install all necessary equipment and accessories for a complete and working system.
12. See architectural & electrical sheets for proper placement of AV devices.

E. Main Gymnasium – AV Systems

1. Audio

    a. The gymnasium system is comprised of several main loudspeaker/arrays and subwoofers in a distributed scheme. Loudspeakers & rigging shall be a finish as indicated by Architect.
        1) The main loudspeaker/subwoofer system shall address three sides/zones of seating banks
        2) Downward facing loudspeaker/arrays above the gymnasium floor shall be used to address the players and performers in this zone.

    b. A digitally networked DSP unit with Dante shall be provided for audio management and systems control.
    c. All DSP programming is the responsibility of the AV contractor.
    d. Provide a digital mixer, media player, and other accessories, as indicated, for the Mix Position system. A 50’ snake (lengths to be verified) shall be provided for connection of the audio systems to the AV system, as indicated.

e. Eight channels of wireless mic receivers with handheld transmitters and antennas shall be provided. Provide protective plastic dome for antennas.
f. One channel of ADA-compliant FM-based assistive listening system shall be provided.
   1) Provide protective plastic dome for antenna.
   2) Receiver and accessories shall be provided as part of a separate package but are required for operation of the space.

g. Provide and install decora style Dante network transmitter devices, as indicated.
h. Provide audio feed to production lighting system for use with the “hype” lighting system. Coordinate with production lighting contractor.

2. Utility

a. See architectural & electrical sheets for proper placement of AV devices.
b. Fixed equipment shall mount in a dedicated AV floor-mount equipment rack with locking front door. Provide sequencing power system with modular raceways & switched modules.
c. Mount all devices per approved drawings. Variance will require re-submittal for approval.
d. Fiber, category, audio, and video patchbays/bulkheads shall be provided, as indicated.
   1) Fiber bulkheads shall use Opticalcon connectors with copper pins terminated for use with installed SMPTE311 hybrid cabling.
   2) Fiber bulkheads shall be located at the Gym Broadcast room so that they may be used for broadcast camera routing, as well as scorekeeper routing and general fiber applications, as needed.

e. An HDMI over fiber transmitter shall be used to route score keeper LED wall signals to the HDMI over fiber receiver at LED wall equipment (by Others) mounted in the AV equipment racks. AV panel patching shall be performed at the opticalcon rack bulkhead at the Broadcast Suite.
f. Provide a complete roll-top desk system at the house mix position.
   1) Provide custom roll-top furniture at the control position as indicated in the equipment list and drawings. Architect shall select finish from manufacturer’s standard line.
   2) Do not install the rear panels to allow access to connections at wall
   3) Provide with the following options:
      a) INPLUS4 – additional 4” height clearance
      b) VIDEOBAY – drop down video display
      c) NOUPPER – maximum clearance
      d) USKB – pull out platform inside rack
      e) Modesty panel
      f) ADA compliant
      g) Institutional Lock System
      h) Stainless Steel Roll Top

3. Control System

a. A touch screen-based control system shall be provided for control over all applicable AV devices.
b. Three 7” color touchscreens shall be provided in locking enclosures at locations shown on the drawings, as well as at control locations.
c. All control system programming is the responsibility of the AV contractor, and shall be submitted during the shop drawing phase for approval.

4. Control System Programming

a. Touchpanels shall be configured with the most often-used device functions. Do not attempt to put every possible device function on the touchpanel.
b. The touchpanel shall be configured to work in two modes: manual and automatic.
1) When in manual mode, all functions shall be “single function” buttons.
2) A password must be entered to access manual mode.
3) In manual mode, access to advanced controls shall be possible, such as:
4) Automixer, Wireless Mic, Main System Volume
5) System On/Off
6) System status (QSC, L-Acoustics error reporting)
7) LED video wall (by others) Power, Input Select
8) Other functions as required
9) In Automatic mode, the automix jacks, wallplate sources, and wireless microphones shall be active.
10) Volume controls for “video playback” and “mic level” shall be always accessible.

c. Touchpanel programming is the responsibility of the contractor. An outline has been made above but does not include all functions required. The contractor is responsible to design a graphic user interface using the following guidelines:
1) In automatic mode, use must be able to complete any function within two button presses.
2) More important functions shall be more prominent on the interface.
3) Like functions shall appear at the same place on every screen.
4) Nesting menus are not allowed.

d. The base template for the touchpanel shall be from the stock manufacturer’s line, with customization as necessary. The template colors shall be modified to match school colors, and the splash screen shall show the school’s logo.

F. Main Gymnasium – Broadcast Systems

1. Audio

a. The audio system is comprised of a digital audio mixer and associated rack mounted digital audio stagebox. This system shall be capable of sending and receiving digital audio via Dante. Provide dust cover.
b. The production video switcher shall be configured to send and receive via Dante digital audio networks. This is the primary means of audio transmission between the audio mix and video production systems.
c. Left and right active audio monitors shall be provided and integrated into the control room furniture, as indicated.

d. Microphone level feeds from broadcast AV panels shall be routed to the digital audio stagebox for audio mix.
e. Audio and network patchbays shall be included, as indicated in the drawings.

2. Video

a. An SDI video router shall be provided for routing SDI signals to and from source and endpoint devices, as well as through signal processing equipment. Router control panels shall be placed at anticipated operator locations, as required.
b. A production video switcher with both SDI and AV-over-IP switching capabilities shall be provided. The switcher shall be capable of basic video formatting and frame synchronization, as well as graphics and text layering, effects and transitions, media playback, multiview, Dante digital audio networking, and 10GBE stream output. KVM monitoring and USB control shall be provided for remote systems access.
c. A dedicated instant replay system shall be integrated into the video routing and switching infrastructure. The instant replay system shall be managed by a dedicated control panel, as well as by software. KVM monitoring and USB control shall be provided for remote systems access.
d. Installed PTZ cameras with both SDI and AV-over-IP capabilities shall be provided. Camera control shall be provided by the video switcher control panel and software, as well as portable control surfaces, as indicated.
   1) Provide protective enclosure to guard against ball hits.

e. Two broadcast camera systems shall be provided. Each camera system shall include the camera, lens, lens control, tripod and head with adapters, viewfinder monitor, fiber extension systems, cabling, and carry cases, as well as associated required accessories.
f. Two tracking cameras with RTMP stream output shall be provided and configured as needed for auto-tracking of sports play. An RTMP to NDI interface device shall be provided to allow the stream into the video switcher workflow.
   1) Provide protective enclosure to guard against ball hits.

g. A 43” video display shall be used for the main switcher multi-view. The display shall be capable of reproducing any feed from the SDI router, as well, by changing inputs on the display. Include mounting hardware and installation, as required.
h. Local operator 28” video monitors shall be provided for video production technical director and audio operator positions, for SDI monitoring and KVM purposes. Additional 28” monitors and KVM receivers shall be available for supplemental operator locations such as replay control, camera operator, graphics, live stream management. Provide wired keyboards and mice for each KVM receiver location.
i. Rackmounted dual monitors shall be included at the equipment racks and at the video production desk, usually for preview and program monitoring but capable of any feed from the router.
j. A rackmounted 17” display shall be located at the equipment racks for SDI monitoring as well as KVM purposes. Provide a wired keyboard and mouse for KVM uses. Monitor and keyboard heights shall be located at comfortable operating heights.
k. An SSD deck for use with 2.5” SSD drives shall be included. Configure for remote control by the production video switcher.

l. Video patchbays shall be provided, as indicated in the drawings
m. Neutrik Opticalcon rack I/O bulkheads using SMPTE311M hybrid cable shall be provided, as indicated in the drawings. Neutrik Opticalcon connections shall include both fiber and copper terminations to allow use with SMPTE311M wire. A minimum of (2) SMPTE 311M hybrid cables with Neutrik Opticalcon on one end and SMPTE304M Lemo on the other end will be required for field connection to broadcast cameras. Opticalcon SMPTE311M hybrid patch cables shall be required at the patchbay, as well as LC duplex patch cables for simple fiber only patches.

3. Edit/Record

a. A rack-mounted Apple Mac Studio with Apple keyboard and mouse shall be provided for multi-channel audio recording and playback. The computer shall be configured per audio playback software manufacturer recommendation. The computer shall have the following minimum options (or better at time of purchase):
   1) Apple M1 Ultra chip with 20-core, 64-GPU, and 32-core Neural Engine
   2) 128.0 GB unified memory
   3) 2.0 TB SSD hard drive
   4) 10GB Ethernet
   5) Wired Mouse & Keyboard
   6) Mac and Windows OS installed (via Parallels)
   7) Software & accessories per equipment list

b. The computer configuration shall meet or exceed the software manufacturer's requirements.
c. A Solid-state drive dock with detachable 2.5" SSD shall be provided and connected to the computer via Thunderbolt.
d. Provide networked audio control surfaces to remotely manage DAW software and plugins. Include a wireless tablet interface with a control surface dock for wireless remote control of associated software. Coordinate wireless access point for dedicated wireless remote-control with Telecom/Electrical.

4. Production Intercom

a. A two-channel production intercom system shall be provided to allow communications between the control booth and remote camera positions and operators.
b. The production intercom station shall be capable of outputting a line-level signal from a microphone mounted on the front panel. This may be used for IFB communication or paging with external audio systems. Note: IFB may also be performed by using one channel of the intercom and appropriated IFB receivers.
c. All intercom connections shall be homerun and terminated at a WAGO-style DIN-rail terminal strip with internal bussing. Wire jumper bussing between blocks is not acceptable.

5. Utility

a. A series of utility items, such as distribution amplifiers, line isolators, sync/clock/PTP/NTP generators, timeclocks, midi/usb interfaces, etc, shall be provided as indicated in the equipment list.

b. An NTP timeclock shall be provided for control room clock monitoring. NTP shall be provided by the sync/clock generator and delivered to all NTP time capable devices. Devices that do not see NTP timeclock may require LTC, also generated by the sync/clock generator. Note: if a campus NTP server or GPS clock service exists, the sync/clock generator should reference and distribute that NTP source to all NTP/LTC devices and clocks.
c. Ethernet switches with adjacent RJ45 patch bays shall be provided.
d. A KVM system over shielded category wire with KVM matrix, transmitters, and receivers shall be provided, as indicated.
e. Acoustically isolated equipment racks with front & rear access shall be provided with accessories as indicated in part 2 of this specification.
f. A power distribution system shall be provided, along with a UPS and accessories as noted.
g. An “ON-AIR” light system shall be provided, complete with necessary power supply activation relay and accessories. The system shall be configured arm and fully activate on record (red). Provide a rack-mount button for activation, in the control furniture, as a back-up to the automated record-ready/record system triggered by video switcher control.
h. Provide UPS at the equipment racks and at the control desk. Computer, switchers, and control devices should be placed on the UPS to provide sufficient time to safely save and shut down.
i. A motorized, sequencing breaker panel shall be provided under electrical. It is in the scope of this section to program the sequencing panel and configure both hard button control to properly sequence the circuits up and down.
    1) All equipment shall shut down when the system is powered down, except for the control processor and associated network switch.

6. Provide a complete Winsted furniture & rack system as required by the drawings. The system should generally include the following items:

a. Base unit w/ continuous laminate work surface
b. Four turret-style rack cabinets, minimum
c. Two pull-out keyboard shelves, minimum
d. Versa-Track system
e. Monitor mounts for (2) desktop monitors
f. Monitor mount for 46” LCD Multiviewer
g. (2) loudspeaker mounts for powered audio monitors
h. Caster wheel option
i. Removable access panels to allow access to wall and in-wall panels & power connections located behind furniture system from front side. This is required so the furniture system doesn’t need to be moved to access wall connections otherwise obscured.
j. Covers, doors, rack rails, power stringers, data/power cable management, and other accessories as needed for a complete system.
k. Laminate finishes shall be selected from the manufacturer’s standard line. Submit options for review.

G. Practice Gymnasium

1. Audio

a. The gymnasium system is comprised of two overhead main loudspeakers with subwoofers in a distributed scheme. Loudspeakers & rigging shall be a finish as indicated by Architect.
b. A digitally networked DSP unit with Dante shall be provided for audio management and systems control.
c. All DSP programming is the responsibility of the AV contractor.
d. Two channels of wireless mic receivers with handheld transmitters and antennas shall be provided. Provide protective plastic dome for antennas.
e. One channel of ADA-compliant FM-based assistive listening system shall be provided.
   1) Provide protective plastic dome for antenna.
   2) Receiver and accessories shall be provided as part of a separate package but are required for operation of the space.

f. Provide and install decora style Dante network transmitter devices, as indicated.

2. Video

a. A presentation video switcher and scaler shall be provided to handle signals from all video devices, including remote laptop computer inputs, BYOD devices and other inputs as indicated on the Drawings. The remote laptop computer inputs shall use CAT cable as their means of transport. The switcher shall be fully HDCP compliant and support EDID.
b. The video scaling shall be properly configured to accept any aspect ratio or resolution and modify the image for proper viewing on a local monitor and the video projection system. This function shall be automatic and require no additional configuration from user.
c. Provide and install decora style HDMI /HD-Base-T transmitter wallplates, as indicated.
d. Provide video projector and lens in protective cage. Provide mounting hardware and installation of video projection equipment, as indicated.
e. The projection screen shall be provided with the following:
   1) Motorized
   2) External Low Voltage Control Unit (LVC-IV)
   3) 1.6:1 aspect ratio
   4) Front projection surface with black backing per equipment list
   5) Black Case
   6) Additional black drop shall be provided as necessary to allow the bottom of the screen to hang at 4’-0” above floor in regular use.
   7) An extra 12” of black drop beyond that required shall be provided to accommodate unforeseen field conditions.
   8) Sized as indicated in the 274116-A equipment list.

f. Video monitoring shall be via HDCP-compliant LCD rack-mount monitor/receiver.

3. Utility

a. See architectural & electrical sheets for proper placement of AV devices.

b. Fixed equipment shall mount in a dedicated AV floor-mount equipment rack with locking front door. Provide sequencing power system with modular raceways & switched modules.
c. Mount all devices per approved drawings. Variance will require re-submittal for approval.
d. Multiformat AV bulkheads shall be provided with various audio, video, and network I/O, as indicated.

4. Control System

a. A touch screen-based control system shall be provided for control over all applicable AV devices.
b. Two 7” color touchscreens shall be provided in locking enclosures at locations shown on the drawings.
c. All control system programming is the responsibility of the AV contractor and shall be submitted during the shop drawing phase for approval.

5. Control System Programming

a. Touchpanels shall be configured with the most often-used device functions. Do not attempt to put every possible device function on the touchpanel.
b. The touchpanel shall be configured to work in two modes: manual and automatic.
   1) When in manual mode, all functions shall be “single function” buttons.
   2) A password must be entered to access manual mode.
   3) In manual mode, access to advanced controls shall be possible, such as:
      a) Automixer, Wireless Mic, Video Source & Main System Volume
      b) System On/Off
      c) Projector On/Off/Mute
      d) Projection Screen Up/Down/Stop
      e) Other functions as required
   4) In Automatic mode, the automix jacks, wallplate sources, and wireless microphones shall be active.
   5) Volume controls for “video playback” and “mic level” shall be always accessible.

c. Touchpanel programming is the responsibility of the contractor. An outline has been made above but does not include all functions required. The contractor is responsible to design a graphic user interface using the following guidelines:
   1) In automatic mode, use must be able to complete any function within two button presses.
   2) More important functions shall be more prominent on the interface.
   3) Like functions shall appear at the same place on every screen.
   4) Nesting menus are not allowed.

d. The base template for the touchpanel shall be from the stock manufacturer’s line, with customization as necessary. The template colors shall be modified to match school colors, and the splash screen shall show the school’s logo.

H. Wresting / Weights (Qty: 2)

1. Audio Playback System

    a. Provide an audio DSP for playback functions, loudspeaker management, along with local inputs on a rack panel. Provide with 8x8 Dante capabilities.
    b. Provide a wireless mic system with headworn athletic-type microphone.
    c. A rack-mounted media player shall be provided with Bluetooth, USB/SD, and 3.5mm stereo auxiliary inputs.
    d. Provide and install decora style Dante network transmitter devices, as indicated.
    e. Loudspeakers are active wall-mount type. Mount as required to clear lighting and other obstructions, while providing even audio coverage in the instruction area. Loudspeakers shall have at least 80” clear below to satisfy ADA requirements.
    f. Provide and install all necessary equipment and accessories for a complete and working system.
    g. Equipment shall be in the local AV equipment rack.
    h. See architectural & electrical sheets for proper placement of AV devices.

I. Dining Hall

1. Provide an audio system with dedicated DSP, wireless mics, and distributed ceiling loudspeakers.

    a. Zone ceiling speakers to optimize for microphone presentations from presentation end of dining hall, as well as other staging areas to be defined by the Client.

2. Provide an FM-based assistive listening system for the area.
3. Four channels of wireless microphone shall be provided with handheld transmitters, complete with remote-mount antennas, and accessories, as noted.
4. Provide a dedicated media player with Bluetooth for audio playback.
5. Provide a touchpanel controller as part of the dining hall control system and configure to control the dining hall system. See requirements for touchpanels.
6. Provide and install decora style digital audio network source devices, as indicated.
7. Video

    a. A presentation video switcher and scaler shall be provided to handle signals from all video devices, including remote laptop computer inputs, BYOD devices and other inputs as indicated on the Drawings. The remote laptop computer inputs shall use CAT cable as their means of transport. The switcher shall be fully HDCP compliant and support EDID.
    b. The video scaling shall be properly configured to accept any aspect ratio or resolution and modify the image for proper viewing on local monitor and the LED wall (LED wall provided and installed by the Client and manufacturer). This function shall be automatic and require no additional configuration from user.
    c. Provide infrastructure and receiver/scaler, if required, to LED Wall processor/equipment (Refer to LED Wall by Owner/Manufacturer)
    d. Video monitoring shall be via HDCP-compliant LCD rack-mount monitor/receiver.
    e. Provide and install decora style HDMI /HD-Base-T transmitter wallplates, as indicated.

J. Network Configuration

1. AV systems that operate on IP-based networks shall be properly configured, using manufacturer-recommended settings.
2. AV systems shall be separated into one VLAN per sub-system.

K. Portable Equipment

a. Not in scope.

1.5 CURRENT TECHNOLOGY:

A. Only the most current hardware and software shall be provided. In no case will discontinued or superseded products be acceptable. If the manufacturer has developed and successfully released products that meet or exceed the criteria within this specification, the Contractor shall notify the Architect and submit the new product for review. If accepted, the products shall be provided at no additional cost to the Owner. Software upgrades and authorized support services for its proper integration into the system shall be provided at no cost to the Owner throughout the warranty period.
B. In the event of known product defaults or recall, the Contractor shall immediately notify the Architect and make immediate arrangements for remedy.
C. None of the stipulations herein shall be grounds for revision to the Project schedule.
D. See related procedures under Warranties in this Section.

1.6 SUBSTITUTIONS:

A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by Architect in accordance with Section 01 – Substitution Procedures. Requests shall be made in a timely fashion so as to not affect the Project schedule in either case of the substitution being accepted or rejected.
B. Documentation for the substitution shall be submitted with supporting material and shall including the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Architect shall be the sole evaluator of the fitness of the substitution.
C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.7 SUBMITTALS:

A. If permitted under Section 01– Submittal Procedures, all submittals shall be made in electronic format.

1. Files shall be in .pdf format and submitted via CD or DVD.
2. Clearly indicate submittal number and description in the file name of the document.
3. Each document shall be a separate file.
4. Markups will be made electronically, and the submittal returned via electronic means.

B. Submittals shall be made in a timely fashion so as to not affect the Project schedule and shall allow for adequate time for review and resubmittal. Partial submittals will not be acceptable and will be returned without review.

C. Submittals shall be reviewed, and field dimensions verified prior to commencing acquisition for, and fabrication of the Work in this section. All services and parts of the work in this section shall be verified through the submittal process.

D. Prior to commencing work on shop drawings, the contractor shall facilitate a meeting between the contractor and Architect and his consultant to “walk through” the AV systems.

E. Conduit, Backboxes and Electrical Systems Verification Letter:

1. Within 30 days of contract award, the AV contractor shall review all relevant information pertaining to the AV systems low-voltage conduit, backboxes, and line voltage electrical work to be performed by Division 26. A formal memo, outlining acceptance (or desired changes) of the contract drawing shall be provided. Failure to provide this memo indicates acceptance of, and liability for, the conduit, backboxes and electrical systems as indicated in the Drawings.

F. Shop Drawings:

1. Submit full-size (minimum 30” x 42”) scaled shop drawings that show the following:

a. Installation requirements and mounting conditions.
b. Provide stamped structural drawings by a structural engineer licensed in the state in which the project takes place showing complete mounting details for all devices over 20 pounds.
c. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
d. Block diagrams, showing equipment interconnection.
e. Internal DSP programming
f. IP table, showing all connected devices with IP address, subnet, VLAN info, MAC address, and any other related network information.
1) Coordinate with Owner for proper IP configuration.

g. Equipment rack and patchpanel drawings.
h. Full-scale drawings of custom plates
i. Color schedule for each device, including plates, speakers, and all equipment with room name and number.
j. Run sheets or field wiring drawings.
k. Equipment modification drawings, including statement of purpose for modification and agreement to provide full manufacturer warranty, if modifications cause a voided warranty.
l. Final schematic drawings of any custom circuitry.
m. Detailed equipment list, including quantity, manufacturer and model.
n. Detailed product drawings, as applicable to the project.
o. Copies of contract drawings will not be accepted as shop drawings and will be returned without review.

2. AV Control System Touchpanels:

a. Provide an electronic file for approval of working touchpanel files. File shall be in a format that both consultant and Owner can use on any windows-based computer (with required software installation.)
b. Provide any required viewing software.
c. Touchpanel design subcontractor is responsible for design of touchpanel layouts but shall be subject to consultant and Architect approval.
d. A separate file for each touchscreen shall be provided.

3. Acceptance of any submitted data or shop drawings for material, equipment, apparatus, devices, arrangement and layout shall not relieve contractor from responsibility of furnishing same of proper dimensions and weight, capacities, sizes, quantity, and installation details to perform efficiently the requirements and intents of the systems design. Such acceptance shall not relieve the contractor from responsibility for error, omissions or inadequacies of any sort on submitted data or shop drawings.

G. Product Data:

1. Submit a detailed equipment list, including manufacturer, model number, description and quantity for each item.
2. Do not submit equipment cut sheets, except for custom or non-standard devices.

H. Samples:

1. Submit samples for review if requested. Samples may include, but are not limited to:

a. Connector, panel and cable assemblies
b. Panel finish samples
c. Custom switch, button or similar assemblies

I. Record Documents: Submit record documents in accordance with Section 01.

1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
2. Submit copies of “as-builts” including:

a. Shop drawings, product data, operations and instructions manuals for all products provided.
b. Equipment list, with manufacturer, model number, and serial number for all installed devices.
c. Electronic backup on Compact Disc of control systems and DSP systems programming.
d. Care and maintenance instructions, service line and online contacts.
e. Warranty documents.
f. Key list, showing the following for all keys in the system: device name and model number, system controlled, key model number or other replacement identifier, tech support number for equipment manufacture, and thumbnail picture of device.

J. Submittal procedures and quantities are specified in Section 01– Submittal Procedures.

1.8 WARRANTY:

A. Warranty shall provide coverage of material and product defects and assembly workmanship or installation for a period of two years following the date of acceptance by the Architect.
B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor.
C. The Contractor shall bear all costs that arise as a result of the warranty claim, including, but not limited to, the use of temporary replacement components, additional Owner staffing or overtime, shipping, cancelled uses or performances.
D. Activate all manufacturers' warranties in the name of the Owner, within one week of the date of acceptance.
E. Provide two return visits following system acceptance to fine tune or repair any items requested by the Owner:

1. 30-40 days following acceptance
2. 1 year following acceptance
3. 2 years following acceptance

1.9 QUALITY ASSURANCE:

A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.
B. Specialty subcontractor shall have been continuously engaged in the sales and integration of audio, video and communications equipment similar to that specified herein for a minimum of 10 years.
C. Specialty subcontractors shall have at time of bid and continuously maintain throughout the project and warranty period a low voltage Specialty Contractor's license appropriate for the work in this Section, and in the state in which the project takes place.
D. Specialty subcontractors shall employ field service technicians within a four-hour driving distance from the Project site.
E. Specialty subcontractors shall employ personnel with the following minimum certifications:

1. Avixa/Infocomm CTS-I Certification
2. Extron Master Programmer Certification
3. QSC – QSYS Level 2 Certification
4. L'Acoustics Level 2 Certification
5. Dante Level 3 Certification
6. Cisco Professional Certification

F. All equipment shall be UL or ETL listed and bear the appropriate labels.

1.10 DELIVERY, STORAGE AND HANDLING:

A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.

C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.

1. Devices shall not be delivered to the project site until the project is suitably clean and all adjacent finish work that may be painted or produce dust has been completed. The contract shall provide and maintain complete protection of all devices until the Project has been made available for occupancy by the Owner. The contractor shall thoroughly clean and remove any dirt or dust that infiltrates system components and be responsible for timely replacement of any damaged components.
2. Device labels and connectors shall be delivered with temporary dust and paint protection installed.

1.11 PROJECT CONDITIONS:

A. Defects in the field which may impact the work in this Section shall be reported to the Architect and corrected in accordance with the requirements of the applicable Section of Work prior to commencement of the Work in this Section.

1.12 MAINTENANCE:

A. Provide maintenance stock of User-serviceable components within the system. Maintenance stock shall be packaged in weather resistant box labeled “spare parts for AV system” and turned over to the owner at time of system commissioning.
B. Maintenance stock shall include:

1. Four fuses of each type in the system.
2. Five connectors of each type in the system.
3. Six spare keys of each type in the system.
4. Components recommended by the manufacturer.
5. Any non-standard tools required for Owner service.
6. Four spare lamps for each type in the system.

PART 2 - PRODUCTS

2.1 PRE-APPROVED SPECIALTY SUBCONTRACTORS

A. The following AV systems contractors are pre-approved to complete the work in this section:

AMT Systems
Attn: Tim Carlson
26810-A Oak Ave.
Santa Clarita, CA 91351
Tel: (661) 251-4206

Diversified
Attn: Adam Lopez
3275 Edward Avenue
Santa Clara, CA 95054
Phone: (408) 969-1972

ICS Integration, Inc.
Attn: Mark Berlo
550 Parrott Street, Unit #40
San Jose, California 95112
Phone: (408) 491-6000

PCD, Inc.
Attn: John Rudolph
1032 Maxwell Drive
Santa Rosa, CA 95401
Phone: (707) 546-3633

Solotech
Attn: Derek Lewis
11060 Randall Street
Sun Valley, CA 91352
Tel: 818-765-3800

Sound Image
Attn: Michael Martin
2425 Auto Park Way
Escondido, CA 92029
Tel: (760) 737-3900

B. Those not listed above shall submit qualifications for review. In order to qualify, the contractor shall submit the following information to the Architect for review:

1. Meet all qualifications and requirements of Section 1.9 – Quality Assurance.
2. List of personnel who will be working on this Project, including skills, experience, and accreditations.
3. List of union affiliations, contractor licenses, and other applicable trade certifications.
4. List of projects completed within the past 5 years, with references. Provide phone and/or e-mail addresses for reference contacts.
5. Proof that at least 5 jobs in the past 5 years have a minimum contract value equal to or greater than the project listed herein, and are of similar type.
6. Proof of bonding and insurance.

C. Permission to bid does not imply acceptance of the specialty subcontractors. It is the sole responsibility of the contractor for this Section to ensure that any price quotations received, and submittals made are for systems that meet or exceed the specifications.

2.2 MANUFACTURERS:

A. AV equipment in this Section shall be provided by specialty manufacturers providing products meeting the specifications herein.
B. Provide all equipment as listed in 274116-A, equipment list.

2.3 SYSTEMS:

A. Audio Systems General Requirements:

1. Grounding: All grounding in racks is the responsibility of the AV contractor. All devices shall be appropriately grounded to the isolated grounding system busbar.
2. Un-Balanced Devices: Provide a balancing transformer for any unbalanced device, at both input and output.
3. Loudspeaker Rigging: All loudspeaker rigging shall be reviewed and stamped by a licensed structural engineer, licensed in the state in which the project takes place. The contractor is responsible to secure the structural stamp, including all expenses associated therein.

B. Video Systems General Requirements:

1. Reference SMPTE standard for specified SDI video type.

C. Modulated (CATV) Video Systems General Requirements:

1. Cable Distribution System: The cable distribution system shall consist of coaxial cables, user interfaces, signal taps, splitters, RF amplifiers, signal equalizers, power supplies, and ancillary hardware as required to meet the system requirements specified below.
2. The signal level of each channel at each TV outlet shall be +5 dBmV, plus or minus 3 dBmV.
3. The system shall meet the following minimum parameters at each TV outlet:

a. Signal-To-Noise Ratio: 43 dB
b. Cross Modulation: -46 dB
c. Hum Modulation: -55 dB
d. Return Loss: 14 dB
e. Isolation (outlet-outlet): 24 dB
f. Aural Carrier Level: 13 dB to 17 dB below visual
g. Impedance: 75 ohm

2.4 MATERIALS:

A. All components supplied under this Section shall be new. Used or factory reconditioned components will not be acceptable.
B. Cabling

1. Provide cabling as indicated in the drawings.

C. Floor-standing 19” Equipment Rack:

1. Provide Middle Atlantic WRK series. See drawings for exact size.
2. Provided with solid rear locking door.
3. 2,500 pound weight capacity.
4. All structural elements shall be finished in black powder coat.
5. Rack shall be UL listed.
6. Provide the following options:

    a. Removable keylocked side panels, model # SPN-xxx. As required.
    b. Top panel with 3-1/2” service plate model #MW-10FT. One per rack.
    c. Vertical Lacer strip, heavily perforated, 77" long, model # LACE-xx-OP. Two per rack.
    d. Horizontal Lacer Bars, model #LBP series. Ten per rack, or as needed.
    e. Brush Grommet panel, model #BRxx series. As needed.
    f. Rear rail kit, 11-gauge, 10-32 threaded, model # WRK-RRxxx. One per rack.
    g. Copper Bus Bar, model #BB-xx. One per rack.
    h. Utility Drawer, model D4. One per rack group.
    i. Blank & Vent panels, as needed to fill rack.
    j. Ganging hardware, model #GANG-10, as needed.
    k. Full height utility light, white w/ dimmer, model FWD-LT-UTL-xxx-D. One set per rack. Provide maximum length allowed by rack size.
    l. Custom rack mounts for equipment without rack ears, model #RSH-series.

7. Mount racks as necessary to meet Zone 4, Seismic Design Category (SDC) “D” and Seismic Use Group III Upper Floor Essential Equipment rating and have an Ip rating of 1.5, based on manufacturer recommendations.

    a. Provide model #WRK-Z4 seismic brackets, one set per rack.

8. Provide the following for thermal management:

    a. 10” fan, model #FAN-10. One per rack.
    b. 10” fan guard, model #GUARD-10. One per rack.
    c. Vent Blockers, model VBK-W27-W32. As required.
    d. Thermostatic Fan Control for MPR raceway, model #FC-4A. One per rack group.
    e. Vent panels at bottom of rack, model VT-series. As required.

9. Provide the following for power management:

    a. Modular power raceway, model #MPR-x. One per rack.
    b. Dual 20A Isolated Ground outlets, model #M-2x20IGA. Fill MPR raceway.
    c. Single-Circuit 15A power strip for UPS power distribution, model #PDT-2015C-NS.
    d. DC power distribution, model PD-DC series or equal. Provide best model to match specified equipment. Provide in quantities as needed. No “wall wart” power supplies are allowed.
    e. Non-switching front-mounted convenience outlets. Provide one unit per rack group. Model #PD-2015R-NS or equal.

D. Floor Standing Swing-Out 19” Equipment Rack:

1. Provide Middle Atlantic SR-series. See drawings for exact sizes.
2. 500 lb. weight capacity.
3. All structural elements shall be finished in black powder coat.
4. Rack shall be UL Listed.
5. Provide the following options:

    a. Solid Front Door, model #FD-xx.
    b. Vertical Lacer strip, heavily perforated, 77" long, model # LACE-xx-OP. Two per rack.
    c. Horizontal Lacer Bars, model #LBP series. Ten per rack, or as needed.
    d. Brush Grommet panel, model #BRxx series. As needed.
    e. Rear rail kit, 10-32 threaded, model # DWR-RRxx. One per rack.
    f. Copper Bus Bar, model #BB-xx. One per rack.
    g. Utility Drawer, model D4. One per rack group.
    h. Blank & Vent panels, as needed to fill rack.
    i. Full height utility light, white w/ dimmer, model FWD-LT-UTL-xxx-D. One set per rack. Provide maximum length allowed by rack size.
    j. Custom rack mounts for equipment without rack ears, model #RSH-series.
    k. If two SR racks are specified next to each other, provide zero-clearance latch, model #DWRSR-ZL. One per pair.

6. Provide the following for power management:

    a. Modular power raceway, model #MPR-x. One per rack. Provide maximum length allowed by rack size. Provide jumpers, junction box, terminals and accessories as required for a complete system.
    b. Dual 20A Isolated Ground outlets, model #M-2x20IGA. Fill MPR raceway.
    c. If UPS is specified: provide single-circuit 15A power strip for UPS power distribution, model #PD-2415SC-NS.
    d. DC power distribution, model PD-DC series or equal. Provide best model to match specified equipment. Provide in quantities as needed. No “wall wart” power supplies are allowed.
    e. Non-switching front-mounted convenience outlets. Provide one unit per rack group. Model #PD-2015R-NS or equal.

7. Provide the following for thermal management:

    a. 4.5” fan, model #QFAN. Two per rack.
    b. 4.5” fan guard, model #GUARD. Two per rack.
    c. Vent Blockers, model VBK-xxx. As required.
    d. Thermostatic Fan Control for MPR raceway, model #FC-4A. One per rack group.
    e. Vent panels at bottom of rack, model VT-series. As required.

E. Wall-Mounted Swing-Out 19” Equipment Rack

1. Provide Middle Atlantic DWR Series.
2. Useable height shall be as required to fit equipment, useable depth shall be 26”.
3. 250 lb. weight capacity.
4. All structural elements shall be finished in black powder coat.
5. Rack shall be UL Listed.

6. Follow attachment methods as described in the drawings, which meet structural criteria provided by the project structural engineer.
7. Provide the following options:

    a. Solid Front Door with keylock, model #FD-xx.
    b. Custom rack mounts for equipment without rack ears, model #RSH-series.
    c. Other items as shown in the equipment list.

8. Provide the following for power management:

    a. Provide rack-mounted power distribution & sequencing device as indicated in the equipment list.

9. Provide the following for thermal management:

    a. Dual 6” fan kit with accessories, model #DWR-FK6-26. One per rack.
    b. Thermostatic Fan Control, model #FC-4-1CA. One per rack.
    c. Vent panels at bottom of rack, model VT-series. One per rack.

F. Casework-Mounted Pull-out 19” Equipment Rack

1. Provide Middle Atlantic SRSRX-XX series.
2. Useable height shall be determined by casework allowances, useable depth shall be 23”.
3. 200 lb. weight capacity.
4. All structural elements shall be finished in black powder coat.
5. Rack shall be UL Listed.
6. Provide the following options:

    a. Custom rack mounts for equipment without rack ears, model #RSH-series.

7. Provide the following for power management:

    a. Provide a rack-mounted, sequenced power distribution panel per specification.

8. Provide the following for thermal management:

    a. Coordinate with casework provider to ensure proper ventilation.
    b. Provide Middle Atlantic UQFP series fan panels.

G. Connectors:

1. Microphone and Line Level Audio

    a. XLR-M, 3-pin:
        1) For panel-mount, Provide Neutrik NC3MD-L-1, 3-pole male XLR connector in black.
        2) For cable-end, provide Neutrik NC3MXX, 3-pole male connector.

    b. XLR-F, 3-pin, Standard

1) For panel-mount, Provide Neutrik NC3FD-L-1, 3-pole female XLR connector in black.
2) For cable-end, provide Neutrik NC3FXX, 3-pole female connector.

c. XLR-F, 3-pin, Automixing (BLUE)
1) For panel-mount, Provide Whirlwind WC3F, 3-pole female XLR connector in blue color shell.
2) No colored trim rings allowed, such as Neutrik.

d. 1/4” Tip/Ring/Sleeve
1) For panel-mount, Provide Neutrik NJ3FP6C, locking tip/ring/sleeve connector.
2) For cable-end, provide Neutrik NP3X, tip/ring/sleeve connector.

e. Phono
1) For panel-mount, Provide Neutrik NF-2D series, with appropriate color isolation washer.
2) For cable-end, provide Neutrik NF2C-B-2 “Profi” connector.

2. Production Intercom:

a. XLR-M, 3-pin, Intercom (RED)
1) For panel-mount, Provide Whirlwind WC3M, 3-pole male XLR connector in red color shell.
2) No colored trim rings allowed, such as Neutrik.

3. Integrated Control Systems:

a. For panel-mount in configurations using legacy data and power bus (AxLink or Cresnet), provide Neutrik NC4FD-L-1, 4-pole female XLR connector.
b. For panel-mount in configurations using networked control bus, refer to RJ-45 data information below.
c. Cable-end configurations are project dependent. See drawings.

4. Loudspeaker:

a. For panel-mount in 2 or 4-conductor applications, use Neutrik Speakon NL4MP 4-pole connector.
b. For panel-mount in 8-conductor applications, use Neutrik Speakon NL8MPR 8-pole connector.
c. For cable-end in 2 or 4-conductor applications, use Neutrik Speakon NL4FC 4-pole connector.
d. For cable-end in 8-conductor applications, use Neutrik Speakon NL8FC 8-pole connector.

5. Video:

a. Production Video/12G:
1) For panel-mount, Provide Neutrik NBB75DFIX, recessed bulkhead jack, feed through, isolated connector.

2) For cable-end, provide Neutrik NBNC75B-series, push-pull style connector. Use appropriate connector for cable specified.

b. "F" Connector:
1) For panel-mount, provide Holland G-F81F* inline barrel connector with 3.0 GHz minimum performance.
2) For cable-end, provide Holland Superlok G-series compression connector with 3.0 GHz minimum performance.

6. RF Antenna – 50-ohm

a. For panel-mount, Provide Canare BJ-JRUD, recessed bulkhead jack, feed through, isolated connector.
b. For cable-end, provide Canare BP-C series. Use appropriate connector for cable specified.

7. Data:

a. RJ-45
1) For panel-mount, provide Neutrik Ethercon NE8 series punch-down connector in black to match cable type.
2) For cable end, provide Neutrik Ethercon NE8-series connectors in black to match cable type.

b. Fiber
1) For panel-mount, provide Neutrik Opticalcon NO2-4FD feed-thru panel mount connectors.
2) For cable end, provide Neutrik Opticalcon cables in quantities shown in 274116-A equipment list.

H. Patchbays:

1. Microphone and Line Level Audio:

a. Provide Bittree 489 programmable series with 3-pin molex style termination with the following options:
1) Longframe ¼"-style connectors
2) 2x26 jacks with 12" deep chassis
3) 2 designation strips in over/under configuration
4) Mono spacing, 2 RU
5) Isolated Grounding
6) Normals per Drawings
7) Black in color
8) Paper designation strips. Provide .doc file to Owner for future use.
9) Provide Middle Atlantic "CLAW" patchcord holder, one per rack.

b. Patchbay layout shall be in standard "output at top, inputs at bottom" scheme with clear method for showing normals. Contractor shall be responsible for exact patchbay layout.
c. Labeling shall be as follows:

1) All labeling shall exactly match circuit in field.
2) Labeling shall be sequential per circuit type, beginning at 1.

d. Patchbays by AVP, Inc are also acceptable.

2. Microphone and Line Level Audio (Bantam/TT):

a. Provide Bittree 969 programmable series with 3-pin molex style termination with the following options:
1) Bantam (TT) style connectors
2) 2x48 jacks with 12” deep chassis
3) 2 designation strips in over/under configuration
4) Mono spacing, 2 RU
5) Isolated Grounding
6) Normals per Drawings
7) Black in color
8) 6” deep rear lacing bar
9) Digital AES internal wire
10) Paper designation strips. Provide .doc file to Owner for future use.
11) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.

b. Patchbay layout shall be in standard “output at top, inputs at bottom” scheme with clear method for showing normals. Contractor shall be responsible for exact patchbay layout.

c. Labeling shall be as follows:
1) All labeling shall exactly match circuit in field.
2) Labeling shall be sequential per circuit type, beginning at 1.

d. Patchbays by AVP, Inc are also acceptable.

3. Loudspeaker:

a. Provide AVP, Inc. WK-U212E3-NL4MP series with solder termination and the following options:
1) 2x12 jacks with 12” deep chassis
2) 2 designation strips in over/under configuration
3) 2 RU
4) Black in color
5) Paper designation strips. Provide .doc file to Owner for future use.

b. Provide 2 output jacks from each amplifier channel. Configure as follows:
1) Amplifier “A”, Channel One Jacks:
2) Pins 1+/1- : Amp Channel One
3) Pins 2+/2-: Amp Channel Two
4) Amplifier “A”, Channel Two Jacks:
5) Pins 1+/1- : Amp Channel Two
6) Pins 2+/2-: No Connection
7) See Drawings for additional information.
8) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.

4. 12G-SDI Production Video:

    a. Provide Bittree Video MINI-WECO 12G+ series patchbay.
    b. Provide the following configuration:
        1) WECO-style connectors
        2) 2x32 jacks with 12” deep chassis
        3) 2 designation strips in over/under configuration
        4) 2 RU
        5) Normals per Drawings. Provide looping plugs in quantities needed.
        6) Black in color
        7) Paper designation strips. Provide .doc file to Owner for future use.
        8) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.

    c. Patchbays by AVP, Inc. in are also acceptable.

5. Data - Copper:

    a. Provide Belden REVConnect Series Flush-Mount Modular Keystone Panel.
    b. Provide with the following configuration:
        1) CAT 6A Shielded
        2) RJ45 jack with shielding to match 10GX cable type
        3) 1x24 jacks with 6” deep removeable rear lacing bar
        4) 1 designation strip in over configuration
        5) 1 RU
        6) Black in color
        7) Paper designation strips. Provide .doc file to Owner for future use.
        8) Provide Middle Atlantic “CLAW” patchcord holder, one per rack.

6. Data - Fiber

    a. Provide Corning CCH Series fiber optic patching systems.
    b. Provide housing, LC patchpanels, and required accessories for a complete installation.

2.5 PANELS:

A. General: The control receptacle panels shall consist of the appropriate connectors required for the system.
B. Physical:

1. Faceplates shall be 0.080” aluminum, edges eased, finished in fine texture, scratchresistant powder coat, with fasteners countersunk.

    a. Panels specified as flush mounted shall overlap back box by 1/2”. Surface mounted panels shall match back box size with no gaps or overlap.
    b. Coordinate back box type, size and mounting with Division 26 - Electrical.

2. Color shall match the finished wall color of the wall onto which it will be mounted, unless otherwise noted. Submit color table for review.

3. Panels noted as custom color shall be factory powder coated a color selected by the Architect. Legends shall be laser etched.
4. Laser etched labels 1/4” high characters minimum, unless otherwise noted.

    a. Labeling shall be as indicated on the Drawings.
    b. Use Arial font.

5. Wall mounted panels shall mount into an industry standard back box, depending on size and quantity of connectors.
6. Rack mounted panels shall mount within industry standard equipment racks.
7. Panels mounted in floor boxes shall include a translucent flexible vinyl dirt guard as indicated on Drawings.
8. Provide complete hardware for mounting on gridiron hangers where indicated on the Drawings.
9. Provide aluminum cable tie-off bars in matching color on all panels 8” wide and larger, as indicated on the Drawings.

    a. Keystone Electronics Corporation “Aluminum Oval Instrumentation Handles”, part number 546, 5” wide x 2” deep handle. www.keyelco.com; 800-221- 5510.
    b. Color: To match panel

10. At keyswitch locations for “SAK” devices:

    a. Provide same key for all locations.
    b. Key must be removeable in both “on” and “off” positions.
    c. See drawings for make & model number.
    d. Provide (6) additional keys for future use, above the keys supplied with the locks.
    e.

C. Floor Pockets:

1. Provide flush, floor mounted pockets with cover and cable slot. Lid finish and lid type to be determined during submittal period from manufacturer’s standard line.
2. Provide interior, flexible translucent PVC dirt guard to cover receptacles. Labels shall remain visible.
3. Provide floor pocket backboxes and pour pans (if conditions warrant) to Division 26 - Electrical for installation.

PART 3 - EXECUTION

3.1 INSTALLATION- GENERAL:

A. Coordinate with Division 26 - Electrical for the proper installation of the conduit, backboxes, and electrical service as specified herein.
B. Coordinate scheduling and access with the Contractor and provide personnel lifts or ladders as required for access to the AV equipment.
C. Remove all packing materials from the Project Site. Insert operations and maintenance information into the Project record documents as specified above in Submittals.

D. Record Block Diagram: Post a laminated 11x17 as-built block diagram of the entire system (split into multiple sheets as necessary), and physically attached to the equipment rack in a logical location for Owner reference.

3.2 CABLE INSTALLATION:

A. Mark cables, regardless of length, with permanent, non-handwritten number or letter cable markers within 6-inches of both ends. There shall be no unmarked cables in the system. Marking codes used on cables shall correspond to codes used on Drawings and schedules.
B. As indicated on the Drawings, group cables according to signal type. Up to 6 separate conduit systems may be in place, divided as follows:

1. A: Microphone Level Audio
2. B: Line Level Audio
3. C: Video and Communication Level
4. D: Loudspeaker Level
5. E: Empty/Future expansion
6. F: Fiber Optic Level

C. As much as possible, maintain separation of signal types when outside of conduit.
D. No cable shall be installed with a bend radius less than recommended by the manufacturer.
E. Cables types shall be as indicated on the Drawings. In plenum spaces, provide the plenum version of the specified cable type.
F. No cable splicing is allowed, except for systems that are daisy-chained.

3.3 PROTECTION OF PROPERTY:

A. Contractor is responsible to provide protection for all equipment, tools and materials delivered to the Project Site prior to final acceptance by Owner. Any loss or damage is the responsibility of the contractor, until final acceptance by Owner.

3.4 SEQUENCING:

A. The contractor shall not install any electronic equipment until the room where the equipment shall be located has been finally painted or otherwise finished, and cleaned by the Contractor or Owner’s Representative. Any damage to equipment resulting from failure to follow this requirement will result in the contractor replacing the damaged equipment at their cost.

3.5 COMMISSIONING AND DEMONSTRATION:

A. Coordinate with Division 26 - Electrical.
B. Appropriately trained personnel shall review, test, program and otherwise complete the system, following completion of installation.
C. Upon completion of the installation, the Contractor shall notify the Architect that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Architect’s schedule.

D. Audio System Tuning:

1. Following complete system installation, each device shall be set for correct gain-staging.

   a. This is best accomplished with an oscilloscope and a 400Hz tone generator, but other methods may be used.
   b. If the system has been set correctly, the console's VU meters will be at zero when the system is accomplishing the specified dB-SPL level. Every device in the audio signal path should clip at the same level, maximizing headroom and keeping the noise floor to a minimum.

2. System shall be tuned prior to final checkout by contractor, using a computer-based audio analysis program, such as SMAART, TEF, or SIMM. A factory-certified individual shall carry out the tuning.

E. Cable Television System Tuning:

1. Following complete installation, each device in the CATV system shall be tuned to exact an output of +5 dBmV, +/- 3 dBmV at the television output.
2. Audio input at the modulator shall be set in accordance with the gain staging requirements covered in the audio sections.
3. Video input at the modulator shall be set per manufacturer's guidelines.

F. Provide to the Architect and or his Consultant the following upon arrival:

1. Measurements of impedance of each loudspeaker prior to connecting it to an amplifier.
2. Measurements confirming the polarity of each loudspeaker, from output of console through entire system.
3. Measurements showing all Ethernet wiring complies with Category 6A requirements for full bandwidth operation.
4. Verification that every line has been sweep tested and conforms to standard requirements per signal level.
5. Measurements showing CATV output voltage at each TV outlet.
6. Demonstration of input and output of signal throughout the entire system.

G. Make available for review by the Architect and or his Consultant:

1. All components for physical inspection and inventory.
2. A computer to access any DSP units.
3. All installed devices in full operation, with no temporary equipment in place.
4. All portable devices, fully complete, and available to test at all plug-in locations.
5. Test equipment, including:

   a. High quality media for every presentation source
   b. Portable TV with CATV receiver input
   c. Sound level meter
   d. Portable amplified loudspeaker
   e. Waveform monitor (oscilloscope)
   f. Audio analysis equipment (provides real time display, pink noise source, test oscillator, level and THD+N measurements)

g. Cablesets, adapters, and connectors for inserting the test equipment into and out of the system's user interfaces and connector plates.

H. The Contractor shall be liable for any return visits by the Architect and/or his consultant as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the Architect to carry out its work.

I. The Contractor shall arrange for access as necessary for inspection of equipment by the Architect and or his consultant

J. Upon completion of the commissioning, Contractor shall demonstrate operation and maintenance of the system to the Owner. Coordinate with the Owner's schedules two weeks in advance minimum.

3.6 TRAINING:

A. Do not provide training until final checkout is complete, and all punch items have been resolved. Contractor will be responsible to conduct training again if provided prior to completion of checkout and punch items.

B. Provide training as follows:

1. Two days during commissioning period for maintenance staff.
2. Two days with user group one week prior to initial handover to users.
3. One day with user group and maintenance staff one month after initial training.
4. One day with user group and maintenance staff one year after initial training, but prior to warranty expiration.

C. Training shall include, but not be limited to:

1. Safety precautions.
2. Identification of all elements provided under this section.
3. Maintenance, diagnostics and trouble shooting.
4. Operation of system, including necessary software training.
5. Operations and maintenance manual orientation.

3.7 PROJECT CLOSEOUT:

A. See submittal section above for required closeout documents.

3.8 APPENDIX:

A. 27 41 16-A Equipment List

Sanger HS
AV Systems Equipment List
Section 274116

Notes: 1. Conduit, backboxes and electrical power required for A/V systems are provided under division 26 work
2. This list contains key components, but does not list every piece needed for a complete system
Contractor is responsible to provide a complete and working sytem, regardless of the completeness of this list.
3. A/R= As Required
4. OFCI= Owner Furnished, Contractor Installed
5. OFOI= Owner Furnished, Owner Installed

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	BLACKBOX THEATRE				
	Audio System				
	Mixer/MultiChannel				
1MA	Digital Mixer	Allen & Heath	SQ5	1	
2MA	Dante I/O Card	Allen & Heath	SQ Dante 64	1	
3MA	Dust Cover	Allen & Heath	SQ-5 Dust Cover	1	
4MA	Tablet Bracket	Allen & Heath	SQ Bracket	1	
5MA	Mixer case w/ doghouse & wheels	Anvil Style ATA	A/R	1	
6MA	Effects Add-Ons	Allen & Heath	Compressor Pack 1	1	
7MA	Effects Add-Ons	Allen & Heath	Dynamic Trio Pack	1	
8MA	Effects Add-Ons	Allen & Heath	GEQ Pack	1	
9MA	*Remote I/O - Amp Room*				
10MA	Digital Audio Mixer, Remote Input, 16x8	Allen & Heath	DT168	1	
11MA	Digital Audio Mixer, Remote Input, 16x8 Rack Kit	Allen & Heath	AB168-RK10	1	
12MA	*Remote I/O- Portable*				
13MA	Digital Audio Mixer, Remote Input, 16x8	Allen & Heath	DT168	2	
14MA	Ruggedized CAT6A STP cable w/ Ethercon, 25'-0"	Whirlwind	ENC6ASE-25	2	ethercon both ends
15MA	Ruggedized CAT6A STP cable w/ Ethercon, 50'-0"	Whirlwind	ENC6ASE-50	2	ethercon both ends
16MA	*Automixer/DSP*				
17MA	Audio DSP matrix / automixer	QSC	Core 110f v2	1	
18MA	Audio expansion	QSC	QIO-ML2X2	1	
19MA	Audio expansion	QSC	QIO-ML4i	1	
20MA	Ctrl expansion - GPIO	QSC	QIO-GP8x8	1	
21MA	QIO rackmount & PSU for (4) modules	QSC	QIO-RMK / QIO-PSU	1	
22MA	32x32 Dante License	QSC	SLDAN-32-P	1	
23MA	UCI Deployment License	QSC	SL-QUD-110-P	1	
24MA	Scripting Engine License	QSC	SL-QSE-110-P	1	

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
25MA	*Outboard Equipment Rack*				
26MA	Rackmount Light/Power Unit	Furman	PL-8C	1	
27MA	UPS, 500VA, Fanless	Middle Atlantic	UPS-S500R	1	
28MA	CD/Media Playback	Denon	DN-900R	1	
29MA	Computer-Based Effects Playback Computer	Apple	Mac Mini	1	see specs for further info, provide key/mouse
30MA	Wireless keyboard & mouse	Apple	A/R	1	
31MA	Mac Mini Rackmount	Sonnettech	RackMac mini	1	
32MA	Thunderbolt to SDI I/O converter	Blackmagic Design	Ultrastudio 4K Mini	1	
33MA	Computer-Based Audio/Video Playback Software	Figure 53	Q-Lab Pro Bundle	1	
34MA	Computer-Based Recording Software	Avid	ProTools	0	OFE
35MA	Dante Virtual Soundcard Software	Audinate	Virtual Soundcard	1	
36MA	Rack Mounted Keyboard shelf	Middle Atlantic	KB-SS	1	
37MA	27" LCD Monitor, 4k	Samsung	Syncmaster Series	1	
38MA	Monitor Mount, desktop style	Ergotron	A/R	1	bolt to top of rolling rack
39MA	Custom Snake, 25'-0"	Whirlwind	A/R	1	
40MA	Rack Mounted Drawer	Middle Atlantic	A/R	1	fill empty spaces
41MA	Rolling Rack Case, 20RU	Anvil Style ATA	A/R	1	no SKB
42MA	*Wireless Mic System*				
43MA	Wireless Mic RX, Quad Channel, Dante	Shure	ULXD4Q	1	
44MA	Wireless Mic Handheld TX	Shure	ULXD2/B58	2	
45AV	Wireless Mic Bodypack TX	Shure	ULXD1	2	
46AV	Wireless Mic Bodypack - Lavaliere Mic	Countryman	B3	4	
47AV	Rechargeable Battery	Shure	SB900B	8	
48AV	2-port Battery Charger, Drop-In w/ PSU	Shure	SBC-200	2	
49AV	Antennas, Powered	Shure	UA 874	2	
50AV	Antenna Rack Panel	Contractor	Custom	1	
51AV	*Loudspeaker System*				
52AV	Main Loudspeaker	L-Acoustics	X12	2	
53AV	Main Loudspeaker Bracket	L-Acoustics	X-UL12	2	
54AV	Subwoofer Loudspeaker	L-Acoustics	SB15M	2	
55AV	Audio Amplifier, 4-ch, AVB	L-Acoustics	LA4X	1	
56AV	Loudspeaker Mounting/Rigging	Custom	Contractor	A/R	Per drawings
57AV	Audio Amplifier, 4-ch, 500W @ 8 ohm, Patchable	QSC	CX-Q 2K4	1	
58AV	*Utility*				
59AV	Audio Patchbay	Bittree	489 Series	A/R	see specs for further info
60AV	Audio Patch Cable, Red, 3'	Bittree	LPC3602-110	20	
61AV	Audio Combining Networks	Radio Design Labs	STD-600	2	
62AV	Audio Isolation Transformers	Radio Design Labs	TX-AT1	2	
63AV	Data Patchbay / RJ-45 / CAT6A STP	Belden	REV Connect Series	A/R	see specs for further info
64AV	RJ-45 to RJ-45 CAT6A STP Patch Cable, 3'	Comprehensive	CAT6A-3BLU	20	

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
65AV	Loudspeaker Patchbay	AVP	WK-U212E3-NL4MP	A/R	see specs for further info
66AV	Loudspeaker Patch Cable, 4-cond, Black, 3'	Whirlwind	NL4-003	10	
67AV	Loudspeaker Y Cable, 4-cond.	Whirlwind/Custom	Custom	2	
68AV	XLR Bulkhead Patchbay	AVP	Maxxum Series	A/R	see specs for further info
69AV	Equipment Racks & Accessories, Amp	Middle Atlantic	WKR Series	1	see specs for further info
70AV	Equipment Racks & Accessories, Booth	Middle Atlantic	SR Series	1	see specs for further info
71AV	Power Controller	Lyntec	SS2-LRP	1	connect to Lyntec panel (by elec)
72AV	Power raceway & accessories	Middle Atlantic	MPR-9A + accessories	1	1/rack
73AV	Power modules	Middle Atlantic	M-2X20IGA	8	8/rack
74AV	UPS, 1000VA, Fanless	Middle Atlantic	UPS-S1000R	2	Amp, Booth
75AV	Ethernet Switch, 10/100/1000, 10G up, Power Over Ethernet	Cisco	CBS350 series	2	see specs for further info
76AV					
77AV					
78AV	Miscellaneous Hardware				
79AV	Wire & Cable				
80AV	Labor				
	Video Systems				
	Switching/Transport				
1AV	Presentation Switcher	Extron	IN1808	1	
2AV	HDMI/DP Transmitter, Decora	Extron	DTP T DWP 4K 332 D	1	
3AV	HDMI Output	Extron	DTP HDMI 4K 330 Rx	1	Projector
4AV	Local Input Panel (HDMI, 1/8")	Contractor	Custom	1	
5AV	*Projection*				
6AV	Video Projector, 15k lumen, 1920x1200, DLP, Laser	Digital Projection	E-Vision 15000 WU	1	
7AV	Video Projector Lens	Digital Projection	A/R	1	
8AV	Video Projector Ceiling Mount	Chief Mfg	A/R	1	
9AV	Motorized Projection Screen, 16:10 ratio, non-tensioned	Draper	Paragon E	1	see drawings for size + black drop
10AV	Projection Screen, Low Voltage Control	Draper	LVC	1	
11AV	*Monitoring / Playback*				
12AV	19" Color Monitor & Receiver, HDCP, Tuner	Totevision	LED-1906HDMTR	1	Amp room
13AV	15.6" rackmount SDI/HDMI monitor	Lilliput	BM-150-4KS	1	Booth
14AV	*Utility*				
15AV	HD Color Camera, Fixed	Marshall	CV344	1	
16AV	HD Color Camera Lens	A/R	A/R	1	provide full stage shot
17AV	Camera Mount	Contractor	A/R	1	
18AV	Video router	Black Magic Design	Smart Videohub 20x20	1	
19AV	Router control panel	Black Magic Design	Master Control Pro	1	
20AV	Video Patchbay	Bittree	12G+ Mini-WECO	A/R	
21AV	Video Patch Cable, Blue, 3'	Bittree	VPCMK3606-75	10	
22AV	Video Looping Plug	Bittree	LPMK7505	10	

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
23AV	*Portable SM Station*				
24AV	Dual 7" LCD Monitor, Rackmount, SDI	Black Magic Design	Smart View DUO	1	SM Station
25AV	Portable Case for 7" Color monitor	SKB	A/R	1	
26AV	*Cable TV*				
27AV	CATV Modulator, Clear QAM & IP, 2-ch	Contemporary Research	QMOD-SDI2	1	provide rack mount
28AV	CATV Amplifier & Combiner	Contemporary Research	QDA4-45	1	
29AV	CATV Accessories	Blonder Toungue	As Required	A/R	taps, splitters, etc.
30AV	Composite Blackburst Generator	Black Magic Design	MC Generator	1	
31AV	*Flat Panels - BOH*				
32AV	32" LCD TV, QAM Tuner	Samsung/LG	A/R	6	
33AV	Flat Panel Mount - 32" Flat Panel	Chief	TS218TU	6	
34AV	*Flat Panels - FOH*				
35AV	65" LCD Monitor, 4K, LAN control, QAM Tuner	Samsung/LG	A/R	1	Lobby
36AV	Wall Mount for Monitor w/ Swing- Recessed	Chief Mfg	PNRIW Series + PSB	1	
37AV	In-Wall Junction Box	Chief Mfg	PAC-501	1	
38AV	55" LCD Monitor, 4K, LAN control, Vertical	Samsung/LG	A/R	3	Lobby
39AV	Wall Mount for Monitor - Pull Out	RP Visuals	RPWM-16B-XM-TNV-NB	3	
40AV	In-Wall Junction Box	RP Visuals	RPWM-16B-BOX	3	
41AV	Digital Signage Player	OFCI	OFCI	0	<QTY: 4 - OFCI>
42AV					
43AV					
44AV	Miscellaneous Hardware				
45AV	Wire & Cable				
46AV	Labor				
	Assistive Listening				
1AL	FM Transmitter	Listen Technologies	LT-800	1	
2AL	FM Transmitter Rackmount	Listen Technologies	LA-326	1	
3AL	FM Transmitter Antenna	Listen Technologies	LA-125	1	
4AL					
5AL					
6AL	Miscellaneous Hardware				
7AL	Wire & Cable				
8AL	Labor				

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	Production Intercom				
1PI	Remote Station, 2 ch	Clear-Com	RM-702	1	Portable SM
2PI	Master Station, 2 ch	Clear-Com	MS-702	1	Booth
3PI	Custom Button Panel	Custom	Custom	2	
4PI	Gooseneck Mic	Clear-Com	GM-9	2	
5PI	Wall Station	Clear-Com	HB-702	2	Green & HM
6PI	Handset w/ Cradle & earset kill switch	Clear-Com	HS-6	2	For HB-702; use right-angle XLR.
7PI	Din Rail Terminal Strip w/ 3-conductor bussing	Wago	A/R	A/R	home run all PL, combine @ TS
8PI					
9PI					
10PI	Miscellaneous Hardware				
11PI	Wire & Cable				
12PI	Labor				
	Program & Paging				
1PM	Microphone for PGM system	Audio-Technica	AT8035	1	
2PM	Shock Mount for PGM Mic	Audio-Technica	AT8415	1	Provide c-clamp; mount to catwalk rail
3PM	Audio Amplifier, 4-ch, 160 watt @ 70v	LEA Professional	Connect 164D	1	
4PM	Audio Amplifier, 8-ch, 160 watt @ 70v	LEA Professional	Connect 168D	1	
5PM	Program/Paging Speakers- Ceiling (SC)	JBL	Control 45 C/T	20	
6PM	Program/Paging Speakers- High Ceiling (SHC)	JBL	Control 47 HC	2	
7PM	Program/Paging Speakers- Pendant (SHP)	JBL	Control 65 P/T	8	
8PM	Paging Speakers, Coax, 70V, Black	Community	R.15 COAX-B	1	provide yoke mount & c-clamp
9PM	70V Volume Control "SAD"	QSC/Atterotech	Axon C1	6	
10PM	Custom Paging System Panels	Custom	Custom	1	
11PM	*Portable SM Station*				
12PM	Rackmount Light/Power Unit	Furman	PL-8C	1	
13PM	Portable Case	SKB	SKB-19-4U	1	
14PM	25' Mult Extension w/ Broadway Latching System	Wireworks	G-Block	1	use BLS type latches
15PM	*House Manager Panel*				
16PM	Custom Button Panel	Custom	Custom	1	see drawings
17PM	Lobby Paging Mic	Shure	SM-58S	1	w/ panel mounted clip, right angle XLR, coil cord
18PM	Dual Mic, 1/8" & RCA Input to Dante	Atterotech	UND6IO-B-C	1	
19PM					
20PM					
21PM	Miscellaneous Hardware				
22PM	Wire & Cable				
23PM	Labor				

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	Control System				
1CS	Touchpanel, Wired, 7" (CSP-1)	QSC	TSC-70-G3	2	Control Booth, Stage
2CS	Rackmount accessory	A/R	A/R	1	
3CS	Touchpanel, Wired, 5"	QSC	TSC-50-G3	1	HM Panel
4CS	Ethernet Switch, 10/100/1000, 10G up, Power Over Ethernet	Refer to Audio System	Add'l swithes, A/R	1	see specs for further info
5CS	Control link to lighting system via IP to ETC Paradigm	Contractor	Custom	1	coordinate with production lighting
6CS	Control System Accessories	A/R	A/R	A/R	psu, blocks, etc…
7CS	Control System Programming	Custom	Custom	1	Use certified programmer
8CS					
9CS					
10CS	Miscellaneous Hardware				
11CS	Wire & Cable				
12CS	Labor				
	Plates & Panels				
1PP	Gang Panel	Contractor	Contractor	A/R	
2PP	Multi-I/O Panel	Contractor	Contractor	A/R	
3PP					
4PP					
5PP	Wire & Cable				
6PP	Labor				
	BLACKBOX THEATRE - BROADCAST				
	Video System - Production/Streaming				
	Video Switcher				
1VP	Production Video Switcher	Newtek	Tricaster Mini X	1	Include rack kit, keyboard, and mouse
2VP	NDI /SDI converters	Newtek	Spark Plus I/O 3GSDI Converter	5	Include rack shelf and power
3VP	Switcher - 1 year warranty professional	Newtek	PTUTCMXHDMI	3	year
4VP	Control Surface - 1 year warranty professional	Newtek	PTUTCTCMCS	3	year
5VP	*Cameras*				
6VP	PTZ Camera, NDI, Low Light, Black	Panasonic	AW-UE80	3	
7VP	PTZ Camera, Wall Mount, Black	Panasonic	FEC-40WM	1	
8VP	PTZ Camera, Pole Clamp, 1.5" pipe, Black	Global Truss	Mini 360 1.5 BLK	2	attach to camera & lighting pipe

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
9VP	*Video Operator Position*				
10VP	Video Switcher Control Panel	Newtek	Tricaster MiniCS	1	
11VP	KVM extender with USB 2.0	Adder	XD641	1	Includes Rx and Tx; include rackmount
12VP	Multiview monitor, 46" LCD	Samsung/LD	A/R	1	mount in furniture
13VP	Dual 7" LCD Monitor, Rackmount, SDI	Black Magic Design	Smart View DUO	1	
14VP	PTZ Controller	Panasonic	AW-RP60	1	
15VP	*Streaming & Recording*				
16VP	Streaming Encoder	Aja	HELO Plus	1	
17VP	SD Card Recorder	Black Magic Design	HyperDeck Studio HD Plus	1	
18VP	SD Card Media, 256GB	ProGrade Digital	256GB UHS-II SDXC Memory Card	4	
19VP	*Utility*				
20VP	Sync Generator	AJA	Gen10	1	Sync at 59.94; format 1080p
21VP	*Furniture*				
22VP	Modular Broadcast Furniture	Winsted	E-SOC 72" Series	1	see specs for requirements
23VP					
24VP					
25VP	Miscellaneous Hardware				
26VP	Wire & Cable				
27VP	Labor				
	DRAMA CLASSROOM				
	Audio System - Production				
1AV	Audio DSP matrix / automixer, 8x8 Dante	QSC	Core 8 Flex	1	provide UCI & Scripting Licenses
2AV	Touchpanel, Wired, 5"	QSC	TSC-50-G3	1	
3AV	Rackmount for TP	QSC	A/R	1	
4AV	Bluetooth Receiver - Media Player	Denon Pro	DN-700CB	1	mount antenna outside rack
5AV	Main Loudspeaker, Powered	Yamaha	DZR10	2	
6AV	Main Loudspeaker Yoke Bracket	Yamaha	UB-DZR10H	2	
7AV	Theatre-Style C-Clamps	ETC	400CC	4	install two per yoke
8AV	Theatre-Style Safety Cable	ETC	400SC	2	install one per yoke
9AV	Mic / Intercom Cable, 25'	Whirlwind	MK425	2	
10AV	Power Cable, 12AWG, 25'-0" black, Rugged Jacket	Contractor	A/R	2	
11AV	Audio over IP/Control Switch, Gigabit, Q-SYS/Dante, 1G up	Cisco	CBS350 Series	1	
12AV	*Utility*				
13AV	Power Distribution & Sequencing	Middle Atlantic	PDS-615R	1	
14AV	AV Rack, Pull-Out Mount	Middle Atlantic	SRSR Series	1	
15AV	Rack Fan	Middle Atlantic	A/R	1	
16AV	*Classroom System - NIC*				
17AV	Flat panel & mount, HDMI input	OFOI	OFOI	0	(Qty: 1 - OFOI)
18AV					
19AV					

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
20AV	Miscellaneous Hardware				
21AV	Wire & Cable				
22AV	Labor				
	RECORDING STUDIO				
	Audio Recording- Control Room				
	Mix/Interface				
1AV	Desktop Control Surface- 16 fader	Avid	S3	1	
2AV	Desktop Control Surface - Master Section	Avid	Dock	1	
3AV	Dock Link	Avid	S3 Dock Link	1	
4AV	10.5" iPad Adapter	Avid	Dock Adapter	1	
5AV	10.5" iPad	Apple	10.5" iPad Air Wi-Fi 64GB	1	
6AV	*Audio Interface*				
7AV	Audio I/O Interface (Dante, HDX)	Avid	MTRX Studio	1	
8AV	Mic Preamp, 8-ch	Grace Designs	M108	2	16-ch total mic pre
9AV	Dante Card for Mic Preamp	Grace Designs	A108 DANTE	2	
10AV	DB9-MIDI Cable	Contractor	Custom	2	
11AV	DB9 Jumper Cable	Contractor	Custom	2	
12AV	*Recording Computer*				
13AV	Recording Computer w/ kybd & mouse	Apple	Mac Studio, 20-core	1	see specs for further info
14AV	CPU Rackmount w/ (3) PCIe Slots	Sonnettech	xMac Studio	1	
15AV	Audio I/O PCIe Card	Avid	HDX Core	1	no software
16AV	Computer-Based Recording Software	Avid	ProTools Ultimate	0	OFE
17AV	USB extender	Icron	Ranger 2304	1	
18AV	Removeable SSD drive bay x4 over Thunderbolt 3	OWC or equal	Flex1U4 or equal	1	Provide (2)1TB SSD drives
19AV	*Monitoring - Audio @ Control*				
20AV	Control Room Monitoring Loudspeaker, Mains, Powered	PMC	Result 6	3	
21AV	Control Room Monitoring Loudspeaker, Sub, Powered	PMC	PMC 8 Sub	2	
22AV	Control Room Monitoring Loudspeaker, Surrounds, Passive	PMC	Ci30	2	
23AV	Control Room Monitoring Amplifier, Surrounds, 4-ch	LEA Pro	Connect 164	1	
24AV	Monitoring Loudspeaker, Wall Mount	PMC	PMK-CI30	2	
25AV	*Monitoring - Audio @ Studio*				
26AV	Control Room Monitoring Loudspeaker, Mains, Powered	PMC	Result 6	2	
27AV	Monitoring Loudspeaker, Wall Mount	PMC	BRKT	2	
28AV	Musician Monitoring System- Base Unit	Digital Audio Labs	Live Mix 16	1	
29AV	Musician Monitoring System, Dante Card	Digital Audio Labs	LM-DANTE-EXP2	1	
30AV	Musician Monitoring System, User Unit	Digital Audio Labs	CS-DUO	4	provide MT-1 mic stand mount
31AV	Talkback Microphone	Audix	GS1	1	
32AV	PTT Microphone	Cad Audio/Astatic	878hl-2	1	Normally open relay PTT mic

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
33AV	*Monitoring- Video/KVM*				
34AV	27" LED Monitor, HDMI Input, 4k resolution, VESA	LG	A/R	2	mounts in furniture
35AV	55" LCD Monitor, HDMI Input, 232 control, 4k resolution	Panasonic	TH-55CQ1	3	or equal
36AV	In-Wall Junction Box	Chief Mfg	PAC-501	3	
37AV	Wall Mount for Monitor w/ Swing- Recessed	Chief Mfg	PNRIW Series + PSB	3	
38AV	Thunderbolt 3 to dual HDMI and dual USB3.0 adapter	OWC	TB3 Mini Dock	2	
39AV	Long-Length Fiber HDMI Cable	Extron	Pro Plenum	5	size TBD in field
40AV	*Patching*				
41AV	Audio Patchbay, Programmable, Long Frame	Bittree	489 Series	A/R	see specs for further info
42AV	Audio Patch Cable, Red, 3'	Bittree	LPC3602-110	20	
43AV	Audio Combining Networks	Radio Design Labs	STD-600	2	
44AV	Audio Isolation Transformers	Radio Design Labs	TX-AT1	2	
45AV	Data Patchbay / RJ-45 / CAT6A STP	Bittree	DSK Series	A/R	see specs for further info
46AV	RJ-45 to RJ-45 CAT6A STP Patch Cable, 3', Blue	Comprehensive	CAT6A-3BLU	20	
47AV	Audio over IP/Control Switch, Gigabit, Q-SYS/Dante, 10G up	Cisco	CBS350 Series	3	
48AV	*Equipment Racks*				
49AV	Equipment Racks & Accessories	Middle Atlantic	WRK Series	1	see specs for further info
50AV	Power Controller	Lyntec	SS2-LRP	1	connect to Lyntec panel (by elec)
51AV	Power raceway & accessories	Middle Atlantic	MPR-9A + accessories	1	1/rack
52AV	Power modules	Middle Atlantic	M-2X20IGA	8	8/rack
53AV	UPS Unit	Middle Atlantic	UPS-1000R	2	Desk & Rack
54AV	*Utility*				
55AV	Power Distribution	Middle Atlantic	PD-915R	1	Desk
56AV	RECORDING light, 12VDC, LED	Punchlight	Recording Display (Black)	5	provide 12V from Midi/relay trigger interface
57AV	Midi to (3) "RL" relay interface	Punchlight	PLMIDI103	2	Include record and record-ready states from PT
58AV	USB MIDI interface	Iconnectivity	mioXL 8x12	1	
59AV	Dual relay to Midi	Midi Solutions	Dual Footswitch controller	1	or equal
60AV	Recording Light Switch in Rack Panel	Contractor	Custom	1	Provide a backup trigger button
61AV	Gang Panel	Contractor	Contractor	A/R	
62AV	Multi-I/O Panel	Contractor	Contractor	A/R	
63AV	Sync/PTP/NTP/LTC Generator	Brainstorm	DXD-8	1	With PTP option
64AV	*Furniture*				
65AV	Studio Furniture	Argosy	G-Series Avid S3+Dock G30	1	finish determined by architect
66AV	Monitor Arm	Argosy	A/R	2	Back of all racks
67AV	Console Keyboard Slide Tray	Sound Const. & Supply	Keyboard Slide Tray	1	
68AV					
69AV					
70AV	Miscellaneous Hardware				
71AV	Wire & Cable				
72AV	Labor				

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	BAND/ORCH & CHORAL ROOMS	**(QTY: 2)**			
	AV System				
	Video		***Qty Per Room***		
1AV	AV Switcher	Extron	IN1808 IPCP	1	
2AV	HDMI Receiver	Extron	DTP HDMI 4K 330 Rx	1	Projector
3AV	BYOD Device	OFCI	OFCI	0	(Qty: 1 - OFCI)
4AV	Video Projector, 8.5k lumen, 1920x1200, DLP, Laser	Digital Projection	E-Vision LASER 8500	1	
5AV	Video Projector Lens	Digital Projection	A/R	1	
6AV	Video Projector Ceiling Mount	Chief Mfg	A/R	1	
7AV	Motorized Projection Screen, 16:10, Matte White	Draper	Acumen	1	size per drawings + black drop
8AV	Projection Screen, Low Voltage Control	Draper	LVC	1	
9AV	*Audio Playback*				
10AV	4x4 line mixer	Extron	DMP44LC	1	
11AV	Bluetooth Receiver	Denon Pro	DN-700CB	1	mount antenna outside rack
12AV	Main Loudspeaker, Powered, White	Martin Audio	CDD-LIVE12	2	
13AV	Loudspeaker Wall Mounting, Mains, white	Martin Audio	WB12	2	
14AV	*Audio Recording*				
15AV	USB/Flash Recorder, 2-ch Mic Preamp, Dante	Denon	DN-900R	1	recording
16AV	Hanging Choir Mics, White	Audix	M1255BW	2	recording
17AV	*Control Systems*				
18AV	Touchpanel Controller	Extron	TLP PRO 725M	1	
19AV	Control System Accessories	Extron	A/R	1	
20AV	Audio over IP/Control Switch, Gigabit, Q-SYS/Dante, 1G up	Cisco	CBS350 Series	1	
21AV	*Utility*				
22AV	Power Distribution	Middle Atlantic	PD-915R	1	
23AV	Custom I/O rack panel	Contractor	Custom	1	
24AV	AV Rack, Pull-Out Mount	Middle Atlantic	SRSR Series	1	
25AV	Rack Fan	Middle Atlantic	A/R	1	
26AV	In-Wall Junction Box with cover, white	Chief Mfg	PAC-526-FCW	2	future flat panels
27AV					
28AV					
29AV	Miscellaneous Hardware				
30AV	Wire & Cable				
31AV	Labor				

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	MAIN GYMNASIUM - AV SYSTEMS				
	Audio System				
	Mixer				
1MA	Digital Mixer	Allen & Heath	SQ5	1	provide console lights & dust cover
2MA	Dante I/O Card	Allen & Heath	SQ Dante 64	1	
3MA	Dust Cover	Allen & Heath	SQ-5 Dust Cover	1	
4MA	Tablet Bracket	Allen & Heath	SQ Bracket	1	
5MA	Effects Add-Ons	Allen & Heath	Compressor Pack 1	1	
6MA	Effects Add-Ons	Allen & Heath	Dynamic Trio Pack	1	
7MA	Effects Add-Ons	Allen & Heath	GEQ Pack	1	
8MA	*Remote I/O*				
9MA	Digital Audio Mixer, Remote Input, 16x8	Allen & Heath	DT168	2	
10MA	Ruggedized CAT6A STP cable w/ Ethercon, 25'-0"	Whirlwind	ENC6ASE-25	2	ethercon both ends
11MA	Ruggedized CAT6A STP cable w/ Ethercon, 50'-0"	Whirlwind	ENC6ASE-50	2	ethercon both ends
12MA	*Outboard Equipment Rack*				
13MA	Rackmount Light/Power Unit	Furman	PL-8C	1	
14MA	Media Playback	Denon	DN-700CB	1	
15MA	Audio/Video Playback Computer w/ Key Mouse	OFE	OFE	0	(Qty: 1- OFCI)
16MA	27" LCD Monitor w/ table stand	Samsung	Syncmaster Series	0	(Qty: 1- OFCI)
17MA	Media Player Software	OFE	OFE	1	*ie- Neptune*
18MA	Dante Virtual Soundcard Software	Audinate	Virtual Soundcard	1	
19MA	Rack Mounted Drawer	Middle Atlantic	A/R	1	fill empty spaces
20MA	*DSP*				
21MA	Audio DSP matrix / automixer	QSC	Core 110f v2	1	
22MA	32x32 Dante License	QSC	SLDAN-32-P	1	
23MA	UCI Deployment License	QSC	SL-QUD-110-P	1	
24MA	Scripting Engine License	QSC	SL-QSE-110-P	1	
25MA	*Wireless Mic*				
26MA	Wireless Mic RX, Quad Channel, Dante	Shure	ULXD4Q	2	
27MA	Wireless Mic Handheld TX	Shure	ULXD2/B58	8	
28MA	Rechargeable Battery	Shure	SB900B	16	
29MA	2-port Battery Charger, Drop-In w/ PSU	Shure	SBC-200	4	
30MA	Antennas, Powered	Shure	UA 874	2	Mount in protective enclosure
31MA	*Scorer's Table*				
32AV	Desktop Announcer Switch	ProCo	SAS-3	2	
33AV	Desktop Mic	Shure	SM58	2	
34AV	HDMI over fiber Tx	AJA	Ha5-12G-T	1	include SFP module
35AV	HDMI over fiber Rx	AJA	Hi5-12G-R	1	include SFP module

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
36AV	*Remote Inputs*				
37AV	1/8" & XLR Input, Dante	QSC	unD6IO	4	
38AV	1/8" & BT Input, Dante	QSC	unD6IO-BT	1	
39AV	*Loudspeaker System - Seating Area*				
40AV	Main Loudspeaker, L/R - Line-Array System	L'Acoustics	A10i FOCUS	8	
41AV	Main Loudspeaker, L/R - Line-Array System	L'Acoustics	A10i WIDE	16	
42AV	Court Fill Loudspeaker	L'Acoustics	A10i WIDE	6	
43AV	Subwoofer Loudspeaker	L'Acoustics	KS21i	12	
44AV	Loudspeaker Array Frame	L'Acoustics	A10i BUMP	10	
45AV	Loudspeaker Rig Plates	L'Acoustics	A10i FOCUS-LINK	8	
46AV	Loudspeaker Rig Plates	L'Acoustics	A10i WIDE-LINK	22	
47AV	Subwoofer Array Frame	L'Acoustics	A15i BUMP	6	
48AV	Audio Amplifier, 4-ch x 2600w	L'Acoustics	LA12x	4	
49AV	Loudspeaker Mounting/Rigging	Custom	Contractor	A/R	Per drawings
50AV	*Loudspeaker System - Services*				
51AV	Loudspeaker Calibration & Travel	L'Acoustics	Calibration / Travel	1	day
52AV	*Utility*				
53AV	Equipment Racks & Accessories, Amp	Middle Atlantic	WRK series	2	see specs for further info
54AV	Power Controller, Rackmount	Lyntec	SS2-LRP	1	connect to Lyntec panel (by elec)
55AV	Power raceway & accessories	Middle Atlantic	MPR-9A + accessories	2	1/rack
56AV	Power modules	Middle Atlantic	M-2X20IGA	16	8/rack
57AV	UPS, 2200VA, Fanless	Middle Atlantic	UPS-2200R	1	DSP/switch/control only
58AV	Audio over IP/Control Switch, Gigabit, Q-SYS/Dante, 10G up	Cisco	CBS350 Series	2	
59AV	Audio over IP/Control Switch, 10G SFP+, Q-SYS/Dante	Cisco	CBS350 Series	1	Provide SFP fiber modules, A/R
60AV	Data Patchbay / RJ-45 / CAT6A STP	Belden	REV Connect Series	A/R	see specs for further info
61AV	RJ-45 to RJ-45 CAT6A STP Patch Cable, 3'	Comprehensive	CAT6A-3BLU	20	
62AV					
63AV					
64AV	Miscellaneous Hardware				
65AV	Wire & Cable				
66AV	Labor				
	Assistive Listening				
1AL	FM Transmitter	Listen Technologies	LT-800	1	
2AL	FM Transmitter Rackmount	Listen Technologies	LA-326	1	
3AL	FM Transmitter Antenna	Listen Technologies	LA-125	1	
4AL					
5AL					
6AL	Miscellaneous Hardware				
7AL	Wire & Cable				
8AL	Labor				

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	Program & Paging				
1PM	Audio Amplifier, 4-ch bridgable, 70V	QSC	SPA-Q200-4F	1	
2PM	Program/Paging Speakers- Ceiling (SC)	JBL	Control 45 C/T	12	Team Rooms
3PM	70V Volume Control "SAD"	QSC/Atterotech	Axon C1	2	
4PM					
5PM					
6PM	Miscellaneous Hardware				
7PM	Wire & Cable				
8PM	Labor				
	Control System				
1CS	Touchpanel, Wired, 7"	QSC	TSC-70-G3	3	Floor, B'Cast, Mix
2CS	Tabletop accessory	QSC	TSC-710t-G3	2	B'Cast, Mix
3CS	Audio over IP/Control Switch, Gigabit, Q-SYS/Dante	Refer to Audio System	Add'l switches, A/R	1	see specs for further info
4CS	Control System Accessories	A/R	A/R	1	
5CS	Control System Programming	Custom	Custom	1	Use certified programmer
6CS					
7CS					
8CS	Miscellaneous Hardware				
9CS	Wire & Cable				
10CS	Labor				
	Utility, Plates & Panels				
1PP	Gang Panel	Contractor	Contractor	A/R	
2PP	Multi-I/O Panel	Contractor	Contractor	A/R	
3PP	Enclosure for TP and I/O panels	FSR, Inc	OWB series	A/R	
4PP	*Furniture*				
5PP	Control Position Furniture, Secure Roll Top	HSA Rolltops	INSXT-II Custom	1	see specs & drawIngs for further info
6PP					
7PP					
8PP	Wire & Cable				
9PP	Labor				

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	MAIN GYMNASIUM - BROADCAST SYSTEMS				
	Production Systems				
	Video Switcher				
1VI	Video Switcher	Newtek	TC1P2RU	1	KVM-TX1
2VI	Control Surface	Newtek	TC1SP	1	Provide dust cover
3VI	Video Switcher- Rack Rails	Newtek	RR2RU3RU	1	
4VI	SDI/RTMP/NDI Converter	Newtek	NC2I/O	1	
5VI	*Instant Replay*				
6VI	Replay Player & Control Surface	Newtek	3Play 3P2 + 3P1 CS	1	KVM-TX2; Provide dust cover
7VI	*Remote Switcher Control*				
8VI	Touchpanel, iPad, 10.2", 128GB, WiFi	Apple	iPad 10.2" (7th Gen)	0	(Qty:1) OFCI
9VI	Remote Control App	Newtek	Livepanel	1	
10VI	Touchpanel Dock for Table	iPort Products	Launchport Base Station	1	w/ PSU
11VI	Touchpanel Sleeve	iPort Products	Launchport Sleeve	1	match supplied iPad
12VI	*Broadcast Monitoring*				
13VI	Dual 8" LCD	Blackmagic	SmartView DUO	2	Rack & Control Desk
14VI	SDI to HDMI converter	Blackmagic Design	Microconverter SDItoHDMI 12G	1	Provide rackmount
15VI	HDMI to SDI converter	Blackmagic Design	Microconverter HDMI to SDI 12G	2	Provide rackmount
16VI	43" LCD Broadcast Monitor, HDMI input, 4k/UHD	Panasonic; or equal	TH-43EQ1; or equal	1	Multiviewer, mount at video operator desk
17VI	27" monitor, UHD, VESA, SDI and HDMI	Lilliput	BM280-4K	2	KVM-RX1/2, include monitor arm at furniture.
18VI	Monitor arm and furniture interface	Chief	Kontour	2	Or equal
19VI	*Video Switcher- Training & Setup*				
20VI	Production Video Switcher- Remote User Training	JB&A	JBA-NTK-TRN-ONL-INTRO	2	3.5 hour session
21VI	Production Video Switcher- Remote Setup	JB&A	JBA-NTK-RMT-COMTC	1	days
22VI	*Video Switcher- Warranty/Subscriptions*				
23VI	Video Switcher- Premium Access	Newtek	NPSUBA	1	year
24VI	Switcher - 1 year warranty professional	Newtek	PTUTC1	3	year
25VI	Control Surface - 1 year warranty professional	Newtek	PTUTC1SP	3	year
26VI	3Play & CS - 1 year warranty professional	Newtek	PTUTC1	3	year
27VI	*Camera Control*				
28VI	CCU: Camera Control Panel w/dust cover	Black Magic	ATEM Camera Control Panel	1	
29VI	PTZ: Camera Control Panel	Panasonic	AW-RP60	1	
30VI	*Routing*				
31VI	40x40 SDI Router	Black Magic	Smart Videohub 40x40 12G	1	
32VI	Router Control Panel	Black Magic	Videohub Master Control Pro	1	

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
33VI	*Edit/Record Computer*				
34VI	CPU	Apple	Mac Studio, 20-core	1	see specs for further info; KVM-TX3
35VI	Wired keyboard & mouse	Apple	A/R	1	
36VI	Mac Studio Rackmount	Sonnettech	RackMac Studio	1	
37VI	TB/USB3 > SDI Interface	Black Magic	UltraStudio 4K Mini	1	Provide Rack mount
38VI	Video Editing Software	Apple	Final Cut Pro X	0	OFCI
39VI	Audio Editing Software	Avid	ProTools	0	OFCI
40VI	Dante Virtual Soundcard Software	Audinate	Virtual Soundcard	1	
41VI	Removeable SSD drive bay x4 over Thunderbolt 3	OWC or equal	Flex1U4	1	Provide (2) 1TB SSD drives
42VI	*Recording*				
43VI	SD Recorder	Black Magic	Hyperdeck Studio HD Plus	1	
44VI	SD Card, 256GB	ProGrade	PGSD256GBCKBH	4	or sim
45VI	*Audio*				
46VI	Digital Mixer	Allen & Heath	SQ5	1	provide console lights & dust cover
47VI	Dante I/O Card	Allen & Heath	SQ Dante 64	1	
48VI	Dust Cover	Allen & Heath	SQ-5 Dust Cover	1	
49VI	Digital Audio Mixer, Remote Input, 16x8	Allen & Heath	DT168	1	
50VI	Digital Audio Mixer, Remote Input, 16x8 Rack Kit	Allen & Heath	AB168-RK10	1	
51VI	Audio Monitor, Powered	JBL	LSR 305	2	mounts in furniture package
52VI	*Production Intercom*				
53VI	Power Supply, 2 ch	Clear-Com	PS-702	1	
54VI	Remote Station, 2 ch	Clear-Com	RM-702	2	Control desk
55VI	Gooseneck Mic, 18"	Clear-Com	GM-18	2	Control desk
56VI	Heavy-Duty Headset	Clear-Com	CC-300	2	
57VI	Camera Headset, double muff	Clear-Com	CC-400	2	Match camera kit
58VI	Wired Beltpack, 1-channel	Clear-Com	RS-701	4	
59VI	2-wire to 4-wire Interface	Clear-Com	EF701M	1	Provide rack mount
60VI	Din Rail Terminal Strip w/ 3-conductor bussing	Wago	A/R	A/R	home run all PL, combine @ TS
61VI	*HD Camera Package*				
62VI	HD Camera	Black Magic	URSA Broadcast G2	2	
63VI	Studio Viewfinder	Black Magic	URSA Studio Viewfinder G2	2	
64VI	B4 studio/broadcast lens, Motor zoom/focus	Canon/Fujinon	A/R	2	
65VI	Focus Control	Black Magic	Focus Demand	2	match to lens
66VI	Zoom Control	Black Magic	Zoom Demand	2	match to lens
67VI	Pedestal Adapter	Black	A/R	2	match camera & Pedestal
68VI	Tripod & Head	Manfrotto	509HD	2	provide 2 handles
69VI	Fiber Converter, Camera	Black Magic	Camera Fiber Converter	2	
70VI	Fiber Converter, Studio	Black Magic	Studio Fiber Converter	2	provide rack mount
71VI	SMPTE304M to Neutrik Opticalcon Hybrid Fiber Cable, 50'	Camplex	HF Series	2	camera
72VI	Camera/Accy Bag	Portabrace	A/R	2	camera
73VI	Tripod/Accy Bag	Portabrace	A/R	2	camera

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
74VI	*Tracking Cameras*				
75VI	Tracking Camera, RTMP output	Hudl	Focus Indoor	2	
76VI	Mounting Accessories, Protective Cage	A/R	A/R	2	
77VI	*PTZ Cameras*				
78VI	PTZ Camera	Panasonic	AW-UE80	2	
79VI	Mounting Accessories, Protective Cage	A/R	A/R	2	
80VI	*KVM*				
81VI	KVM Matrix, Manager, 10-port	Adder	AdderView DDX 10	1	
82VI	KVM Matrix, TX Unit	Adder	AdderView DDX CAM	4	Provide rack mount; one spare
83VI	KVM Matrix, RX Unit	Adder	AdderView DDX USR	5	Provide rack mount; two spare; incl. kybd/mouse
84VI	Pull-out Keyboard, Mouse	CIM	RMD-187	1	or equal
85VI	Rack monitor with SDI and HDMI	Lilliput	BM150-4KS	1	KVM-RX3
86VI	*Facility/Team Room Feeds*				
87VI	SDI to HDMI converter	Blackmagic Design	Microconverter SDItoHDMI 12G	2	
88VI	32" LCD TV, QAM Tuner	Samsung/LG	A/R	2	Team Rooms
89VI	Flat Panel Mount - 32" Flat Panel	Chief	TS218TU	2	
90VI	*Patching & Distribution*				
91VI	Audio Patchbay	Bittree	489 Series	A/R	see specs for further info
92VI	Audio Patch Cable, Red, 3'	Bittree	LPC3602-110	10	
93VI	Audio Combining Networks	Radio Design Labs	STD-600	2	
94VI	Audio Isolation Transformers	Radio Design Labs	TX-AT1	2	
95VI	Data Patchbay / RJ-45 / CAT6A STP	Belden	REVconnect Series	A/R	see specs for further info
96VI	RJ-45 to RJ-45 CAT6A STP Patch Cable, 3', Blue	Comprehensive	CAT6A-3BLU	20	
97VI	Audio over IP /Control Switch, Gigabit, Q-SYS/Dante, 10G up	Cisco	CBS350 series	2	or equal
98VI	Video Patchbay	Bittree	12G+ Mini-WECO	A/R	
99VI	Video Patch Cable, Blue, 3'	Bittree	VPCMK3606-75	10	
100VI	Video Looping Plug	Bittree	LPMK7505	10	
101VI	XLR / BNC Bulkhead Patchbay	AVP, Inc.	Maxxum Series	1	Control desk
102VI	Sync/PTP/NTP/LTC Generator	Brainstorm	DXD-8	1	With PTP option
103VI	Wallmount timeclock	ESE	ES-993U/NTP-C	1	Provide mounting materials, A/R
104VI	Opticalcon Hybrid fiber bulkhead, (Fiber+copper)	A/R	A/R	1	D-type connector rack bulkhead panel
105VI	SMPTE304M to Neutrik Opticalcon Hybrid Cable (in rack)	Camplex or equal	A/R	2	Panels (all spaces)
106VI	Opticalcon Hybrid cable Patchcord (fiber+copper), 3' length	Camplex	HF Series	2	
107VI	LC fiber patch cables, for non-SMPTE applications	Belden	FX series	4	
108VI	*Utility*				
109VI	Equipment Racks & Accessories, Amp	Middle Atlantic	WRK series	2	see specs for further info
110VI	Power Controller, Rackmount	Lyntec	SS2-LRP	1	connect to Lyntec panel (by elec)
111VI	Power raceway & accessories	Middle Atlantic	MPR-9A + accessories	2	1/rack
112VI	Power modules	Middle Atlantic	M-2X20IGA	18	9/rack
113VI	UPS, 1000VA, Fanless	Middle Atlantic	UPS-1000R	2	Rack & Control Desk
114VI	Power Distribution	Middle Atlantic	PD-915R	2	Control desk

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
115VI	*Recording Lights*				
116VI	ON AIR light, 24VDC, LED	Sandies	343-24	2	provide 24VDC PSU
117VI	Logic Converter for on-air lights	Henry Engineering	Superelay II	1	
118VI	Rackmount RED LED button for on-air light activation	Contractor	Custom	1	
119VI	*Furniture*				
120VI	Broadcast Furniture	Winsted	Prestige Sightline Series	1	see specs & drawIngs for further info
121VI					
122VI					
123VI	Miscellaneous Hardware				
124VI	Wire & Cable				
125VI	Labor				
	PRACTICE GYMNASIUM				
	Audio System				
	Mixer				
	DSP				
1AV	Audio DSP matrix / automixer, 8x8 Dante	QSC	Core 8 Flex	1	Provide UCI & Scripting License
2AV	Audio DSP - 32x32 Dante License	QSC	SLDAN-32-P	1	
3AV	Ctrl expansion - GPIO	QSC	QIO-GP8x8	1	
4AV	*Wireless Mic - Aux*				
5AV	Wireless Mic RX, Dual Channel, Dante	Shure	ULXD4D	1	use supplied antennas
6AV	Wireless Mic Handheld TX	Shure	ULXD2/B58	2	
7AV	Rechargeable Battery	Shure	SB900	4	
8AV	2-port Battery Charger, Drop-In w/ PSU	Shure	SBC-200	1	
9AV	Plastic Dome for Wireless Antenna Protection	plasticdome.net	A/R	2	
10AV	*Remote Inputs*				
11AV	1/8" & XLR Input, Dante	QSC	unD6IO	4	
12AV	1/8" & Bluetooth Input, Dante	QSC	unD6IO-BT	1	at TP enclosure
13AV	*Loudspeakers- Aux*				
14AV	Main Loudspeaker (Court) 120x60	JBL	AM7215/26	2	White in color / Rotate Horns A/R
15AV	Subwoofer Loudspeaker	JBL	ASB 6115	2	White in color
16AV	Loudspeaker Mounting	Contractor	Custom	A/R	See drawings
17AV	Amplifier, 4-ch, 1000w/ch max @ 8-ohm (4k max output)	QSC	CX-Q 4K4	1	
18AV	*Utility*				
19AV	Equipment Racks & Accessories	Middle Atlantic	SR Series	1	see specs for further info
20AV	Power Controller	Lyntec	SS2-LRP	1	connect to Lyntec panel (by elec)
21AV	Power raceway & accessories	Middle Atlantic	MPR-9A + accessories	1	1/rack
22AV	Power modules	Middle Atlantic	M-2X20IGA	8	8/rack

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
23AV	UPS, 1000VA, Fanless	Middle Atlantic	UPS-1000R	1	
24AV	Audio over IP /Control Switch, Gigabit, Q-SYS/Dante, 1G up	Cisco	CBS350 Series	1	
25AV	Data Patchbay / RJ-45 / CAT6A STP	Belden	REV Connect Series	A/R	see specs for further info
26AV	RJ-45 to RJ-45 CAT6A STP Patch Cable, 3'	Comprehensive	CAT6A-3BLU	10	
27AV					
28AV					
29AV	Miscellaneous Hardware				
30AV	Wire & Cable				
31AV	Labor				
	Video Systems				
	Switching/Transport				
1AV	Presentation Switcher	Extron	IN1808	1	
2AV	HDMI/DP Transmitter, Decora	Extron	DTP T DWP 4K 332 D	2	Panels
3AV	HDMI Receiver	Extron	DTP HDMI 4K 330 Rx	1	Projector
4AV	*Projection*				
5AV	Video Projector, 21k lumen, 1920x1200, DLP	Digital Projection	M-Vision LASER 21000 WU	1	
6AV	Video Projector Lens	Digital Projection	A/R	1	
7AV	Video Projector - Steel Cage Enclosure	Display Devices	SC-PCM Series	1	Custom Size to Projector
8AV	Motorized Projection Screen, 16:10, Matte White	Draper	Paragon E	1	size 162" x 260" + black drop
9AV	Projection Screen, Low Voltage Control	Draper	LVC-IV	1	
10AV	*Monitoring*				
11AV	19" Color Monitor & Receiver, HDCP, Tuner	Totevision	LED-1906HDMTR	1	
12AV					
13AV					
14AV	Miscellaneous Hardware				
15AV	Wire & Cable				
16AV	Labor				
	Assistive Listening				
1AL	FM Transmitter	Listen Technologies	LT-800	1	
2AL	FM Transmitter Rackmount	Listen Technologies	LA-326	1	
3AL	FM Transmitter Antenna	Listen Technologies	LA-125	1	
4AL	Plastic Dome for Wireless Antenna Protection	plasticdome.net	A/R	1	
5AL					
6AL					
7AL	Miscellaneous Hardware				
8AL	Wire & Cable				
9AL	Labor				

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	Control System				
1CS	Touchpanel, Wired, 7"	QSC	TSC-70-G3	2	
2CS	Rackmount accessory	QSC	A/R	1	
3CS	Audio over IP /Control Switch, Gigabit, Q-SYS/Dante	Refer to Audio System	Add'l switches A/R	1	see specs for further info
4CS	Ctrl expansion - GPIO	QSC	QIO-GP8x8	1	
5CS	Control System Accessories	A/R	A/R	1	
6CS	Control System Programming	Custom	Custom	1	Use certified programmer
7CS					
8CS					
9CS	Miscellaneous Hardware				
10CS	Wire & Cable				
11CS	Labor				
	Plates & Panels				
1PP	Gang Panel	Contractor	Contractor	A/R	
2PP	Multi-I/O Panel	Contractor	Contractor	A/R	
3PP	Enclosure for TP and AV I/O panels	FSR, Inc	OWB series	A/R	
4PP					
5PP					
6PP	Wire & Cable				
7PP	Labor				
	WRESTING / WEIGHTS	**(QTY: 2)**			
	Audio DSP		***Qty Per Room***		
1MA	Audio DSP matrix / automixer	QSC	Core 110f v2	1	
2MA	32x32 Dante License	QSC	SLDAN-32-P	1	
3MA	UCI Deployment License	QSC	SL-QUD-110-P	1	
4MA	Scripting Engine License	QSC	SL-QSE-110-P	1	
5MA	Bluetooth Receiver media player	Denon Pro	DN-700CB	1	mount antenna outside rack
6MA	1/8" & XLR Input, Dante	QSC	unD6IO	2	
7MA	Unbalanced to Balanced Audio Transformer	RDL	ST-UBA2 + PSU	1	audio from TV in classroom system
8MA	Audio over IP /Control Switch, Gigabit, Q-SYS/Dante, 1G up	Cisco	CBS350 Series	1	

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
9MA	*Wireless Mic System*				
10MA	Wireless Mic RX, Single Channel	Shure	ULXD4	1	mount antennas outside rack
11MA	Wireless Mic Bodypack TX	Shure	ULXD1	1	
12MA	Bodypack Microphone, Aerobics	Shure	SM31FH	2	
13MA	Waterproof TX pack w/ belt	Aquapaq	A/R	2	match bodypack TX, w/ belt
14MA	*Loudspeakers*				
15MA	Main Loudspeaker, Powered, white	Db Technologies	LVX12W	4	
16MA	Main Loudspeaker Mounting, white	Db Technologies	WB-09	4	
17MA	Subwoofer Loudspeaker, Powered, white	Db Technologies	DVA S09DPW	2	
18MA	Subwoofer Mounting, white	Contractor	Custom	2	
19MA	*Control*				
20MA	5" rackmounted touchpanel	QSC	TSC-50-G3	1	
21MA	*Utility*				
22MA	Power Distribution & Sequencing	Middle Atlantic	PDS-615R	1	
23AV	AV Rack, Pull-Out Mount	Middle Atlantic	SRSR Series	1	
24MA	Rack Fan	Middle Atlantic	A/R	1	
25MA					
26MA					
27MA	Miscellaneous Hardware				
28MA	Wire & Cable				
29MA	Labor				
	DINING HALL				
	AV Systems				
	Audio				
1MA	Audio DSP matrix / automixer	QSC	Core 110f v2	1	
2MA	32x32 Dante License	QSC	SLDAN-32-P	1	
3MA	UCI Deployment License	QSC	SL-QUD-110-P	1	
4MA	Scripting Engine License	QSC	SL-QSE-110-P	1	
5MA	Dual Mic, 1/8" & RCA Input to Dante	Atterotech	UND6IO-B-C	4	
6MA	1/8" & Bluetooth Input, Dante	QSC	unD6IO-BT	1	
7MA	Media player	Denon	DN-700CB	1	
8MA	*Wireless Mic System*				
9MA	Wireless Mic RX, Quad Channel, Dante	Shure	ULXD4Q	1	
10MA	Wireless Mic Handheld TX	Shure	ULXD2/B58	4	
11MA	Rechargeable Battery	Shure	SB900B	8	
12MA	2-port Battery Charger, Drop-In w/ PSU	Shure	SBC-200	2	
13MA	Antennas, Powered	Shure	UA 874	2	

© The Shalleck Collaborative, Inc

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
14MA	*Loudspeakers*				
15MA	Ceiling Loudspeaker, 8", High Ceiling (SHC)	JBL	Control 47 HC	8	
16MA	Pendant Loudspeaker, 8", High Ceiling (SHP)	JBL	Control 67 HC/T	10	
17MA	Audio Amplifier, 4-ch, 500W @ 8 ohm, Patchable	QSC	CX-Q 2K4	1	
18MA	Main Loudspeaker, Powered	Db Technologies	LVX12#	2	Verify Finish
19MA	Main Loudspeaker Mounting	Db Technologies	WB-09	2	Verify Finish
20MA	*Assistive Listening*				
21MA	FM Transmitter	Listen Technologies	LT-800	1	
22MA	FM Transmitter Rackmount	Listen Technologies	LA-326	1	
23MA	FM Transmitter Antenna	Listen Technologies	LA-125	1	
24MA	*Video*				
25MA	Presentation Switcher	Extron	IN1808	1	
26MA	HDMI/DP Transmitter, Decora	Extron	DTP T DWP 4K 332 D	1	
27MA	HDMI Output	Extron	DTP HDMI 4K 330 Rx	1	LED wall
28MA	BYOD Device	OFCI	OFCI	0	(Qty: 1 - OFCI)
29MA	19" Color Monitor & Receiver, HDCP, Tuner	Totevision	LED-1906HDMTR	1	
30MA	*Control System*				
31MA	Touchpanel, Wired, 7"	QSC	TSC-70-G3	2	
32MA	Rackmount for TP	QSC	A/R	1	
33MA	Enclosure for TP	FSR, Inc	OWB series	1	
34MA	Audio over IP /Control Switch, Gigabit, Q-SYS/Dante, 1G up	Cisco	CBS350 Series	1	
35MA	Control System Accessories	QSC/Global Cache	A/R	1	
36MA	Control System Programming	Custom	Custom	1	Use certified programmer
37MA	*Utility*				
38MA	Power Distribution & Sequencing	Middle Atlantic	PDS-615R	1	
39MA	AV Rack, Wall Mount	Middle Atlantic	DWR Series	1	
40MA	Data Patchbay / RJ-45 / CAT6A STP	Belden	REV Connect Series	A/R	see specs for further info
41MA	RJ-45 to RJ-45 CAT6A STP Patch Cable, 3'	Comprehensive	CAT6A-3BLU	20	
42MA	XLR Bulkhead Patchbay	AVP	Maxxum Series	A/R	see specs for further info
43MA	Rack Fan	Middle Atlantic	A/R	1	
44MA	Gang Panel	Contractor	Contractor	A/R	
45MA	Multi-I/O Panel	Contractor	Contractor	A/R	
46MA	Floor Pocket	FSR, Inc	FL-500P	1	
47MA					
48MA					
49MA	Miscellaneous Hardware				
50MA	Wire & Cable				
51MA	Labor				
		END OF SECTION			

SECTION 28 31 00 - FIRE ALARM AND DETECTION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:

1. Provide a complete campus wide, fully addressable, power limited, fire detection and emergency voice/alarm control (EV/ACS) system. The system shall be connected, tested, verified by AHJ to be acceptable and left in first class operating condition. All equipment herein specified shall be engineer-approved and California State Fire Marshal (CSFM) listed. The entire installation shall conform to the National Fire Protection Association (NFPA) Standard 72, 90A & CEC Article 760 and authorities having jurisdiction as applicable. The system specified and depicted on the plan is a complete and approved system. Substitution of system components or manufacturer will require the contractor to separately obtain approval with the CSFM at Contractor's expense and shall meet all requirements of the system as designed and pre-approved. The entire fire alarm system has been submitted and approved by the Division of the State Architect as a complete submittal. Any routing of the system wiring that is significantly different than shown on the approved drawings shall have the approval of the engineer and must be obtained prior to construction.
2. Provide all work and material as shown and / or required to provide a fully functional and adequate system as described hereon and as required by the California State Fire Marshal.
3. Supervision: The fire alarm system shall monitor the integrity of all alarm initiating and indicating appliance circuits and provide local and remote status of all connected systems. The system shall be provided with automatically charged standby batteries to maintain system operation for 24 HRS in the normal supervisory mode and 5 minutes of alarm. Batteries shall be supervised for connection to the system and low voltage threshold. The automatic battery charger shall be capable of charging fully discharged system batteries to 100% in 8 hours.
4. The system wiring and installation shall be as stated in drawings and as required by the manufacturer. All wiring shall be color coded, tagged and verified to assure that it is free from shorts and grounds and shall be rated for the appropriate environmental conditions such as well locations.
5. Testing: The completed system shall be tested in accordance with NFPA Standard 72-7-1.
6. Warranty: The equipment and wiring shall be warranted to be free from electrical and mechanical defects for a period of two (2) years commencing with final acceptance by Owner.
7. All Fire Alarm wiring shown in drawings shall be installed in conduit.
8. System Operation shall include:
   a. Separate zone signaling and device status indication for all initiating devices.

b. Audible to sound the California uniform fire alarm signal in temporal mode. Devices shall be at least 15dBA above average ambient sound level, but not less than 75dBA at 10’ or more than 120dBA.
c. Visual devices shall not exceed 2 flashes per second and shall not be slower than 1 flash per second. Visual devices shall be synchronized when 3 or more devices are within the same field of view.
d. Supervision of all circuits to indicate any abnormal wiring condition.
e. One (1) N.O./N.C. integral relay for external device interface or as indicated on drawings.
f. Central station connection capable of indicating (3) distinct separate signals as being tamper, trouble and alarm with point reporting capabilities.

9. All work shall be completed as shown on the plans and or as specified within this specification and shall include the following (but is not limited to):
   a. Life safety fire alarm detection and signaling system.
   b. Furnishing and installation of equipment and devices.
   c. Conductors, connections and interconnections where specified and all in conduit system.
   d. Interface with elevator controls.
   e. Conduit, wire and connections for control of heating and ventilation motors, smoke dampers and smoke exhaust.
   f. Testing, cleaning and adjusting of completed work.
   g. Wiring diagrams, as-built drawings and three (3) sets of equipment operations and maintenance instructions for Owner.
   h. Complete maintenance for two years. Proposal for subsequent maintenance contract.
   i. All work and material for complete and operable systems as indicated or specified.
   j. Permits, inspections and fees.
   k. Identification and instruction to Owner Representative. Training shall consist of a minimum or two (2) 6-hour sessions.
10. Coordination with Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
11. Furnishing of special back boxes where required for installation of fire alarm devices.
12. Mechanical system duct detectors shall interface with fire alarm system without additional or special control devices.
13. All conductors to be installed in conduit pursuant to Specification Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
14. Qualifications: Contractor shall receive written approval and verified test results which shall be submitted to the owner for system from manufacturers recognized representative prior to completion and acceptance.
15. All initiating devices shall be separately addressed for individual identification at control panel.
16. As-Built Drawings: A complete set of reproducible “as-built” drawings showing installed wiring, color coding, wire tag notations exact locations of all installed equipment, specific interconnections between all equipment and internal wiring of the equipment shall be delivered to the owner upon completion of the system.
17. Maintenance Instructions: Three (3) submittals of maintenance instructions shall be provided and shall be complete, easy to read, understandable and shall provide the following information:
    a. Instructions for replacing any components of the system, including internal parts.

b. Instructions for periodic cleaning and adjustments of equipment with a schedule of these functions.
c. A complete list of all equipment and components with information as to the address and telephone number of both the manufacturer and local supplier of each item.
d. User operating instructions shall be prominently displayed on a separate sheet located next to the control unit in accordance with UL Standard 864. The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defects for two years from the date of final acceptance.

1.3 SUBMITTALS

A. Comply with applicable provisions of Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.

B. The submittal shall include certification from the manufacturer verifying that the distributor is an authorized agent, who is qualified and trained by the manufacturer in the proper installation, operation and service of the system.

C. Shop Drawings:
1. A complete list of all supplied equipment including model numbers with catalog data sheets on each component and CSFM number.
2. Provide schematic layout, floor plan, drawings indicating location of all components and equipment, required size and location of conduit and outlets and type and quantity of system conductors. Include voltage drop calculations and battery calculations based on actual number of devices to be installed. In lieu of contractor provided shop drawings, it shall be acceptable for contractor to provide written acknowledgement that the fire alarm drawings and specifications from the approved construction documents will be used as project fire alarm shop drawings and no exceptions are taken.
3. Include wiring diagrams for overall system and components including control panels, annunciators, power supplies, initiating circuits, notification appliances, control devices and FATC. Address numbers shall be noted on all appliances.
4. Include physical and electrical characteristics of equipment to indicate conformance with the Specifications.
5. Describe system characteristics and function as well as device wiring diagrams.
6. Voltage drop and battery calculations for each control panel and power supply and initiating circuits.
7. System operational matrix.

D. Manufacturer shall provide certification that the equipment supplied under this Section has been reviewed and certified by OSHPD to meet the current criteria for special seismic certification in compliance with 2019 CBC 1705A.12.13 and OSHPD CAN 2-1705A.12.13. Include seismic companion anchorage requirements from the testing and as approved by the manufacturer. The manufacturer shall provide an approved label on the equipment enclosure stating that the equipment has been awarded a certificate of compliance for special seismic certification. The label shall include OSHPD special seismic certification pre-approval (OSP) number when relevant.

E. Data Sheets: Show California State Fire Marshal Listing, U.L. listing, equipment ratings, dimensions and finishes.

F. Manufacturer's Certificate: Note whether the system meets or exceeds specified requirements.

G. Operating and Maintenance Instruction Manual:
1. Manual shall include the following tailored to this specific project:
   a. Operational description.
   b. Coded cabling plan.
   c. Two wire circuit diagrams.
   d. Wiring destination schedule.
   e. Schematic component diagrams and PC board layouts.
   f. Maintenance and alignment procedures.
   g. Voltage drop and battery calculations.

1.4 COORDINATION

A. Refer to the electrical and mechanical drawings and specifications to determine quantities and location of devices and required scope of work and coordinate work with mechanical drawings. Provide function described under mechanical section Sequence of Control, for fire and/or emergency conditions. Submit proposed interconnection to elevator supplier. Submit conduit and pathing requirements to electrical installer. For self-contained door release, coordinate with door supplier. Coordinate with mechanical drawings for atrium smoke evacuation system, provide all associated equipment required for complete operating system.

1.5 SYSTEM DESCRIPTION

A. General: System to be listed by Underwriters Laboratories and the California State Fire Marshal, designed to meet the functional requirements of NFPA 72A, 72B and 72D.

B. Features:
1. Main fire control command center panel with graphic annunciator, printer (where specified) and alarm communicator transmitter (DACT) where specified and/or required.
2. Remote annunciator(s) as specified.
3. Alarm/trouble point transmitters.
4. Manual alarm reporting stations (addressable).
5. Ionization smoke detectors (addressable).
6. Fan duct smoke detectors (addressable).
7. NAC extender panels.
8. Heat detectors (addressable).
9. Electromagnetic door hold open devices as required.
10. Combination speaker/visual alarm signal devices.
11. Horn and audible devices.
12. Visual alarm signal device.
13. Exterior bell.
14. Connection to sprinkler waterflow and pressure switches (addressable).
15. Sprinkler valve supervision (addressable).
16. Provision for connection to off-site central station via leased telephone lines.
17. Interface with the HVAC system for control of supply fans for all buildings. All required interface relays. Manual override control of motors and dampers at fire control panel.
18. Interface with the elevator system for elevator recall.
19. Interface with fire dampers for the release of fire dampers on fire alarm initiation.

20. Beam detector and transmitter (addressable).
21. Control module.
22. Monitor module.
23. Sync. Module.

1.6 SYSTEM OPERATION

A. System to be the active interrogate/respond type alarm system, 24 volt DC noncoded, positive, non-interfering, successive operation, in which all devices are constantly sending status signals to the main fire control command center from remote data transmitter panels approximately every one second. A change in status to be reported twice to determine that it is a valid signal, and be automatically and permanently recorded.

B. Wiring, equipment and devices for alarm initiation, annunciation, and audible signaling to be continuously supervised for opens, shorts or grounds (trouble). Each alarm initiating device circuit to be provided with illuminated and audible annunciation of both trouble and alarm conditions. Non-illumination indicates a normal condition.

C. Any alarm or trouble condition shall sound an audible signal at the fire command center and the remote annunciator. Signal shall be silenced by a momentary contact switch which shall transfer the signal to a visual indicator. Subsequent trouble conditions shall cause the signal to resound and in turn may be silenced. Upon restoration to normal, the trouble signal silencing indicator shall extinguish automatically.

D. Activation of any automatic or manual alarm initiating device shall cause the following to occur:
   1. Sound an audible alarm and illuminate the visual indicator for zone and type of alarm at the fire command center, the remote annunciator and fire alarm control panel.
   2. Sound, at building of origin, the audible alarm signal over the system audible devices and activate the visual signal devices.
   3. Transmit signal to release the electromagnetic hold open devices on corridor doors by floor.
   4. Transmit signal to close smoke dampers.
   5. Transmit alarm signal to energy management system for shutdown of building air handler.
   6. Transmit alarm signal to the central station office.
   7. Release exit door locks.

E. System shall not incorporate a time delay for any of the alarm initiating devices. All alarms shall be considered confirmed alarms.

F. Detection shall be addressable and reporting of fire conditions to be accomplished by the following basic methods:
   1. Manual stations.
   2. Smoke detectors.
   3. Heat detectors.
   4. Duct detectors.
   5. Waterflow switches.
   6. Beam detectors.

G. Fire alarm system inputs to be further subdivided as follows, for a more defined indication of the location and nature of the fire or trouble condition:
   1. Manual station by device and location.
   2. Smoke/heat detector by device and location.
   3. Waterflow or pressure switch by device and location.
   4. Sprinkler valve position indication by device and location.

H. Alarm condition shall override trouble indication. Trouble indication shall reappear after alarm reset.

I. Fire Alarm Zones shall be as indicated on drawings.

J. Printout on system printer of all alarm and trouble reports, indicating type of device, condition, time and date and alarm clearing.

K. Selective manual testing of any device point or zone in the system to determine normal, trouble or alarm status.

L. Command center shall have annunciator indicating building floor, room number and zone.

M. Remote annunciators to duplicate annunciation from the main fire control command center.

N. System shall be capable of manual operation in the event of malfunction of the central processor. Supplier shall include a statement in the system shop drawing submittal explaining the manual operating capability of the system. System shall provide redundant processor capabilities to duplicate primary processor function.

O. HVAC Interface: Coordinate system function with mechanical contractor for programmable shutdown of building air handlers, and starting of exhaust fans and control of equipment associated with atrium smoke control system, refer to mechanical plans for information.

P. Operation: All components shall be interconnected in accordance with the manufacturer's instructions to provide a complete and operable system as described.

1.7 FIRE ALARM SYSTEM FUNCTIONALITY

A. Provide a complete, electrically supervised networked addressable fire alarm and control system, with analog initiating devices.

B. The system shall be an EST multiprocessor based control panel communicating over a peer-to-peer token ring network over fiber with a capacity of up to 64 nodes.

C. Each node shall incorporate a fire alarm control panel with associated intergrading and signaling circuits.

D. The control panels shall have the capability to accept firmware upgrades via laptop computer, without the requirement of replacing hardware components.

E. The network shall be based on a peer-to-peer token ring technology operating at 625 K baud, using Style 4, 6 or 7.

F. The network shall include the capability of using fiber-optic cables up to 200 microns.

G. Each network node shall be capable of being programmed off-line using Windows based software supplied by manufacturer. Each node shall also be capable of being downloaded by connecting a laptop computer into any node in the system.

H. Each network node shall be capable of being grouped with any number of additional nodes to produce a “Region”, allowing that group of nodes to act as one, while retaining the peer-to-peer functionality.

I. Each network node shall be capable of annunciating all events within its “Region” or annunciating all events from the entire network, on the front panel LCD without any additional equipment.

J. Each network node shall be capable of having an integral digital alarm communication transmitter (DACT) that can report events in either its region, or the entire network to a single account.

K. Each fire alarm control panel shall be capable of storing its entire program, and allow the installer to activate only the devices that are installed during construction, without further downloading of the system.

L. Each system shall be provided with four (4) levels of password protection with up to sixteen (16) passwords.

M. Each node shall be capable of using up to 125 “Network Groups” to allow control between different nodes.

1.8 LOADS OF EQUIPMENT AND COMPONENTS

A. Follow IEEE Standard where applicable.

B. Provide fuse protection for equipment and spare fuses.

C. Operating voltage dissipated by resistors shall not exceed 25% of ratings.

D. Operating voltage of capacitors shall not exceed 80% of rated voltage.

E. Operating loads and voltages on transistors and solid-state devices shall not exceed manufacturer's recommendation for normal full load operation.

F. Use electronic components of types and rating commonly available from stock of established commercial distribution.

1.9 GUARANTEE

A. Conform to applicable provisions of the GENERAL REQUIREMENTS.

B. Service technicians and replacement components for the system shall be available locally from a service representative of the manufacturer who is able to provide evidence of technical training and authorization by the manufacturer.

C. For a period of two years from date of final acceptance, the system shall be under full guarantee for materials and labor at no cost to the Owner. The system shall be under a service contract with a technician authorized by the manufacturer. Replacement parts and labor shall be readily available during normal business hours while the service contract is in effect. A complete system inspection and test shall be performed at five months and again at eleven months after final acceptance. Tests shall include all smoke detector sensitivity settings.

D. All component failures shall be remedied to the satisfaction of the Owner.

E. A continuing service contract shall be offered at time of bid to commence at the expiration of warranty included with the system.

PART 2 - PRODUCT

2.1 MATERIALS

A. Fire Alarm Control Panel (FACP) and system shall be UL listed for power-limited application, (as described on the plans). System shall be as manufactured by Gamewell/FCI.

B. Peripheral Devices
1. Analog Photoelectric Smoke Sensors (refer to drawings for model number).
   a. Analog photoelectric sensors shall have a low profile and be capable of being set at five sensitivity settings of “LOW, LOW MEDIUM, MEDIUM, MEDIUM HIGH, and HIGH” levels.
   b. Automatic and manual functional sensitivity and performance tests shall be possible without the need for generating smoke. This method shall test all sensor circuitry and a “Failed Test” indication shall display for any failed test.
   c. Two LEDs providing 360-degree visibility of operating status and alarm indication shall be provided on each sensor. The LEDs shall pulse periodically indicating that the sensor is receiving power and communication is taking place. This feature shall be field programmable. Upon alarm, these LEDs shall light continuously. An alarm output shall be available for remote annunciation.
   d. The system shall check the sensitivity of each sensor periodically. If a sensor alarm threshold sensitivity has changed, due to again and/or dust accumulation, the system shall automatically compensate for this change (drift compensation).
   e. Each sensor shall allow for the setting of two sensitivity levels. These levels may be programmed so that when the building is occupied, a sensor will be less sensitive than when the building is unoccupied. This feature permits sensors to be more reliable and at the same time reduces/minimizes unwanted alarms. This feature shall also provide for programmable weekend days, where the sensor will remain at an unoccupied sensitivity level.
   f. The sensor screen and cover assembly shall be removable for field cleaning.
2. Addressable Thermal Sensor (refer to drawings for model number):
   a. Addressable thermal sensors shall have a low-profile and operate on the combination “rate-of-rise” and “fixed temperature” principals with the fixed

temperature set point at 135ºF. They shall contain dual thermistor sensing circuitry for fast response.

3. Addressable Subloop Monitor Module (refer to drawings for model number):
   a. An addressable monitor module with an initiating circuit capable of being configured Class B, Style B. The module shall contain a yellow status LED that shall flash when in a quiescent mode and light continuously when in alarm. The LED shall be field programmable not to provide quiescent status indication, if so desired.
4. Manual Fire Alarm Station: Double Action Manual Station (refer to drawings for model number):
   a. Furnish and install a manual station as indicated. Each station shall be of the addressable double action type, requiring an outer door to be lifted to expose the actuator door. Upon pulling forward of the actuator door, the unit shall lock into a readily observable "alarm" position.
5. Duct Smoke Detectors (refer to drawings for model number):
   a. The contractor shall furnish and install where shown on plans photoelectric or ionization duct smoke detectors wired in a two-wire configuration. The detectors shall be UL Listed under UL Standard 268A for duct smoke detectors and allow remote functional testing without generating smoke.
6. Remote Serial Annunicator:
   a. Furnish an install where shown on the plans a remote serial annunciator. The annunicator shall provide an 80-character display, which shall duplicate all information on the basic system display with the exception of menus. It shall also contain the following function keys: Alarm Acknowledge, Trouble Acknowledge, Signal Silence, System Reset/Lamp Test and System Drill Test. The cabinet shall contain a keylock, which will enable the switches only when placed in the "ON" position, with the exception of the Trouble Acknowledge, which is used to silence the local trouble audible sounder. The annunicator shall also contain the following LEDs: Alarm, Supervisory, System Trouble, Power Fault, System Silenced, NAC #1 Silenced, NAC #2 Silenced. The annunicator shall mount on a standard three-gang surface or flush electrical box. The control panel shall accommodate up to five (5) remote annunicators, which can be located up to 4,000 feet from the control panel.

C. Refer to architect specifications for graphic annunciator requirements.

D. Fire Alarm remote power supply, NAC panel, shall be UL listed for power-limited application. Provided with (4) four-signal circuits minimum capacity or as required to make system fully operational with an output current of 6 to 9 amps as required for proper operation.

E. System Devices and components shall be provided as specified on the fire alarm equipment legend and as shown on associated electrical drawing:

F. Fire Alarm terminal cabinet shall be Square D Class 6650. Size as shown on drawings or as required.

G. Architect to select all fire alarm signaling device colors.

H. Substitutions
   1. The fire alarm System has been designed and approved as a "complete system". Substitute equipment will be approved when the following conditions are met:

a. A request for substitution shall be made prior to bid for the Owner's and design team consideration and approval.
b. Submit detailed fire alarm plans, specifications and engineering calculations including but not necessarily limited to:
1) CSFM listing #'s and Manufacturer Model #'s for every system component which is to be interconnected as a part of this project.

2. Single line, riser and point to point wiring diagrams including battery and voltage drop calculations for the entire system in compliance with NFPA 72. Indicating appliance shall be calculated on the bases of the highest current rating possible at that device.
3. Indication of conductor type(s), power-limited or non-power-limited system, independent of interconnected to existing system.
4. Submit / obtain approval from the Owner and Division of State Architect (DSA) for the entire system.
a. The party requesting the substitution shall be responsible for any additional cost acquired during the approval.

PART 3 - EXECUTION

3.1 GENERAL

A. Comply with all applicable paragraphs in Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL, apply as though repeated herein.

B. Install system(s) in accordance with manufacturer's instructions.

C. Include services of certified technicians to supervise installation, provide adjustments, provide final connections, system testing and system training to Owner Representative.

3.2 GROUNDING

A. All equipment to be grounded by means of green ground wire to "U" contact of duplex receptacles and bonded to ground provided under 26 05 26, GROUNDING AND BONDING OF ELECTRICAL SYSTEMS.

3.3 INSPECTION

A. Systems to meet all the requirements of the CSFM and IOR and AHJ and shall be approved thereby before installation and prior to final acceptance.

3.4 LOCATION

A. Before installation, verify exact location of control equipment and outlets. The Owner reserves the right to relocate system components within a radius of 10' at no increase in cost before rough-in work is started for the respective component.

3.5 WIRING

A. Furnish all conductors, equipment, terminal strips, etc., and labor to install a complete and operable system. All cable conductors shall be color coded and numbered for identification at all terminals. Green shall be for grounding conductor only. Use red insulation and or red jacketing on all fire alarm cable.

3.6 TESTING

A. After all equipment specified herein for each system has been installed and is in operating condition, conduct performance tests to determine if the installation and components comply with these specifications. Furnish competent personnel, all test material and approved test instruments and conduct the tests under supervision of factory personnel, in the presence of the Engineer, the building and fire inspecting agencies.
   1. The contractor's job foreman, in the presence of a representative of the manufacturer, a representative of the owner, and the fire department shall operate every installed device to verify proper operation and correct annunciation at the control panel.
   2. At least on half of all tests shall be performed on battery standby power.
   3. Where application of heat would destroy any detector, it may be manually activated.
   4. The signaling line circuits and notification appliance circuits shall be opened in at least two (2) locations to verify the presence of supervision.
   5. When the testing has been completed to the satisfaction of the contractor representative IOR, representatives of the manufacturer and owner, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and the authority having jurisdiction.
   6. The contractor shall leave the fire alarm system in proper working order, and, without additional expense to the owner, shall replace any defective materials or equipment provided by him under this contract within two years from the date of final acceptance by the awarding authority.
   7. The local responding fire department must be notified prior to the final test in accordance with local requirements and when requested, participate in system testing and evaluation.

3.7 REPORT

A. Prepare written report of final test results, signed by witnessing parties. Submit to the Engineer in triplicate for final approval.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 28 55 00 – EMERGENCY RESPONDER RADIO COVERAGE SURVEY

PART 1 – GENERAL

1.1 SUMMARY

A. Specification intent is to establish the requirements and standards for initial survey for public safety radio signal strength per NFPA, IFC and local AHJ requirements.

B. Survey shall be performed after the building is substantially completed, and prior to start of installation of electrical wiring.

C. Contractor shall perform a survey using an RF Spectrum Analyzer, a calibrated, system-compatible radio or another suitable instrument with traceable certificate of calibration to analyze the RF signal strength of the Emergency Responder Radio Signal into the buildings and determine the amplification of the required signal. Both inbound and outbound signal strength shall be determined, measured, calculated, and documented as required by code.

1.2 SURVEY CRITERIA IF REQUIRED

A. The required Public Safety Radio Signal Level inside the Buildings must be determined per code, ordinance or AHJ.

B. Survey shall be performed by an FCC licensed technician holding a current license required by code for this application.

1.3 REGULATIONS

A. Codes, regulations, and standards referenced in the Section are:

1. NFPA 1 – The National Fire Code
2. NFPA 70 – The National Electrical Code
3. CFC 510- Emergency Responder Radio Coverage
4. NFPA 101, Life Safety Code, the Ohio Building Code, and Local Code and Building Authority requirements.
5. NFPA 72 National Fire Alarm Code
6. FCC 47 CFR Private Land Mobile Radio
7. 90.219 Services-Use of Signal Boosters
8. ICC International Fire Code, Code and Commentary
9. Local or State Promulgated Fire Code

10. ADA "Americans with Disabilities Act"

11. FCC's OET 65 Standards "Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields"

12. FCC Rules Part 22, Part 90 and Part 101

13. NFPA 1221 2019 Edition

14. UL 2524

1.4 DEFINITIONS

A. Definitions:

1. Bi-Directional Amplifier BDA: Device used to amplify band-selective or multi-band RF signals in the uplink, to the base station and in the downlink from the base station to subscriber devices for enhanced signals and improved coverage.

2. Emergency Responder Radio Coverage System: A two-way radio communication system installed to assure the effective operation of radio communications systems for fire, emergency medical services, or law enforcement agencies within a building or structure. A system used by firefighters, police, and other emergency services personnel.

3. FCC: Federal Communications Commission

4. OET 65 Standards: FCC's Bulletin 65 provides Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.

5. Public Safety/First Responder: Public Safety or First Responder agencies that are charged with the responsibility of responding to emergency situations. These include, but are not limited to law enforcement departments, fire departments, and emergency medical companies.

6. RSSI: Received signal strength indicator RSSI is a measurement of the power present in a received radio signal.

7. BER: Bit Error Rate is the number of bit errors per unit time

8. GROL- FCC General Radio Operators License

9. ERRCES- Emergency Responder Radio Coverage Enhancement System

10. DAS-Distributed Antenna System

1.5 EXECUTION

A. Testing Procedures

1. Minimum Signal Strength: For testing system signal strength and quality, the testing shall be based on the. -95dBm nominal signal at 100%.

2. Spectrum Analyzer or Calibrated Handheld Radio shall be used as basis for signal measurements or other method as approved by AHJ.

3. Testing should be based on a minimum of 20 grid locations per floor or maximum of 1600 SQ ft. areas if the floor exceeds 32,000 Sq. Ft. Also, testing should include all critical areas per NFPA. See 1.02 of this specification and NFPA 72 2019 or NFPA 1221 2019, or as required by the local AHJ, local code or ordinance.

4. A minimum signal strength of -95 dBm shall be provided throughout the coverage area for both uplink and downlink by the Local Fire Department.

   a. RSSI measurement only

1.6 SURVEY SUBMITTALS

A. Submit testing data for each level of all buildings.

1. An RF measurement drawing of each floor of all buildings which indicates relative RF field strength for each frequency band of interest must be submitted to the AHJ.

2. Contractor to prepare shop drawing to clearly indicate the areas that have passed or failed based on the above requirements.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 28 55 10 – EMERGENCY RESPONDER RADIO COVERAGE SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
1. The Emergency Responder Radio Coverage system for the buildings shall be provided based on a performance specification: Provide component and system design (functional block diagram) submittals based on the performance criteria as listed, and as shown on the plans.
2. System shall comply with requirements of UL2524 In-building 2-Way Emergency Radio Communication systems, NFPA 72, NFPA 1221, and CFC 2019 Section 510.
3. System shall meet all requirements of local responding agencies, and all authorities having jurisdiction (AHJ).
4. Contractor shall perform a site survey in accordance with Specification Section 28 55 00 – Emergency Responder Radio Coverage Survey.
5. Contractor shall prepare engineered plans and specifications and submit to local AHJ and obtain a separate permit / AHJ approval, prior to installation.
6. All areas with-in all buildings and site enclosures shall be provided with radio coverage to meet AHJ requirements.
7. An approved manufacturer or qualified and approved vendor shall supply, test and determine locations of components required for proper operation, provide, install, test and certify the performance of the complete system. Vendor qualifications must be acceptable to the AHJ.
8. Provide and install all antennas, pathways, amplifiers, signal boosters, cabling, connectors, straps, supports, testing, etc., required for a complete full functioning radio coverage system as described herein and on the plans.

1.3 SUBMITTALS

A. Submit in accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

PART 2 - PRODUCTS

A. The system design shall be based on the GAMEWELL-FCI line of Public Safety Signal Boosters UL2524, NFPA 72, NFPA 1221, IFC and FCC certified to establish standards of quality for materials and performance.

B. Design shall include iBwave software-simulated radio propagation modeling with heat maps showing predicted signal coverage levels within the building. The iBWave design shall be done by iBWave certified personnel.

C. Signal booster shall be Class B Public Safety type as designated by FCC or as required by the AHJ.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with the Installer present for compliance with requirements and other conditions affecting the performance of the system work.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:
1. Install system in accordance with NFPA 72 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.

B. Wiring Methods:
1. Install all cabling in raceways listed for the application.

C. Impedance and Level Matching:
1. Carefully match input and output impedance’s and signal levels at signal interfaces. Provide matching networks where required.

D. Control Circuit Wiring:
1. Install control circuits in accordance with NFPA 72 and as indicated. Provide number of conductors as recommended by system manufacturer to provide control functions indicated or specified.
2. All housings are to be located as specified and shown on drawings.
3. Make installation in strict accordance with approved manufacturer's drawings and instructions.
4. The contractor shall provide necessary transient protection on the AC power feed.

E. Wiring Within Equipment:
1. Provide adequate length of conductors. Bundle, lace, and train the conductors to terminal points with no excess.

F. Identification of Conductors and Cables:
1. Use color coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams.

G. Repairs:

1. Wherever walls, ceilings, floors, or other building finishes are cut for installation, repair, restore, and refinish to original appearance.

3.3 GROUNDING

A. Provide equipment grounding connections for systems as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.

B. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, and other impairments.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services:
   1. Provide services of a duly factory authorized service representative for this project location to supervise the field assembly and connection of components and the pre-testing, testing, and adjustment of the system.
   2. Make observations to verify that units and controls are properly labeled, and interconnecting wires and terminals are identified.
   3. Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at Contractor's expense. Verify by the system test that the total system meets the Specifications and complies with applicable standards.
   4. All tests shall be conducted, documented, and signed by a person in possession of an FCC General Radio Telephone Operators License. All testing personnel shall be certified and authorized by the signal booster manufacturer in the installation and operation of their equipment. Personnel qualifications must be acceptable to the AHJ.

3.5 COMMISSIONING

A. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system. Provide a minimum of 4 hours in service training. Operators Manuals and Users Guides shall be provided at the time of this training.

B. Schedule training with Owner through the Architect, with at least seven days advance notice.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 31 11 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. This Section includes the following:

1. Provide all material, labor, equipment and services necessary to completely clear and demolish all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. RELATED SECTIONS:

1. Contract General Conditions and Division 1, General Requirements
2. Section 31 20 00.01 – Earthwork: Excavation, Filling, and Grading
3. Section 31 22 22.01 – Soil Materials
4. Section 31 23 33 – Trench Excavation and Backfill

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. In accordance with Specification Section GENERAL REQUIREMENTS, and the following:

a. Materials and equipment used for this project shall comply with the current applicable regulations of the California Air Resources Board [CARB] and the Environmental Protection Agency [EPA].

B. Meetings:

1. Minimum agenda shall be to discuss coordination of upcoming work, review the work progress, discuss field observations, identification of any potential problems which may impede planned progress; corrective measures to regain projected schedule; and maintenance of quality and work standards.
2. Meetings shall include Pre-Clearing and Demolition Meetings.
3. Participants (or designated representative of) invited to attend each of the above meetings shall be as follows:

a. Contractor.
b. Owner.
c. Architect.
d. Testing Laboratory.
e. Local Governing Authorities as applicable.
f. Utility Representatives as applicable.
g. Owner's Inspector.
h. Clearing and Demolition Subcontractor.
i. Other subcontractors, as appropriate (including any accessory subcontractors).

1.4 PROJECT CONDITIONS OR SITE CONDITIONS

A. Dust Control

1. Contractor shall comply with all requirements of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for construction activity related to this project.
2. A Dust Control Plan, as required by the SJVAPCD, may be required for this project. Contractor shall be responsible for preparing said Dust Control Plan, submitting to the SJVAPCD for review and approval, and paying all SJVAPCD review and permitting fees related to the Dust Control Plan.
3. No construction activity related to this project may begin until Contractor has secured an approved Dust Control Plan, if one is required.
4. Contractor shall be solely responsible to implement all requirements of the Dust Control Plan throughout the life of this contract.
5. Should fines or fees be levied against the Project for violations of the Dust Control Plan and/or related SJVAPCD regulations, Contractor shall be responsible to pay all said fines or fees and to implement all mitigation measures required by SJVAPCD in order to bring the construction activity into compliance with SJVAPCD regulations. The costs for any such fines or fees shall be included in the lump sum price bid for work under this contract and no additional payment will be made therefor.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives, walks or occupied facilities.

    a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and Authorities having jurisdiction.
    b. Provide alternate routes around closed or obstructed traffic ways if required by Authorities having jurisdiction.

3. Locate and identify utilities.

    a. Call a Local Utility Locator Service (USA – "Underground Service Alert" – [800] 227-2600) for the task of locating any applicable utilities in the area where the Project is located.

4. Carefully remove items indicated to be salvaged and store on Owner's premises at the Owner's direction.

PART 2 - PRODUCTS

(NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:

1. Protect and maintain all benchmarks and survey control points from disturbance during clearing and demolition operations.
2. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties.
3. Furnish and install temporary protection/barrier fencing surrounding the limits of demolition.
4. Protect trees, plant growth, and features not specifically designated for removal. Locate and clearly flag trees and vegetation to remain or to be relocated.
5. Protect existing improvements designated to remain from damage during construction.

    a. Restore damaged improvements to their original condition, as acceptable to the Owner.

3.2 CONSTRUCTION

A. Shrub and Weed Removal:

1. Remove weeds and rooted topsoil to a minimum four (4) inch depth and temporarily stockpile as needed for re-use in finished grading of landscape areas. Remove excess material from the site.
2. Where existing vegetation is to be replaced by new materials, remove contaminated or excess soil from the site and legally dispose of off-site.

B. Existing Site Improvements Removal:

1. Remove existing above and below grade improvements as necessary to facilitate new construction.

   a. Remove concrete slabs, sidewalk, curbs, mow strips, gutters, and fence post footings.

      1) Neatly saw-cut length of existing pavement to remain before removing existing pavement unless existing full-depth joints coincide with line of demolition. Saw-cut faces vertically.

   b. Remove indicated utility improvements within the limits of construction.

      1) Excavate for and disconnect utilities designated to be removed. Seal or cap off underground.
      2) Coordinate removal and/or relocation of utilities with the appropriate utility agencies.

   c. Where existing underground utilities, irrigation pipes, wells, leach fields, or underground tanks are encountered, they must be removed or moved to a point at least 5 feet horizontally outside the proposed building and 3 feet horizontally outside the concrete flatwork or pavement construction areas. All resultant cavities must be backfilled with engineered fill.

C. Existing Utilities to Remain or be Relocated:

1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

   a. Notify Architect and the Owner not less than seven (7) days in advance of proposed utility interruptions.
   b. Arrange to shut off indicated utilities with utility companies and Owner.

D. Disposal:

1. Legally dispose of all debris (surplus soil materials, unsuitable topsoil, obstructions, demolished materials, waste materials, trash, etc.) resulting from clearing, grubbing, demolition and from construction. Disposal of all materials shall be at a location secured by the Contractor off of the Owner's property.

END OF SECTION

SECTION 312000– EARTHWORK FOR BUILDINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to do all Earthwork and other related items necessary to complete the Project as indicated by Contract Documents unless specifically excluded.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 11 01 CONCRETE FORMWORK
   4. 03 20 00 REINFORCEMENT
   5. 03 30 00 CAST-IN-PLACE CONCRETE
   6. 04 22 00 CONCRETE MASONRY UNITS
   7. 07 14 16 FLUID-APPLIED WATERPROOFING
   8. 31 31 00 SOIL TREATMENT
   9. 31 20 00.01 EARTHWORK (CIVIL)
   10. 31 22 22 SOIL MATERIALS (CIVIL)
   11. 32 12 00 PAVEMENT
   12. 32 19 19 ORNAMENTAL METAL
   13. 32 31 13 CHAIN LINK
   14. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   15. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data:
      a. Information indicating the source of all import material, the fill material type and where it is to be used.
   2. Quality Assurance/Control:
      a. Material Test Reports:
         1) Classification of Soils.
         2) Compaction Characteristics of Soils.
         3) Density and Unit Weight of Soils in Place.
         4) Environmental Contaminates Report.
         5) Import Soil:
            a) Letter of certification from contractor indicating material conforms to DTSC requirements.
            b) Soil Test Results.
   3. Project Closeout: In accordance with Specification Section – PROJECT CLOSEOUT.
      a. Drawings indicating the extent and depth of all engineered fill. This information shall be a part of the Project "As-Built" and Project "Record" Documents in accordance with the Specification Section – PROJECT DOCUMENTS.

1.3 QUALITY ASSURANCE

A. Qualifications:
1. Material:
a. Soils Report: Prepared by:
1) BSK & ASSOCIATES, Geotechnical Consultants, (BSK Report G21-049-11F, Dated March 17, 2021.
2) The report of the existing soil conditions is available for reference only at the Geotechnical Consultant's office for purchase at the cost of reproduction.
2. Installer:
a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:
a. AHJ Authority Having Jurisdiction
b. CAL/OSHA Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.
c. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.
d. COF County of Fresno, Standard Drawings and Specifications, latest edition.
e. COS City of Sanger. Standard Drawings and Specifications, latest edition.
f. DTSC California Department of Toxic Substances Control.
g. EPA Environmental Protection Agency.
h. FMFCD Fresno Metropolitan Flood Control District.

C. Certificates:
1. Installer's certification that all Earthwork installation meets or exceeds the requirements of this specification.
2. Contractor's certification (on Contractor's letterhead paper) that the Earthwork materials and installation meets or exceeds the requirements of this specification.
3. Contractor and Supplier of imported material shall certify that the soils do not contain any environmental contaminates regulated by Local, State or Federal Agencies.

D. Meetings:
1. Pre-Installation: Schedule prior to the start of work.
a. Coordinate the work with other work being performed.
b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.

a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.4 PROJECT CONDITIONS

A. Existing Conditions:
1. Examine site and verify conditions with the Drawings and Specifications.
2. Thoroughly investigate and verify conditions under which the Work is to be performed.
3. Locate and identify utilities:
a. Call a Local Utility Locater Service (USA - "Underground Service Alert") for the task of locating any applicable off-site and on-site utilities in the area where the Project is located.
4. No allowance for extra Work will be granted resulting from negligence or failure to meet requirements of Article titled "Existing Conditions" above.

B. Environmental Requirements:
1. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
a. All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover.
b. All on-site unpaved roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.
c. All land clearing, grubbing, scraping, excavation, land leveling, grading, and cut and fill activities shall be effectively controlled of fugitive dust emissions utilizing application or water or by presoaking.
d. When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions or at least six inches of freeboard space from the top of the container shall be maintained.
e. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. The use of blower devices is expressly forbidden.
f. Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/ suppressant.
2. Burning: No burning will be allowed on-site.
3. Rain: Work under this section shall not be started or maintained under threat of rain, unless the work is not affected by the rain.
4. Do not place fill during weather conditions which will alter moisture content of fill materials sufficiently to make compaction to the specified densities difficult or impossible.
5. When reference is made to SWPPP (Storm Water Pollution Prevention Plan, if any within this Project Manual), then comply with all environmental protection requirements included therein.
6. In accordance with EPA and AHJ.

C. Protection:

1. Protect cut and fill areas to prevent water running into excavation. Maintain areas free of water. Remove seeping water immediately by pumps.
2. Protect cut slopes from erosion due to precipitation and other sources of runoff.
3. Protect utilities to remain within the construction area and special construction. If utility lines are uncovered (water, electric, sewer, etc.) not shown on the drawings during excavation of site, notify the Architect promptly for its review and action.
4. Do not permit access to undeveloped portions of the site, nor to areas that are outside of the limits of grading.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Locator Tape:
1. Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be 6 inches wide and installed over all of the pipelines as shown on the drawings.

B. Earth Fill:
1. Fill shall consist of non-hazardous, non-expansive, low corrosivity and predominantly granular material composed of a reasonably well graded mixture of hard inert mineral fragments, approved by the Geotechnical Engineer.
2. Free of brush, roots, sod, rubbish or other organic materials or clay.
3. Free of rocks **3 inches** or larger in greatest dimension. Not more than **15 percent** larger than **2-1/2 inches**. Remove rock or stones, which may interfere with the action of compacting equipment.
4. Materials excavated from the site below the top **twelve (12)** inches may be used, subject to approval by the Geotechnical Engineer.
5. The moisture content of the soil shall be at least optimum moisture content at the time of placement.

C. Imported Fill:
1. Import Material:
   a. Import Material to be used shall have the consistency as follows:
      1) Percent Passing 3-inch Sieve 100
      2) Percent Passing No. 4 Sieve 65-100
      3) Percent Passing No. 200 Sieve 20-45
      4) Plasticity Index Less than 12
      5) Expansion Index Less than 20
      6) R-Value (for fill placed in pavement areas only) 50 Minimum , in paved areas.
      7) Low Corrosion Potential
         a) Soluable Sulfates: < 1,5000 mg/kg
         b) Solubale Chlorides: < 300 mg/kg
         c) Soil Resistivity: > 3,000 ohm-cm
   b. The Contractor shall be responsible for securing an acceptable source of import material with the approval of the Geotechnical Engineer and the Owner's Testing Lab prior to transport to the site.
   c. All import material shall meet the standards and criteria of DTSC for environmentally clean soil suitable for school construction.

2. Materials excavated from the site below the top **twelve (12) inches** inches may be used, subject to approval by the Geotechnical Engineer:
   a. On-Site soils shall be in accordance with Engineered Fill paragraph in this specification section and remove all roots 1/4 inch in diameter or larger.

D. Back Fill:
1. In accordance with Article titled "Earth Fill" above, within this specification section.

E. Trenches and Backfill.
1. Mechanical and Plumbing Utility Trench Back Fill shall be soil in accordance with "Earth Fill" paragraph within this specification section, unless indicated otherwise within this Project Manual.
2. Electrical Utility Trench Back Fill shall be sand in accordance with "Sand Fill" (for Electrical Trenches) paragraph within this specification section, unless indicated otherwise within this Project Manual
3. Pipes and conduits must be bedded and shaded in accordance with the requirements of the pipe manufacturer; refer to the related Plumbing, Electrical and Civil drawings and specifications.
4. As a minimum standard, a minimum of 6-inches of sand bedding material for pipe installations greater than 12-inches in diameter.
5. For pipe diameters smaller than 12-inches, the bedding thickness may be reduced to 4-inches. The bedding material and envelope (up to 6-inches above the pipe) must consist of sand (Sand Equivalent greater than 30), be placed in loose lifts not exceeding 8-inches in thickness, compacted to at least 90 percent of the maximum dry density, and moisture conditioned to within 2 percent of optimum moisture content.
6. Water jetting to attain compaction is never allowed.
7. Adequate excavation width must be provided to permit uniform compaction on both sides of utility lines installed within the trench.
8. The trench backfill material may consist of engineered fill. Trench backfill outside the building footprint must be placed in loose lifts not to exceed 8-inches in loose thickness, compacted to at least 90 percent of the maximum dry density, and moisture conditioned to within 2 percent of optimum moisture content. The upper 12-inches of trench backfill below pavement sections must be compacted to at least 95 percent of the maximum dry density. Conduits extending through or below footings must be œsleeved as determined by the Project Structural Engineer.
9. Utility trench backfill beneath the building foundations must be backfilled with a lean concrete sand slurry, and extend 36" each side of the footing.

F. Sand Fill:
1. Sand to be washed and of natural siliceous or igneous origin, having hard, strong, and durable particles.
2. Sand shall comply with ASTM C 33 "Standard Specification for Concrete Aggregates", generally as follows:
   a. Percent passing 3/8 inch sieve: 100%.
   b. Percent passing No. 4 sieve: 95 to 100%.
   c. Percent passing No. 50 sieve: 10 to 30%.
   d. **Percent passing No. 100 sieve: 2 to 10%.**

G. Finish Fill:
1. Predominately granular material composed of a reasonably, well-graded mixture of hard inert mineral fragments approved by Geotechnical Engineer.
2. Shall be topsoil free of brush, roots, sod, rubbish or other organic materials.
3. Free of rocks **1/2 inch** or larger and not more than **15 percent.**

4. Topsoil stripped from the top **twelve (12)** inches from the site may be re-used subject to approval by the Geotechnical Engineer.
    a. On-Site topsoil shall be in accordance with Finish Fill paragraph in this specification section.

2.2 SOURCE QUALITY CONTROL

A. Tests, Inspection:
1. Material Test Reports: Performed by the Owner's Testing Laboratory agency in accordance with the Specification Section – TESTING LABORATORY SERVICES, indicating and interpreting test results for compliance of the following with requirements:
    a. Classification according to ASTM D 2487 "Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)", of each on-site and import soil material proposed for fill and backfill.
    b. Laboratory compaction curve according to ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)", for each on-site and import soil material proposed for fill and backfill.
2. Material Test Reports: Performed by the Contractor's Testing Laboratory agency in accordance with the Specification Section – TESTING LABORATORY SERVICES, indicating and interpreting test results for compliance of the following with requirements:
    a. Imported soil: Test report showing import fill dirt chemicals are within allowable DTSC standards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION:

A. Layout of Work:
1. Contractor shall be responsible for all lines and grades.
2. Check all bench marks, monuments and property lines and verify locations.
3. Locate and maintain all grade stakes.
4. Monuments moved or displaced during grading operation are to be replaced by a California Registered Civil Engineer or Surveyor, at Contractor's expense.

B. Coordination:
1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work.

2. If this project contains a STORM WATER POLLUTION PREVENTION PLAN (SWPPP), coordinate with the requirements of that section for protection of the site and adjacent properties.
3. Grading operations must be scheduled as to avoid working during periods of inclement weather. Should these operations be performed during or shortly following periods of inclement weather, unstable soil conditions may result in the soils exhibiting a "pumping" condition. This condition is caused by excess moisture, in combination with compaction, resulting in saturation and near zero air voids in the soils. If this condition occurs, the affected soils must be over-excavated to the depth at which stable soils are encountered and replaced with suitable soils compacted as engineered fill. Alternatively, the Contractor may proceed with grading operations after utilizing a method to stabilize the soil subgrade, which must be subject to review by the Geotechnical Engineer prior to implementation.

C. Protection:
1. Protect and maintain all benchmarks and survey control points from disturbance during clearing and demolition operations.
2. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
3. Protect existing improvements designated to remain from damage during construction.
   a. Restore damaged improvements to their original condition, as acceptable to the Owner.
   b. Support exiting fences as required, where site earthwork operations are near existing fence posts or footings.

D. Surface Preparation:
1. Stripping:
   a. Remove all topsoil, vegetation, organics and debris from entire project site. Remove to a minimum of stripping depth of **twelve (12) inches**.
   b. Stockpile stripped topsoil suitable to be re-used as Finish Fill for:
      1) Landscape areas.
      2) Athletic Field areas.
      3) Stripped topsoil is not suitable for use as Earth Fill and Engineered Fill.
2. Removal of loose or organic soils resulting from Specification Section – CLEARING AND DEMOLITION.
   a. All loose or organic materials resulting from excavations and removal of:
      1) Irrigation lines.
      2) Trees.
      3) Vineyards.
      4) Wells.
      5) Debris pits.
      6) Uncontrolled fills.
      7) Existing above and below grade improvements shall be removed.
   b. Expose undisturbed native soils, scarify to a minimum depth of **six (6)** inches, then compact as Engineered Fill.
   c. At locations where the existing ground slope exceeds a ratio of 4:1 (horizontal to vertical ratio), the existing ground surface must be "benched" as directed by the Geotechnical Engineer, prior to placing fill material.
   d. Backfill with Engineered Fill at building areas, exterior pavement areas, concrete slab areas and improvement structures.
      1) Backfill with Earth Fill at Landscape and Athletic Field areas.

3.3 CONSTRUCTION

A. Over-excavation:
1. Over-excavation shall occur after stripping operations.
2. Over-excavate at all planned building areas to a depth indicated on the drawings, but not less than **twenty-four (24)** inches below exposed grade or **twenty-four (24)** inches below bottom of foundation footings, whichever is greater.
3. Over-excavate to a depth indicated on the drawings, but not less than **twenty-four (24)** inches below exposed grade at:
   a. Exterior pavement (drives, parking and playcourt) areas.
   b. Concrete slab (emergency access, sidewalk, and curb) areas.
   c. Improvement structures.
4. Extend over-excavation for a distance of not less than **five (5) feet** beyond the perimeter of the footprint of each:
   a. Respective building area and its associated footings.
   b. Exterior pavement areas.
   c. Concrete slab areas.
   d. Improvement structures.
   e. Over-excavation shall not undermine and extend beyond past existing site improvements that are to remain.
5. Stockpile excavated on-site soils suitable to be re-used as Earth Fill or Engineered Fill.
6. Remove all unsuitable excavated material.
7. The exposed subgrade soil must be proof rolled under the observation of the Geotechnical field representative to detect soft or pliant areas.

B. Scarification and Compaction:
1. Scarification and Compaction shall occur after over-excavation operations.
2. The exposed grade in areas to receive Earth Fill and Engineered Fill shall be scarified to a minimum depth of **eight (8) inches**.
3. Moisture condition to within **two (2)** percent of optimum moisture content.
4. Compact to at least **ninety-two (92)** percent of the maximum dry density in accordance with ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)".

C. Placing Earth Fill:
1. Shall occur after scarification and compaction operations.
2. Spread Earth Fill in successive layers that will result in compacted layers **six (6) inches** thick maximum.
3. Moisten or dry Earth Fill to obtain optimum moisture content for compaction. Add water as required to obtain uniform distribution of water to each layer. Disc soil to thoroughly mix after water is added.
4. Compact Earth Fill to a density of not less than **ninety-two (92)** percent in accordance with ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)".
5. Compaction by ponding and jetting shall not be permitted.
6. Contractor shall be responsible for selection of equipment used for compaction, and for obtaining specified fill density.
7. Costs of initial compaction tests shall be borne by the Owner. Contractor shall pay for all re-tests required due to failure of initial tests.

D. Placing Engineered Fill:
1. Shall occur after scarification and compaction operations.

2. Place Engineered Fill in accordance with article titled "Placing Earth Fill" within this specification section.
3. As a minimum, extend to **five (5) feet** beyond the perimeter of the footprint of each:
   a. Respective building area.
   b. Exterior pavement areas.
   c. Concrete slab areas.
   d. Improvement structures.
4. Preparation of sub-grade and selection and placing of Engineered Fill subject to continuous inspection and supervision of Geotechnical Engineer.
5. Compact Engineered Fill to a density of not less than **ninety-two (92)** percent, but not more than **ninety-five (95)** percent, in accordance with ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)". Density of each layer of Engineered Fill shall be tested and verified that it meets required density of Geotechnical Engineer prior to placing succeeding layer.
   a. Compact top **eight (8) inches** of Engineered Fill a density of not less than **ninety-five (95)** percent in accordance with Test Designation ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)" at:
      1) Dedicated fire access areas.
      2) Parking areas.
      3) Driveway areas.
      4) Playcourt areas.
6. Roll Engineered Fill under interior and exterior slabs to smooth surface, free of large or sharp particles.
7. Conduct work to minimize inspection costs.
8. When testing agency reports that sub-grades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained

E. Excavation for Formwork:
1. Excavate for footings to depth and width indicate on the drawings or within these specifications.
2. Protect top corners of trenches against sloughing.
3. Side forms at footings may be omitted if excavation stands without caving. Make footing trench **two (2) inches** wider than width of concrete footing indicated on the drawings, when earth is used as a form. Cut trenches true and straight. Make side cuts neat and plumb. Bottom of trenches shall be level with reasonably sharp corners.
4. When forms are required at footings, allow additional space for construction and inspection.
5. Provide means to accurately position and secure sill bolts, tie downs, reinforcing, and all other inserts in concrete.
6. Footings to bear on firm soil, as determined and approved by the Geotechnical Engineer.
7. Notify the Architect if unsuitable bearing is encountered at depths indicated. After review and approval of the Architect and Geotechnical Engineer, continue excavation.
8. Fill trenches excavated below indicated depths on drawings with concrete to required elevations. Concrete shall be in accordance with Specification Section - CAST-IN-PLACE CONCRETE.

F. Trenching for Piping or Conduit:
1. Cut trenches true and straight. Make sides with neat cut. Bottom of trenches shall be uniform and in conformance with laying piping.
2. Cut trenches wide enough to provide sufficient working space.
3. Piping or conduit to bear on firm soil. Notify the Architect if unsuitable bearing is encountered at depths indicated on the drawings.

a. Sub-Base Support: Where installation of sub-base material is indicated, excavate to depth indicated or, if not otherwise indicated, a minimum of **six (6) inches** below bottom of work to be supported.

b. Excavate by hand below belling so that piping bears continuously on firm soil.

4. Fill trenches excavated below required depths to required depths with Sand Fill, Earth Fill or Back Fill as required in accordance with article titled "Placing Back Fill" within this specification section.

a. Lean concrete shall be used as Back Fill where Utility Trenches extending from the exterior to the interior limits of building. Lean concrete shall extend a minimum distance of **two (2) feet** laterally on each side of the exterior building line and a minimum of **six (6) inches** above footing penetration.

G. Protection of Excavations:

1. Provide all shoring and bracing as required and those codified in local, state or federal safety regulations.

a. OSHA Health and Safety Standards for Excavations.

b. Any other successor regulations.

2. Prevent water, caving, or sloughing from entering excavation.

3. Maintain excavations free of water.

H. Placing Back Fill:

1. Remove all debris, wood, paper and deleterious materials from excavations before placing Back Fill.

2. Do not backfill against foundation wall without Architect's approval and not until forms have been removed. Place Back Fill on each side simultaneously or brace one side.

3. Do not Back Fill over piping until piping has been tested, inspected and approved.

4. Place Back Fill in accordance with article titled "Placing Earth Fill" within this specification section, or in accordance with article titled "Placing Engineered Fill" within this specification section, when Back Fill occurs within limits of Engineered Fill.

a. Compact around the lower haunches of piping without disturbing the pipe's line and grade.

b. Compact the fill to **ninety-two (92)** percent minimum **twelve (12) inches** above pipe or to **twenty-four (24) inches** of required grade, whichever is greater.

c. Compact the remainder of the fill to **ninety-two (92)** percent minimum, or as required by surface construction.

d. All compaction shall be in accordance with ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)".

5. Jetting of trench backfill is not allowed.

I. Placing Finish Fill:

1. Remove debris subject to termite attack, rot, or corrosion and all other deleterious materials from areas to receive Finish Fill.

2. Place Finish Fill in Landscape and Athletic Field areas only. The maximum depth allowed is **twelve (12) inches**.

3. Place Finish Fill in maximum layers of **six (6) inches** and compact to a density of not less than **eighty-five (85)** percent in accordance with ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)".

J. Grading:

1. Grade to elevations as indicated on the drawings.

2. Grading shall be reasonably smooth, compacted and free from irregular surface changes.

3. Grade ditches, swales and gutters to drain readily.

4. Slope grade evenly from proposed building pads in all directions to provide drainage.
   a. Grades at exterior building walls shall slope away from the structure at a minimum slope of **2** percent for a minimum of **5 feet**, in order to prevent standing water adjacent to building foundations.
5. Protect newly graded areas. Repair impairments resulting to grading from settlement or washing and re-establish grades to the required elevations and slopes.
6. All grading shall be plus or minus **0.05 foot** of the designated grade in areas to receive concrete slabs-on-grade, other concrete improvements, and asphalt concrete paving.
   a. Finished grades in turf and planter areas shall be within plus or minus 0.05 foot of the designated grade.
7. Keep elevations of areas to be turfed **one (1) inch** below proposed adjoining walks, curbs, slabs, etc., and areas of planters **two (2) inches** below proposed improvements.
8. All grading shall be plus or minus **0.05 foot** of the designated grade in areas to receive concrete slabs-on-grade, other concrete improvements, and asphalt concrete paving.
   a. Finished grades in turf and planter areas shall be within plus or minus **0.10 foot** of the designated grade.
9. Keep elevations of areas to be turfed **two (2) inch** below proposed adjoining walks, curbs, slabs, etc., and areas of planters **three (3) inches** below proposed improvements.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
   1. Required field test reports on placed fill materials. Test will be performed by the Owner's Testing Laboratory Agency in accordance with the Specification Section – TESTING LABORATORY SERVICES.
   2. Testing Agency will test compaction of soils in place according to ASTM D 1556 "Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method"; ASTM D 2167 "Standard test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method"; ASTM D 2922 "Standard test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)"; and ASTM D 2937 "Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method", as applicable. Tests will be performed at the following locations and frequencies:
      a. Paved and Building Slab Areas: At sub-grade and at each compacted fill and Back Fill layer.
      b. Foundation Wall Back Fill: At each compacted Back Fill layer.
      c. Trench Back Fill: At each compacted initial and final Back Fill layer.
   3. Costs of initial compaction tests shall be borne by the Owner. Contractor shall pay for all re-tests and re-inspection required due to failure of initial tests.

B. Inspection:
   1. As required by Regulatory Requirements.
   2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
   3. No work shall be without the inspections required by Regulatory Requirements.
   4. Testing Agency: Owner will engage a qualified independent Geotechnical Engineering testing agency to perform field quality-control testing.
   5. Allow testing agency to inspect and test sub-grades and each fill or back fill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

3.5 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and re-compact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, back fill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.6 CLEANING

A. Disposal of Surplus and Waste Materials:
   1. Remove surplus satisfactory soil material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's Property.

END OF SECTION

SECTION 31 20 00 - EARTHWORK FOR SITE: EXCAVATION, FILLING AND GRADING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. This Section includes the following:

1. Excavating soil and other material for surface improvements.
2. Placing fill.
3. Compaction of existing ground and fill.
4. Preparation of subgrade for other improvements.
5. Grading of soil.

B. RELATED SECTIONS

1. Contract General Conditions and Division 1, General Requirements
2. Section 31 11 00 – Site Clearing
3. Section 31 22 22.01 – Soil Materials
4. Section 31 23 33 – Trench Excavation and Backfill

1.3 REFERENCES

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18-inch (457 mm) Drop.

B. A Geotechnical Engineering Investigation Report has been prepared for the project by BSK Associates; BSK Project No. G21-049-11F, dated March 17, 2021. A copy of the report is available (for reference only) at the cost of reproduction. Contact BSK Associates if a copy of the report is desired.

1.4 DEFINITIONS

A. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.5 SUBMITTALS

A. Product Data:

1. Information indicating the source of all import material, the fill material type and where it is to be used, and approval of the District's Inspector of Record for incorporation of import material into the Work.

B. Material Test Reports:

1. Classification of Soils.
2. Compaction Characteristics of Soils.
3. Density and Unit Weight of Soils in Place.
4. Imported fill shall be tested and approved by the Owner's Geotechnical Engineer prior to import to the site, including testing for compliance with Department of Toxic Substances Control (DTSC) guidelines. Said testing and certification documents shall be paid for by the Owner.

C. Project Closeout: In accordance with Specification Section PROJECT CLOSEOUT.

1. Drawings indicating the extent and depth of all engineered fill, and overexcavation and recompaction. This information shall be a part of the Project "As-Built" and Project "Record" Documents in accordance with the Specification Section PROJECT DOCUMENTS.

1.6 QUALITY ASSURANCE

A. Installer:

1. Qualifications:

a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project within the past 5 years.

B. Regulatory Requirements:

1. In accordance with Specification Section REGULATORY REQUIREMENTS and the following:

a.	CARB	Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board [CARB].
b.	CF	City of Fresno, Codes and Ordinances
c.	EPA	Environmental Protection Agency.

d. CAL/OSHA Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.

e. DTSC Comply with all recommendations of the California Department of Toxic Substance Control (DTSC) regarding soil testing for potential contaminants.

C. Certificates:

1. Installer's certification that all Earthwork installation meets or exceeds the requirements of this specification.
2. Contractor's certification (on Contractor's letterhead paper) that the Earthwork materials and installation meets or exceeds the requirements of this specification.

D. Meetings:

1. Pre-Installation: Schedule prior to the start of work.

   a. Coordinate the work with other work being performed.
   b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.

   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.

3. Completion: Scheduled by the Contractor upon proper completion of the work.

   a. Inspect and identify any problems which may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been filed.

1.7 COORDINATION

A. Coordinate work with Owner's personnel.

B. Provide required notification to the Owner and Geotechnical Engineer or the Engineer of Record so that a representative from the Owner's Geotechnical Engineering consultant can be present for all excavation, filling and grading operations to test and observe earthwork construction.

C. Verify that the location of existing utilities has been indicated at work site by utility authorities, by Owner, and as specified on the Plans.

1.8 EXISTING CONDITIONS

A. Existing Conditions:

1. Examine the site and verify conditions with the Drawings and Specifications. Contractor shall familiarize himself with existing site conditions and any changes that have occurred at the site since the preparation of the contract documents and shall be responsible to account for any such changes in the price bid for this work.
2. Thoroughly investigate and verify conditions under which the Work is to be performed.
3. Locate and identify utilities:

   a. Call a Local Utility Locator Service (USA - "Underground Service Alert" – [800] 227-2600) for the task of locating any applicable off-site and on-site utilities in the area where the Project is located.

4. No allowance for Extra Work will be granted resulting from negligence or failure to meet requirements of this Section.

B. Where subsurface work involves more than the normal depth of excavation required for the removal and/or construction of surface improvements (surface improvements such as concrete flatwork, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to indicate on the plans the location of all main and trunk line utility facilities which may affect the Work. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. Under similar circumstance, service laterals and appurtenances will have also been shown where information was available as to their location. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

D. Determine exact location of existing buried utilities by:

1. Marking on ground or pavement surface the alignment and extent of the facilities and the probable location of existing utilities using construction plans and existing surface features.
2. Requesting Underground Service Alert (USA) to indicate location of existing buried facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days notice of request for locations and notify Owner of said request concurrently.
3. Confirm exact location of existing utilities by hand methods of excavation, or by use of vacuum equipment.

E. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities along the route of the proposed work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or Owner's personnel.

F. Provide Field Engineering to record the location of all utilities encountered. Where locational conflicts exist between existing utilities and the planned location of facilities to be constructed under this Contract, submit detailed information to the Engineer for review and direction.

G. Maintain all existing utility mains and service lines in constant service during construction of the Work.

H. Where service disruptions are allowed, minimize the length of such disruptions by proper scheduling and diligent pursuit of the work, and coordinate the timing of any such disruptions in advance with the District.

I. Existing soils are considered to have a low corrosive potential to buried metal objects.

J. Existing soils are considered to have a low expansion potential.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.

1. All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover.
2. All land clearing, demolition, grubbing, scraping, excavation, land leveling, grading, and cut and fill activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by pre-soaking.
3. When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions or at least six inches of freeboard space from the top of the container shall be maintained.
4. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. The use of blower devices is expressly forbidden.
5. Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/ suppressant.

    a. Contractor shall comply with all requirements of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for construction activity related to this project.
    b. A Dust Control Plan, as required by the SJVAPCD, may be required for this project. If required, Contractor shall be responsible for preparing said Dust Control Plan, submitting to the SJVAPCD for review and approval, and paying all SJVAPCD review and permitting fees related to the Dust Control Plan.
    c. If a dust control plan is required, no construction activity related to this project may begin until Contractor has secured an approved Dust Control Plan.
    d. Contractor shall be solely responsible to implement all requirements of the Dust Control Plan throughout the life of this contract.

e. Should fines or fees be levied against the Project for violations of the Dust Control Plan and/or related SJVAPCD regulations, Contractor shall be responsible to pay all said fines or fees and to implement all mitigation measures required by SJVAPCD in order to bring the construction activity into compliance with SJVAPCD regulations. The costs for any such fines or fees shall be included in the lump sum price bid for work under this contract and no additional payment will be made therefore

B. Burning: No burning will be allowed on-site.

C. Rain: Work under this section shall not be started or maintained under threat of rain, unless the work is not affected by the rain.

D. Do not place fill during weather conditions which will alter moisture content of fill materials sufficiently to make compaction to the specified densities difficult or impossible.

E. When reference is made to SWPPP (Storm Water Pollution Prevention Plan), if any within this Project Manual, then comply with all environmental protection requirements included therein.

F. In accordance with EPA, CARB and CF.

G. Protection:

1. Protect cut and fill areas to prevent water running into excavation. Maintain areas free of water. Remove seeping water immediately by pumps. Provide dewatering as necessary.
2. Protect cut slopes from erosion due to precipitation and other sources of runoff.
3. Protect utilities to remain within the construction area and special construction. If utility lines are uncovered (water, electric, sewer, etc.) not shown on the drawings during excavation of site, notify the Architect promptly for its review and action.
4. Do not permit access to undeveloped portions of the site, nor to areas that are outside of the limits of grading.

H. Before being brought onto the site, all import soil must be sampled, tested and approved by Owner's Geotechnical Engineer. All import material must comply with DTSC recommendations and guidelines for environmentally clean soil suitable for school construction. Import testing will be provided and paid for by the Owner.

1.10 PROJECT RECORD DOCUMENTS

A. Submit under provisions of GENERAL CONDITIONS and DIVISION 1, GENERAL REQUIREMENTS.

B. Accurately record actual locations of utilities encountered including depth and horizontal location, as measured from permanent site features.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill in Turf or Other Planting Areas: Type S2 or S3 per Division 31 Specification Section SOIL MATERIALS.

B. Fill in Non-planting Areas: Type S1, S2 or S4 per Division 31 Specification Section SOIL MATERIALS.

C. Imported material: Type S3, S4 or S5 per Division 31 Specification Section SOIL MATERIALS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

3.2 PREPARATION

A. Layout of Work:

1. Contractor shall be responsible for all lines and grades. Layout shall be provided by a California registered Land Surveyor or Civil Engineer, at Contractor's expense.
2. Check all benchmarks, monuments and property lines and verify locations.
3. Locate and maintain all grade stakes.
4. Monuments moved or displaced during grading operation are to be replaced by a California Registered Civil Engineer or Surveyor, at Contractor’s expense.

B. Locate, identify, and protect existing above and below grade utilities from damage.

C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

D. Protect existing structures, fences, curbs, sidewalks, paving, and other improvements to remain from damage from excavation equipment and vehicular traffic.

E. Employ equipment and methods appropriate to the work site.

F. Protect excavated areas from drainage inflow and provide for drainage of all excavated areas.

G. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

3.3 SITE STRIPPING:

A. Reference is made to Division 31 Specification Section SITE CLEARING.

B. Within the areas of planned surface improvements and structures, the near surface soils containing vegetation, roots, organics, or other objectionable material must be stripped and removed from the site. Upon approval of the Geotechnical Engineer, suitable materials stripped from the site may be stockpiled and incorporated into the finish fill for planting areas.

C. All areas to receive surface improvements shall be stripped to remove turf, shrubs, trees and other vegetation, along with associated root systems, concrete, wood, metal, rubbish and other unsuitable debris, and any loose, saturated or unconsolidated soil material. Minimum stripping depth is expected to be 4-inches below existing site grades. Stripping shall continue to the depth required to expose acceptable basement soils that are free from deleterious which are not suitable for Engineered Fill, as required by the Geotechnical Engineer.

3.4 EXCAVATION

A. Following clearing and stripping operations, excavate planned construction areas as specified in this Section.

B. Within the area of proposed improvements or the planned building improvements plus at least 5 feet horizontally beyond the perimeter of these improvements, the subgrade must be over-excavated at least 24 inches below existing site grade or bottom of proposed foundations, which ever depth is greater.

C. Provide additional excavation as required to conform to the lines, grades and cross-sections shown on the plans.

D. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw. Remove all roots 1/2” in diameter and greater.

E. Remove excess soil not to be used as fill in the Work from the site. Unless requested by Owner to be deposited at a site designated by Owner on the property, obtain a disposal site and legally dispose of said excess material, all at no additional cost to the Owner.

F. Areas disturbed by demolition must be excavated to expose undisturbed soils.

G. Excavated soils free of deleterious substances (organic matter, demolition debris, tree roots, etc.) and with less than 3% organic content by weight, may be returned to the excavations as Engineered Fill.

3.5 FILLING AND COMPACTING

A. Once clearing, stripping and over-excavation operations are complete, scarify the surface to receive fill material or improvements to a depth of 8-inches (12” beneath asphaltic concrete), moisture condition to at least 2% above optimum moisture content, and compact to a minimum of 90% relative compaction (95% relative compaction below asphaltic concrete) based on ASTM Test Method 1557.

B. Place and compact soil to finish subgrade of improvements to be placed thereon, or to finished surface grade where no improvements are to be placed thereon.

C. All fill required shall be placed as Engineered Fill.

D. The Contractor shall be solely responsible for securing an acceptable source of import material as required to grade the site. Reference is made to 31 20 00 1.9.H

E. On-site soils are suitable for re-use as Engineered Fill, providing they are cleansed of excessive organics (less than 3 percent by weight, ASTM D2974), debris, and fragments larger than three (3) inches in maximum dimension and meet the requirements of soil Type S4, Division 31 Specification Section SOIL MATERIALS.

F. Engineered Fill shall be moisture conditioned to within 2% of optimum moisture, placed in uncompacted layers not exceeding eight (8) inches in thickness, and compacted as specified, based on ASTM Test Method D1557.
   1. Non-vegetative surface improvement areas (structures and site concrete improvements) - To a minimum of 90% relative compaction.
   2. Vegetative surface improvement areas (turf and planters) - Below top twelve (12) inches - to a minimum of 90% relative compaction. Top twelve (12) inches - 85% relative compaction.
   3. Pavement areas: to a minimum 95% of relative compaction in top twelve (12) inches.

G. Maintain optimum moisture content of fill materials to attain required compaction density.

H. Additional lifts shall not be placed if the previous lift did not meet the required dry density or relative compaction, or if soil conditions are not stable.

I. Conform fill to the lines, grades and cross-sections shown on the plans.

J. Fill materials to conform to Division 31 Specification Section SOIL MATERIALS.

K. Provide, at no additional cost to Owner, imported soil material conforming to the requirements of Division 31 Specification Section SOIL MATERIALS, as needed to attain finished grades of Work.

L. Utilize equipment which will not disturb or damage existing utilities and other improvements.

3.6 PREPARATION OF SUBGRADE FOR SURFACE IMPROVEMENTS

A. Where concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvements, or a layer of said surface improvements, are to be constructed on the soil surface, prepare the subgrade for said improvements in accordance with this section.

B. Scarify the soil as specified and remove and dispose of (off the project site) all rocks, hardpan chunks or otherwise unsuitable material over 3 inches in size.

C. Thoroughly moisture condition and compact as described above.

D. Prior to commencing construction of surface improvements, pass a test roller of size and weight as approved by the Owner over the subgrade to establish the extent of soft or spongy areas requiring repairs.

E. Conform finished subgrade surface to the lines, grades and cross-sections shown on the plans.

3.7 FINE GRADING

A. Fine grade all finished surfaces to the lines, grades and cross-sections shown on the plans, and to blend to hard surface improvements.

B. Rake and smooth all finished surfaces not to receive hard surface improvements.

C. Use suitable stockpiled or imported topsoil for the top 12-inches of areas to receive landscape improvements.

D. Import topsoil meeting the requirements of Division 31 Specification Section SOIL MATERIALS, as required to complete finish grading.

E. Topsoil may not be used in areas requiring Engineered Fill.

3.8 TOLERANCES

A. Top surface of Subgrade for Non-Vegetative Surface Improvements or Layers thereof: Plus or minus 0.02 foot from planned elevation.

B. Top surface of Subgrade for Vegetative Surface Improvements or for Bare Ground - Plus or minus 0.05 foot of planned elevation, or as required for finish surface to match adjacent improvements or ground.

3.9 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of GENERAL CONDITIONS and/or DIVISION 1, GENERAL REQUIREMENTS.

B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.

C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest.

D. All retesting required as a result of failure of initial test will be performed by Owner’s testing agency, at the expense of the Contractor.

3.10 PROTECTION

A. Protect graded areas from traffic, freezing, erosion, and all other sources of damage. Keep free of debris and trash.

B. Repair and re-establish grades to specified tolerances where completed or partially completed work becomes eroded, rutted, settled, or where it is damaged by subsequent construction operations or weather.

C. Where settlement occurs prior to acceptance of the work, remove and replace surface improvements, excavate, replace, and re-compact in accordance with these specifications, and restore the surface improvements.

3.11 CLEANING

A. Remove all surplus or unsatisfactory soil material, trash, and debris, and legally dispose of off of the Owner's property.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 31 22 22 - SOIL MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. SECTION INCLUDES
   1. Excavated (and re-used) materials and imported materials.

1.3 RELATED SECTIONS:
   1. Section 31 20 00.01 - Earthwork: Excavation, Filling and Grading.
   2. Section 31 23 33 - Trench Excavation and Backfill.

1.4 SUBMITTALS

A. Samples: Submit, in air-tight containers, 10 lb. sample of Type S3, S4 and S5 fill to inspector.

B. Soil Analysis: Submit for Type S3, S4 and S5 soils to be imported.

C. Materials Source: Submit location of imported materials source. Provide materials from same source throughout the work. Change of source requires approval.

D. For imported soil, obtain Geotechnical Engineer and District approval prior to importing.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Soil Type S1: Excavated and re-used material, graded; free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.

B. Soil Type S2: Excavated and reused material, graded; free of roots, lumps greater than one inch, rocks larger than 1/2 inch, debris, weeds and foreign matter.

C. Soil Type S3: Imported topsoil, friable loam; reasonably free of roots, rocks larger than ½ inch, debris, weeds, and foreign matter.

D. Soil Type S4: Imported borrow, suitable for purposes intended, meeting the following characteristics:

1. Maximum Particle Size: 3”
2. Percent Passing #4 Sieve: 65-100
3. Percent Passing #200 Sieve: 20-45
4. Expansion Index: <20
5. Plasticity Index: <12
6. R-Value (in paved areas): >50
7. Low Corrosion Potential:

    a. Soluble Sulfates: <1,500 mg/Kg
    b. Soluble Chlorides: <300 mg/Kg
    c. Soil Resistivity: >3,000 ohm-cm

E. Soil Type S5: Imported sand. Natural river or bank sand (sand equivalent greater than 30), washed; free of silt, clay, loam, friable or soluble materials, and organic matter.

2.2 SOURCE QUALITY CONTROL

A. Inspection of imported soil will be performed by the Geotechnical Engineer, at source of import and prior to being delivered to the site.

PART 3 - EXECUTION

3.1 STOCKPILING

A. Stockpile excavated or imported material onsite at location designated by project inspector.

B. Stockpile excavated or imported material in sufficient quantities to meet project schedule and requirements.

3.2 STOCKPILE CLEANUP

A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

B. Dispose of excess material off-site.

END OF SECTION

SECTION 31 23 33 - TRENCH EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Geotechnical Report prepared by BSK Associates Engineers and Laboratories, Project number G21-049-11F, dated by March 17, 2021.

1.2 SUMMARY:

A. SECTION INCLUDES
1. Excavating trenches, holes and pits for constructing the Work.
2. Backfill and compaction.
3. Providing suitable bedding and backfill material, as specified herein.

B. RELATED SECTIONS
1. Contract General Conditions and Division 1, General Requirements.
2. Section 31 11 00 - Site Clearing
3. Section 31 20 00.01 - Earthwork: Excavation, Filling and Grading
4. Section 31 22 22.01 - Soil Materials
5. Section 33 12 00 - Water Utilities
6. Section 33 40 00 - Storm Drainage

1.3 REFERENCES

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.4 DEFINITIONS

A. Utility: Any buried or above ground pipe, conduit, cable, associate devices or appurtenances, or substructure pertaining hereto.

1.5 QUALITY ASSURANCE

A. Qualifications

1. Installer:

   a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project within the past 5 years.

B. Regulatory Requirements:

1. In accordance with Specification Section REGULATORY REQUIREMENTS and the following:

a.	CARB	Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board [CARB].
b.	CF	City of Fresno, Codes and Ordinances
c.	EPA	Environmental Protection Agency.
d.	CAL/OSHA	Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.

C. Certificates:

1. Installer's certification that all trench backfill installation meets or exceeds the requirements of this specification.
2. Contractor's certification (on Contractor's letterhead paper) that the trench backfill materials and installation meets or exceeds the requirements of this specification.

D. Meetings:

1. Pre-Installation: Schedule prior to the start of work.

   a. Coordinate the work with other work being performed.
   b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.

   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.

3. Completion: Scheduled by the Contractor upon proper completion of the work.

   a. Inspect and identify any problems which may impede issuance of warranties or guaranties.

4. Maintain installed work until the Notice of Substantial Completion has been filed.

1.6 COORDINATION

A. Coordinate work with Owner's personnel.

B. Verify that the location of existing utilities have been indicated at work site by utility authorities.

1.7 EXISTING UTILITIES

A. Where subsurface work involves more than the normal depth of excavation required for the removal and/or construction of surface improvements (surface improvements such as concrete work, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to indicate on the plans the location of all main and trunkline utility facilities which may affect the Work. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

B. Under circumstance similar to 31 23 33/1.7A, service laterals and appurtenances will have also been shown where information was available as to their location. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. Determine exact location of existing buried utilities by:

1. Marking on ground or pavement surface the alignment and extent of the proposed facilities and the probable location of existing utilities using construction plans and existing surface features.
2. Requesting Underground Service Alert (USA) to indicate location of existing buried facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days notice of request for locations, and notify Owner of said request concurrently.
3. Locate exact location of existing utilities by hand methods of excavation, or by use of vacuum equipment.

D. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities along the route of the proposed work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or Owner's personnel.

E. Provide Field Engineering per Contract General Conditions and Division 1 to record the location of all utilities encountered. Where locational conflicts exist between existing utilities and the planned location of facilities to be constructed under the Contract, submit detailed information to the Owner's Inspector and Engineer for review and direction.

F. Maintain all existing utility mains and service lines in constant service during construction of the Work.

G. Where service disruptions are allowed, minimize the length of such disruptions by proper scheduling and diligent pursuit of the work.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Fill Type S1, S2, S4 and S5, as specified in Division 31 Specification Section SOIL MATERIALS.

2.2 WARNING TAPE

A. 6” wide warning tape shall be installed over all of the pipelines as shown on the details.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

B. Protect existing structures, fences, sidewalks, curbs, and other improvements from excavation equipment and vehicular traffic.

C. Maintain and protect above and below grade utilities which are to remain.

D. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

3.2 EXCAVATION

A. Excavate soil required to locate existing utilities and install the work.

B. Use hand methods of excavation to locate existing utilities, and to excavate trenches, pits and holes in congested areas.

C. Employ equipment and methods appropriate to the work site. Small mechanical excavators may be used only in areas where there is sufficient space so as not to damage adjacent improvements, and where the locations of all existing utilities have been determined by hand methods of excavating.

D. Cut trenches just wide enough to enable installation and proper bedding and backfill, and to allow inspection.

E. Do not interfere with 45 degree bearing splay of foundations.

F. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose material.

G. Excavate trenches, pits or holes bottoming in hardpan to a minimum of 6 inches below the grade for the bottom of the pipe and any couplings, and then backfill to the pipe grade with Type S2, S4 or S5 material, containing sufficient moisture to allow compaction to 90% of maximum dry density. No additional payment will be made for such over-excavation and refill.

H. In all trenches or excavation sites where a firm foundation is not encountered, such as soft, spongy, or otherwise unsuitable material, remove the material to a minimum of 12 inches, or to a depth determined by the Engineer, below the bottom of the proposed pipe or structure, and backfill the space with Type S2, S4 or S5 material containing sufficient moisture to allow compaction to 90% of maximum dry density. No additional payment will be made for such additional excavation or backfill.

I. Excavate trenches to provide the design grade of the facility, or as directed by the Engineer.

J. Stockpile excavated material to be returned to trench adjacent thereto in location which will not be detrimental to existing improvements, or pedestrian or vehicular traffic. Remove from site all unsuitable or excess material not to be used.

K. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw.

L. Remove excess soil not used as backfill from the work site. Obtain a disposal site off of the Owner's property and legally dispose of said excess material, all at no additional cost to the Owner.

M. If water is encountered during excavations, provide all dewatering measures necessary to construct improvements shown.

N. Contractor shall make all provisions necessary, including but not limited to, shoring or sloping back trench walls as required to address sandy soils. The cost of these provisions shall be included in the lump sum amount bid for this work and no separate payment will be made therefore.

3.3 PROTECTION OF EXCAVATIONS

A. Provide all shoring and bracing as required and those codified in local, state and federal safety regulations.

B. Prevent water, caving or sloughing ground from entering excavations.

C. Maintain excavations free of water.

3.4 BACKFILLING

A. Provide type S5 pipe bedding as required by Plans and compact to 90% relative compaction.

B. After installation of pipes and appurtenances and placement of pipe bedding material, backfill trenches and excavations to finished grade, or subgrade in areas to receive surface improvements

C. Backfill trenches above pipe bedding material and to within 24 inches of finish subgrade with Type S1, S2, S4 or S5 soils, except that that top 12 inches shall be type S2, S3, S4 or S5 soils.

D. Employ a placement method that does not disturb or damage existing or proposed pipes or other Utilities or Improvements.

E. Place and compact all soil backfill in continuous layers not exceeding 8 inches in loose uncompacted thickness, moisture condition to at least 3% above optimum moisture content.

F. Maintain optimum moisture content of fill materials to attain required compaction.

G. Backfill final 12-inch thickness to finish subgrade in areas to receive concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvement, with Type S2, S4 or S5 soils.

H. Backfill final 12-inch thickness to finish subgrade in areas to receive sod, other vegetation, or bare soil, with Type S2 or S3 soils.

I. Compact backfill below the top 12-inches to 90% relative compaction.

J. In areas to receive buildings, structures, or concrete flatwork, compact the top 12-inches to 90% relative compaction.

K. In areas to receive asphalt concrete pavement or concrete pavement subject to vehicular traffic, compact the top 12-inches to 95% relative compaction.

L. In planting areas, compact the top 12-inches to 85% relative compaction.

3.5 TOLERANCES

A. Top Surface of Backfill under Paved or Concrete Areas: Plus or minus 0.02 feet from required elevations.

B. Top Surface of General Backfilling: As required for finish surface to match adjacent improvements or ground.

3.6 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of General Conditions and/or Division 1.

B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.

C. If tests indicate work does not meet specified requirements, recompact, and retest. Retests required due to failure of initial tests shall be paid for by the Contractor.

3.7 PROGRESS AND PROSECUTION

A. Backfill any excavation opened in any day on that same day.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 313100– SOIL TREATMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to provide Termite Control and Herbicide, and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 31 00 00 OFFSITE DEVELOPMENT
   5. 31 20 00 EARTHWORK
   6. 32 12 00 PAVEMENT
   7. 32 90 00 LANDSCAPE CONSTRUCTION
   8. 33 40 00 STORM DRAINAGE
   9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   10. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data for each type of product specified:
      a. Include the EPA Registered Label showing the Active Ingredients and their percentages.
   2. Quality Assurance/Control Submittals:
      a. Certificates:
         1) Indicating compliance with applicable regulations for all products, signed by product manufacturer.
         2) Installers Qualification for products specified.
      b. Manufacturer's written Instructions for each type of product specified:
      c. Test reports:
         1) Soil Treatment application.
   3. Closeout Submittals:
      a. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
         1) Identify and accurately locate extent of treatment on the Site Plans.
      b. Warranty in accordance with Specification Section - WARRANTIES.
         1) Special Warranty specified within this specification section.

1.3 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:

a. All products shall comply with all applicable EPA regulations and standards in the place where the Project is located, and in effect at the time of application.
b. Obtain termite control products from a single manufacturer for each product.

2. Installer Qualifications:
   a. A specialist who is EPA approved and licensed according to regulations of authorities having jurisdiction to apply termiticides and herbicides in the jurisdiction where the project is located.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:
   a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located
   b. EPA Environmental Protection Agency – All Applicable Environmental Protection Regulations and Standards.
   c. USDA United States Department of Agriculture.
   d. All products will comply with the current EPA laws and California Rules and Regulations at the time of application. Should the products listed become unavailable because of changes in the law, submit substitute products in accordance with Section - SUBSTITUTION PROCEDURES for review by the Architect.

C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with other work being performed.
   b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.4 PROJECT CONDITIONS

A. Environmental requirements:
1. To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.5 SEQUENCING AND SCHEDULING

A. Coordination:
1. Coordinate soil treatment application with excavating, filling, grading, and concrete operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.6 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
2. In accordance with manufacturer's written standard warranty:
a. Warranty Period Five (5) Years.
1) From the date of Substantial Completion.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:
a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified termiticide product manufacturer:
a. BAYER CORPORATION "PREMISE 75".
b. BASF CORPORATION "TERMIDOR SC".
c. AMVAC "WISDOM TC FLOWABLE".

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Termiticide:

1. PREMISE® 75 insecticide in water soluble packets as manufactured by BAYER CORPORATION, delivered in a minimum of a 0.1 percent solution as indicated by the label and in accordance with local environmental regulations, or approved equivalent.
   a. Active Ingredients:
      1) Imidacloprid, 1-((6-Chloro-3-pyridinyl)methyl)-*N*-nitro-2-imidazolidinimine 75.0 percent.
      2) Inert Ingredients: 25.0 percent.
      3) Total: 100.0 percent.
2. TERMIDOR SC Termiticide
3. /Insecticide to use at 0.06 percent - 0.125 percent finished solution. The 0.06 percent should be used in typical control situations.
   a. Active Ingredients:
      1) Fipronil: 5 amino-1-(2,6 dichloro-4-(trifluoromenthyl)(phenyl)-4-((1,R,S)-(trifluoromethyl) sulfinyl)-1-H-pyrazole-3-carbonitrile 9.1 percent.
      2) Inert ingredients 90.9 percent.
4. WISDOM TC Flowable use a 0.06 percent emulsion for subterranean Termites.
   a. Active Ingredients:
      1) Bifenthrin 7.9 percent.
      2) Other ingredients 92.1 percent.

B. Herbicide:
   1. Commercial chemical for weed control registered by the EPA and the State of California. Provide granular, liquid, or wettable powder form.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Termiticide:
   1. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.
      a. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings[. Termiticide may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer].
   1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION

A. General:
   1. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

B. Applying Termiticide for Pre-Construction Treatment:
   1. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide per the soil conditions present, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticide barrier or treated zone is established around and under building construction. Distribute treatment evenly.
      a. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
         1) If the slab-on-grade construction is applied directly over the vapor retarder/barrier, then apply the termiticide just under the vapor retarder/barrier just prior to it's placement. Spray all penetrations on top of the vapor retarder/barrier after it is placed and sealed, and just prior to the placement of the concrete.
         2) If the slab-on-grade construction is applied over a sand layer laid on top of the vapor retarder/barrier, then apply the termiticide directly over the sand layer just prior to the placement of the concrete.
      b. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
      c. Crawlspaces: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
      d. Masonry: Treat voids.
      e. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
   2. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
   3. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
   4. Post warning signs in areas of application.
   5. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

C. Applying Termiticide for Post-Construction Treatment:
   1. New construction shall always require Pre-Construction Treatment.
   2. Only if the project involves Modernization and Termiticide
   3. Treatment is required, follow product label instructions for Post-Construction Treatment.

D. Applying Herbicide Treatment:
   1. Extent of Herbicide Application: Soil under all asphaltic concrete paving, including driveways, parking areas, and athletic courts.

2. Application:
    a. Prepare substrate in accordance with manufacturer's written recommendations.
    b. Apply Herbicide Solution over sub-base prior to application of asphaltic concrete.
    c. Apply in form allowed by the EPA label.
    d. Rate of Application: As recommended by the label.
    e. Take all precautions to limit herbicide treatment to areas immediately under paved areas.

3.4 FIELD QUALITY CONTROL

A. Soil Treatment Application Report: After application of soil treatment is completed, submit report for Owner's record information, including the following:
    1. Date and time of application.
    2. Moisture content of soil before application.
    3. Brand name and manufacturer of termiticide.
    4. Quantity of undiluted termiticide used.
    5. Dilutions, methods, volumes, and rates of application used.
    6. Areas of application.
    7. Water source for application.

END OF SECTION

SECTION 32 90 00 LANDSCAPE CONSTRUCTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all material, labor, equipment and services necessary to do all Landscape Construction work and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded. Work is to include, but is not limited to, the following:
1. Soil Testing
2. Clearing, Ripping and Grading
3. Cultivation, Soil Amending and Leaching
4. Furnish and Plant Plants and Trees
5. Fertilization & Mulching
6. Turfgrass Installation
7. Weeding
8. Staking
9. Clean-up and Maintenance

1.2 RELATED SPECIFICATION SECTIONS

A. Division 31 EARTHWORK

B. 32 8400 LANDSCAPE IRRIGATION

C. Division 03 CONCRETE

D. Division 26 ELECTRICAL

1.3 STANDARDS

A. Materials and installation shall conform with all State and Local codes and regulations governing the trades included in this work. Requirements of these plans and specifications not conforming therewith, but exceeding code requirements, then the plans and specifications shall govern.

1.4 DEFINITIONS

A. The term approved shall mean by the Architect, and only in writing.

1.5 EXAMINATION OF SPECIFICATIONS, PLANS AND SITE

A. It shall be the responsibility of the Contractor to carefully examine the site, plans and specifications relating to this work for completeness, accuracy and clarity. Any conflict, error,

or clarification shall be immediately brought to the attention of the Owner's authorized representative in writing to obtain a ruling. Failure to do so prior to bidding shall result in any corrective work necessary shall be completed at the Contractor's expense.

1.6 PERMITS AND INSPECTIONS

A. The Contractor shall obtain and pay required fees to any governmental or public agency. Permits for the installation or construction or the work included under this Contract, which are required by legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. Contractor shall also arrange for and pay costs in connection with inspections and examination required by these authorities.

1.7 GUARANTEE

A. Guarantee shrubs, ground covers, and lawn as to growth and health for one (1) year after final acceptance by Owner. The contractor is responsible for replacement of plant materials due to theft and vandalism until final acceptance of the project by the Owner after completion of the specified maintenance period.

B. Guarantee trees to live and grow upright for a period of one (1) year after completion and final acceptance by the Owner. The contractor is responsible for replacement of trees due to theft and vandalism until final acceptance of the project by the Owner after completion of the specified maintenance period.

C. Replace plants which lose more than 30% of their original leaves within the below described time limits.

D. Remove and replace plants within 15 days of notification which fail to conform. Replace with materials as originally specified. Guarantee for replaced materials shall begin with date of replanting and shall be as previously described.

1.8 SUBMITTALS

A. Within the required time period stated, the Contractor shall submit six (6) copies of complete lists of proposed materials to Landscape Architect including source, manufacturers name and catalog numbers.

B. Materials and equipment shall not be ordered until given written approval by Landscape Architect.

C. The Contractor shall confirm availability of plant material, supplies and materials for inclusion in the submittal. If a plant is found not to be suitable or available, the Contractor is to submit a list of three to five appropriate substitutions that are available for selection by the Landscape Architect. Plants and trees to be supplied may not be available locally and are to be secured well in advance and substitutions for these plants may not be allowed.

1.9 UNDERGROUND OBSTRUCTION

A. The Contractor shall verify all underground obstructions and / or utilities, existing or proposed prior to making landscape excavations or installing tree stakes. Contractor shall avail themselves of any as built drawings of the site, Underground Service Alert (USA) 1-800-227-2600 and records of existing and proposed site work.

B. If there is a conflict with the utilities and the planting, notify the Landscape Architect for a ruling prior to planting.

1.10 PROJECT CONDITIONS

A. No plants shall be planted in situations that show obvious poor drainage. Such situations shall be brought to the attention of the Landscape Architect and Owner's authorized representative. Generally, the drainage problem is to be corrected prior to installing plant material.

B. All landscape areas are to be deep ripped to a depth of twelve inches (12") below finish grade in two directions. All trees are to have 18" diameter drainage holes that are 10' deep.

C. The Contractor shall guarantee repair of damage to any part of the premises resulting from leaks, defects in materials, equipment or workmanship. The Contractor shall be liable for any and all accidents resulting from their work, including open holes and trenches during construction.

D. During landscape construction operations keep hardscaped surfaces clean and work areas organized.

E. Landscape concrete mow strips are to be installed so that they do not conflict with site drainage or impede drainage away from buildings. Generally, a minimum 2% slope away from buildings is to be maintained for positive site drainage. Concrete mow strips are not to trap water or cause puddling.

1.11 WORKMANSHIP

A. The Contractor shall have experience and demonstrated ability in the installation of landscapes of this type. No work shall be completed without supervision by a qualified foreman. All work shall be installed by skilled persons proficient in the trades required, in a neat, orderly and organized manner, with the recognized standards of craftsmanship developed for the industry and as described in the plans, specifications and manufacturers installation instructions.

1.12 SOIL & WATER TESTING

A. An independent soil testing laboratory, Dellavalle Laboratory, contact Chad Reenders (559) 922-9299, is to test the existing soil after rough grading operations are completed with a complete fertility assay to evaluate the soils ability to maintain and support the ornamental landscaping. Samples from eight (8) locations on the site are to be taken, with two samples from each location, one at four (4") inches in depth, and the second at sixteen (16") inches in depth (sixteen samples). The soil testing laboratory is also to complete a preliminary screening for detrimental agricultural chemical residue that may be present on site, if these results are

positive, notify the Owners authorized representative for a ruling. The contractor is to pay for all required soil tests and consulting time with the soil scientist for detailed recommendations to be submitted to the Owners authorized representative for evaluation.

B. After the soil amending and leaching process has been completed, the Contractor is to take additional samples from the eight (8) locations on the site, with two samples from each location, one at four (4") inches in depth, and the second at sixteen (16") inches in depth (sixteen samples) to evaluate the progress and effectiveness of the soil amending and leaching work. The contractor is to pay for all required soil tests and consulting time with the soil scientist for detailed recommendations to be submitted to the Owners authorized representative for evaluation. If leaching is not required because no detrimental salts are present in the soil, then the second round of testing is required after the installation of the specified amendments to verify the progress of the soil reclamation process. Testing locations are to be determined by the Landscape Architect.

C. Contractor is to get one (1) irrigation water test with an agricultural suitability analysis by Dellavalle Laboratories and submit the results for review.

1.13 CONSTRUCTION OBSERVATION

A. The Contractor is to coordinate construction observation site visits with the Landscape Architect and District Maintenance Department during the appropriate phases of construction, or as required by the Landscape Architect. The Contractor is to schedule site visits a minimum of one week in advance at the required phases of construction. The following outlines the phases of construction which require a site visit, however it is not limited to the following construction phases:

1. Preconstruction meeting
2. Staking of plant and tree locations prior to irrigation installation.
3. Staking of sprinklers and mainline routing.
4. Mainlines, wiring, lateral pipes, & valve manifolds prior to backfill.
5. Irrigation coverage test and rough grading.
6. Trees & plants prior to installation, still in containers.
7. Fine grading of turf areas prior to turf installation.
8. Substantial completion to start maintenance.
9. Final acceptance after successful maintenance period.

B. The Owner will pay for initial construction observation visits, however, any additional visits required due to non-compliance, incomplete work, or substandard performance will be paid by the contractor at a cost of $500.00 per extra visit.

1.14 PROTECTION TO THE PUBLIC HEALTH AND WELFARE

A. The Contractor in the course of their work shall make every effort to guard the public health, safety and welfare during construction. This shall include erection of barricades, night warning lights and all necessary devices required to protect the public health and welfare or as required by existing governmental codes. The Contractor shall accept any and all liabilities arising from accident or injury on the job and after construction. All equipment which protrudes above grade shall be installed against a structure or an appropriate barricade shall be erected to protect public safety.

PART 2 - MATERIALS

2.1 PLANTS

A. Conform to list of plant materials on drawings. Contractor is to provide digital photos of representative example of each plant and tree type to be used and submit to Landscape Architect and District for review and comment. Plants and trees are also to be inspected by Landscape Architect and District when delivered to the site, prior to planting, so non-conforming materials can be identified and rejected prior to planting.

B. Plants shall be the best of their kind and class, and of optimum age, and in conformance with the standards of the American Society of Nurserymen.

C. Plants shall have normal, well-developed branch systems and shall not be root or pot-bound. Do not prune or top trees prior to delivery.

D. Delivery to be made not more than 2 days prior to installation unless nursery area approved by landscape architect is established with an automatic irrigation system.

E. It will be the responsibility of the contractor to place material order(s) sufficiently in advance of planting to assure availability of plants in species and size specified. Plant varieties noted to be available from Mountain States Wholesale Nursery may not be available locally. Contact Mountain States Wholesale Nursery, Wendy Proud at (626) 274-1956 to arrange for plant availability and delivery. Substitutions for these plants and trees will not be made due to lack of advance planning.

F. No substitutions will be made without approval of the Landscape Architect or authorized representative.

2.2 SOIL AMENDMENTS AND TOPDRESSING MULCHES

A. Soil amendments (type and quantity) are to be based on the soil test results and recommendations by the soil testing laboratory. The contractor is to include the amendments outlined in part 3.03 of this Section in the bid price. Prices for the soil amendments are to be quoted as unit prices to be adjusted based upon the recommendation of the testing lab. The contractor is to pay for all required soil tests and consulting time with the soil scientist for detailed recommendations.

B. Organic topdressing mulch: Premium walk on bark as supplied by Superior Soil Supplements (559) 904-3372, contact Andrea Fike. Organic topdressing mulch is to be installed in a 3” compacted layer. Mulch depth is to be evaluated at the beginning and at the end of the maintenance period for compliance with the 3” compacted layer requirement. Contractor is to continuously supplement the topdressing mulch as it settles throughout the specified maintenance period to achieve the specified 3” compacted depth in all designated landscape planter areas at the end of the maintenance period. This is essential to suppress weed growth and will be closely evaluated for compliance.

C. Inorganic topdressing mulch: Gray decomposed granite as supplied by Rosenbalms Rockery, Fresno, CA. Inorganic topdressing mulch is to be installed in a 3” compacted thickness and is to be brought to an optimum moisture content and compacted with a water filled drum roller.

Contractor is to continuously supplement and compact the topdressing mulch as it settles throughout the specified maintenance period to achieve the specified 3” compacted depth in all designated landscape planter areas at the end of the maintenance period. This is essential to suppress weed growth and will be closely evaluated for compliance.

D. Commercial fertilizer (15-15-15), Best Pre-plant fertilizer (6-20-20 XB), slow release fertilizer Best All Season (19-6-12) with Polyon 43.

E. Gypsum (100% purity) and Elemental Soil Sulfur (99% purity) as supplied by Superior Soil Supplements, Hanford, California, (559) 904-3372.

F. Plant fertilizer tabs: Agriform, Best-Tabs or approved equal, quantities as shown below: 1 gallon plant (2 tabs), 5 gallon plant (4 tabs), 15 gallon plant (6 tabs) & box size tree (8 tabs).

G. Global Premium Humate as supplied by Superior Soil Supplements, Hanford, California, (559) 904-3372.

H. Certificates: In addition to any certificates specified, the Contractor shall furnish a certificate with each delivery of bulk material stating the source, quantity, date, and type of material. All certificates shall be delivered to the Owners authorized representative at the time of each delivery.

I. Samples and delivery tags: The contractor is to submit samples of the materials to be used for inspection and approval. Contractor is to submit all soil amendment delivery tags to the DSA Inspector. Delivery tags are to itemize delivered materials with weights and quantities and Supplier name and contact information. Quantities of all soil amendments to be installed are to be verified as being in compliance with the approved soil amendments to be installed on the project. Soil amendments not verified by delivery slips or other reliable manner are to be verified with additional soil testing as outlined in part 1.12 at the Contractors expense, in addition to the specified soil testing.

2.3 ACCESSORIES

A. Tree Stakes: 2 inches by 2 inches by 10 feet long treated lodgepole or natural redwood. Use two stakes per tree. See the tree installation detail.

B. Tree Ties: flexible vinyl "Cinch-Tie", manufactured by V.I.T. Products, San Diego, California, (619) 673-1760, and distributed by Horizon Sales, Pleasanton, California, (510) 462-6602. Use a minimum of four 24" ties per tree. See the tree installation detail.

C. Tree String Trimmer Guard: polyethylene "Trim Guard", manufactured by V.I.T. Products, San Diego, California, (619) 673-1760, and distributed by Horizon Sales, Pleasanton, California, (510) 462-6602. Use one Trim Guard per tree in the lawn areas only.

D. Tree Root Barriers: All trees within ten (10'-0") feet of a hardscaped surface, perimeter fence or building are to have root barriers installed that are 24" deep by 24" wide as manufactured by Root Solutions, Inc. and distributed by Vespro Inc., San Rafael, California, (415) 434-3072. Each 24” box tree is to have up to 16 panels and larger box size trees are to have additional panels as required. If the concrete is only on one side of the tree, then 8 panels (centered on the tree) are to be installed in a straight line along the concrete or boundary as recommended by the manufacturer, or if the concrete is on two sides of the tree, then install 8 panels (centered on

the tree) on two sides or the 16 panels are to be installed around the perimeter concrete, if concrete is on more than two sides of the tree as recommended by the manufacturer.

E. Top Soil: If required, imported topsoil shall be natural, fertile, friable loam, capable of sustaining vigorous plant growth, free of subsoil, roots, grass, excessive amount of weeds, salt, stone and foreign matter; acidity range of pH 5.5 to 7.5; containing a minimum of 4% and a maximum of 25% organic matter. Obtain approval of the Landscape Architect or Authorized representative for placement. The contractor is to submit a topsoil sample to an approved testing lab for a complete fertility assay for approval prior to importing the material on-site.

F. Import Soil: If required, imported fill dirt shall be tested with a fertility assay from Dellavalle Laboratories to certify that the fill dirt is free of salt, boron or other deleterious minerals or matter prior to delivery and placement on the site. Contractor is responsible for all remediation required for the placement of substandard fill dirt containing salt, boron or other deleterious minerals or matter that may require the installation of additional soil amendments, leaching, additional soil testing, replacement of failed plant materials to bring the non-conforming soil into compliance at the Contractors sole expense.

G. Other Materials: Materials not specifically indicated, but necessary for the proper execution of the work, shall be of first quality as selected by the Contractor subject to approval of the Landscape Architect.

2.4 WEED CONTROL

A. Methods and chemicals shall be suitable with regard to season and shall control weeds and shall be approved by all governing agencies.

B. Treatment shall not damage or impede growth of trees, shrubs, and ground covers to be planted, nor kill or damage any existing plant material specified to remain.

C. Applicator shall be a licensed State of California Agricultural Pest Control Operator, Category E, or as required by all governing agencies.

D. Contractor shall obtain required permits from County Agricultural Commissioner. Weed control treatment shall be in accordance with Federal, State of California, County and local codes and regulations, and shall be safe, not cause a health hazard, nor disrupt or inconvenience continuing business operations of the Owner and neighbors, public street, parking lot and sidewalk use or construction activities.

E. Method of treatment shall be strictly in accordance with manufacturer's recommendations.

F. Method of application and chemicals to be reviewed and approved by the Owners representative.

G. Contractor shall ascertain and insure that all planted areas are weed-free prior to planting and maintain the site weed free during construction and maintenance periods.

2.5 STABILIZED DECOMPOSED GRANITE

A. Grey decomposed granite is to be supplied by Rosenbalm Rockery, or approved equal and is to meet gradation specification as determined by ASTM C 136 methodology (Caltrans 202) with sand equivalent as determined by ASTM D 2419 methodology (Caltrans 217) and shall have a minimum of 30.

B. Naturalseal is a stabilizing organic non-toxic binder, buff in color and without a marked odor. The swell volume shall have a minimum of 35 ml/g with a minimum mucilliod content of 80 percent. The light extraneious matter shall not exceed a maximum of 20 percent with the heavy extraneous matter not exceeding 5 percent. The material shall be screened with 90 – 100 percent passing a 200 mesh sieve.

C. Decomposed granite is derived from the crushing and screening of naturally friable granite. The blending of course sand with rock dust is not an equal product. The granite is screened to include stone particles of 3/8” minus. The particles that pass the 200 screen mesh as determined by ASTM methodology shall not exceed 18 percent. The sand equivalent shall be a minimum of 30 and the R-value shall be a minimum of 70.

D. Stabilizing organic binder Naturalseal as distributed by Rosenbalm Rockery Inc. shall have a minimum swell volume of 32 ml/gm. The binder shall be incorporated with the granite fines by the use of a pug mill that includes a weight belt feeder that insures the proper ratio of binder to granite fines. Blending with the use of a bucket loader or similar is not acceptable. For pathways the binder shall be blended at the rate of 12 lbs per ton of granite fines. For parking lots or roadways the binder shall be incorporated at the rate of 14 lbs per ton.

E. For pathways, stabilized decomposed granite shall be placed to a minimum depth of 3” compacted thickness. For driveways or vehicular roadways stabilized decomposed granite shall be placed to a minimum depth of 4” compacted thickness.

F. For each 2” lift evenly spread the material over designated area. Grade and smooth as outlined on the plans. Thoroughly water entire area so that the entire depth of the material is moist. After a period of +/- 6 hours compact the final lift with a 1,000 – 3,000 lbs static drum roller. Allow for a sufficient curing period of +/- 4 days prior to use.

PART 3 - EXECUTION

3.1 SITE INSPECTION

A. Locate cables, conduit, piping, and other obstacles prior to beginning excavation. Notify Owners representative of obstacles requiring relocation.

B. Remove rocks and other similar underground obstructions to depths necessary to permit proper installation of lawns and planting.

C. Verify that landscape irrigation system has been properly installed and is fully operational.

D. Verify dimensions shown on plan and notify Owners representative of any discrepancy.

E. Review plant list and consult Owners representative with any questions or concerns.

3.2 GRADING

A. Contractor is to remove weeds and debris from site prior to starting grading operations and is to maintain the site weed free throughout the progress of construction.

B. Contractor is to work soil in a manner which does not cause excessive compaction or clods which will not break easily. Apply water as necessary to obtain optimum moisture content for tilling and planting. The Contractor is to coordinate deep ripping of all landscape areas to a depth of twelve inches (12") to break up compacted areas to improve drainage.

C. After the grades have been reestablished after irrigation trench backfill and prior to planting, the Contractor is to heavily irrigate the site to the point of producing runoff to verify that the site is free draining without puddles or low spots. Contractor is to address grading problems and repeat the test until all puddles and areas of standing water drain within one half hour (1/2 hr). Contractor is to fill settled areas as required. Planting shall not proceed until all grading corrections have been completed and the areas have been retested to confirm conformance.

D. The contractor is responsible for the grading of all planting areas. The grades shall be gently flowing with no abrupt changes. The contractor is responsible to insure that the planting areas have adequate soil and is to fill low areas as needed. The contractor is to grade the areas to drain as intended by the site grading plan by the Project Civil Engineer. Typically the planter areas are to be slightly crowned or cross sloped to insure positive drainage away from planted areas to the perimeter to drain as intended by the Site Drainage Plan. No standing water will be permitted in planter areas where plants and trees are located. Slope surfaces away from buildings at a 2% slope with no pockets of standing water. The contractor is responsible for all import or export of soil and removal of debris, trash, or other elements off site at Contractors expense to provide the Owner with a completed landscape project at no additional cost to the Owner.

E. Provide neat, smooth, and uniform finish grade. Final soil elevations in perimeter areas are to be as noted below. Grades may taper from perimeter areas over a smooth gradual transition.
   1. Sodded Turf Areas: 3/4" below the adjacent sidewalks or other hardscape features.
   2. Hydroseeded Turf Areas: 3/4” below the adjacent sidewalks or other hardscape features.
   3. Planter Areas: 3” below the adjacent sidewalks or other hardscape features.

F. Notify Owners representative upon completion of grading for approval and to verify the smoothness and accuracy of fine grading and clod-free condition of planting surface. No planting is to be started prior to obtaining the approval of the fine grading from the Owners authorized representative.

G. Install concrete mow strips between all turf and planter boundaries. Install the mow strips as shown in the Concrete Mow Strip Detail and as outlined in the project plans and specifications. Contractor is to insure that concrete mow strips do not interfere with site drainage and do not trap water or cause puddling.

3.3 SOIL PREPARATION

A. Soil Amendments, Cultivation and Weed Control:
   1. The contractor is to cultivate the soil amendments into the top eight (8") inches of soil. The following soil amendment types and quantities are to be included in the bid. Pending the results of the soil tests, and recommendations of the soil testing laboratory,

adjustments to the types and quantities of soil amendments to be used may be necessary. The contract price will be adjusted according to the actual soil amendments installed on the project. The contractor is to include the following soil amendments as part of the bid:

a. Lawn Areas:
   1) Gypsum (100% purity) (Preplant), (4 tons per acre).
   2) Soil Sulfur (100% purity) (Preplant), (1/2 ton per acre).
   3) Best Triple Pro Fertilizer (Preplant) - (15-15-15), (500 lbs per acre).
   4) Best Preplant Fertilizer (Preplant) - (6-24-24 XB), (500 lbs per acre).
   5) Global Premium Humate (Preplant), (250 lbs per acre).
   6) Best All Season Fertilizer with Polyon 43 (Maintenance) - (19-6-12), maintenance applications and rates as follows:

      Sodded Turf Areas: (200 lbs per acre) per maintenance application. Minimum of four maintenance applications required for bid. Fertilize sodded areas monthly. Actual application will conform to soil test results.

      Hydroseeded Turf Areas: (130 lbs per acre) per maintenance application. Minimum of eight maintenance applications required for bid. Fertilize hydroseed areas every other week. Actual application will conform to soil test results.

   7) Pelletized Gypsum, (Maintenance) - (1 tons per acre). One maintenance application required for bid. Actual application will conform to soil test results.
   8) Terra C Premium Humate, (Maintenance) - (250 lbs per acre). One maintenance application required for bid. Actual application will conform to soil test results.

b. Planter Areas:
   1) Nitrified Aged Fir Humus (forest product) (Preplant), (4 cu. yds. per 1000 sq. ft.).
   2) Gypsum (100% purity) (Preplant), (4 tons per acre).
   3) Soil Sulfur (100% purity) (Preplant), (1/2 ton per acre).
   4) Best Triple Pro Fertilizer (Preplant), (15-15-15), 500 lbs per acre.
   5) Best Preplant Fertilizer (Preplant), (6-24-24 XB), (500 lbs per acre).
   6) Global Premium Humate (Preplant), (250 lbs per acre).
   7) Best All Season Fertilizer with Polyon 43 (Maintenance) - (19-6-12), maintenance applications and rates as follows:

      Planter Areas: (200 lbs per acre) per maintenance application. Minimum of four maintenance applications required for bid. Fertilize planter areas monthly. Actual application will conform to soil test results.

   8) Pelletized Gypsum, (Maintenance) - (1 tons per acre). One maintenance application required for bid. Actual application will conform with soil test results.
   9) Global Premium Humate, (Maintenance) - (250 lbs per acre). One maintenance application required for bid. Actual application will conform to soil test results.

2. The Owners authorized representative and Contractor shall negotiate the differences in

costs according to the materials required based upon the recommendations of the soil testing laboratory. No labor difference in cost will be allowed for application of the corrected materials to be used.

3. Soil Amending – Application #1: If salt is present in the soil test results, Contractor is to apply and incorporate the following soil amendments into the soil – Gypsum, Soil Sulfur and Nitrified Aged Fir Humus (planter areas only). Contractor is to reestablish site grades (smooth areas without displacing amendments) and leach the soils for four to six weeks.
4. Contractor is to retest the site soils as noted in 1.12 (B) above, if salt is present in the soil test results and leaching is required.
5. Soil Amending – Application #2: Contractor is to apply and incorporate the following soil amendments into the soil – Preplant Fertilizers and Humate amendments. Contractor is to reestablish site grades (smooth areas without displacing amendments) and leach the soils for one to two weeks.
6. If there are no or low salts in the soil test reports and leaching is not required, then the Contractor can combine Preplant Soil Amendment Applications #1 & #2 and delete the leaching requirement and issue a credit to the District.
7. After cultivation, water the site until the first weed crop is established. Cultivate or treat with chemicals to assure a weed-free condition.
8. Planting beds may be established after the second cultivation and final fine grading has been inspected and approved.

B. Planting holes:

1. All 15 gallon size trees or larger, are to have one 18” diameter hole drilled up to ten (10’) deep to insure proper drainage. Holes are to be off set with tree root balls “benched” into the top of the hole to prevent the tree against settlement.
2. Holes are to be excavated three times the size of the rootball. The contractor is to slightly off-set the drainage holes to prevent settling of plants after installation. The contractor is to guarantee that the trees and shrubs will not settle below grade. Trees in turf grass areas are to be planted after the hydroseeded turf and sod has become established and no longer requires excessive irrigation, which may cause undue stress to the trees.
3. Holes are to be in damp (but not saturated) and friable condition with all hidden obstructions removed before planting. The backfill is to be mixed thoroughly as specified adjacent to the planting hole prior to planting.

C. Leaching: Leaching of the soils is a critical element in how fast the soils will be reclaimed. The Contractor is to expedite the irrigation installation during the early stages of the project to allow leaching operations with the irrigation system at the earliest possible time in the project schedule. The Contractor is to provide labor and materials as needed to leach soils with irrigation water in areas that will not delay the progress of other site improvements. During leaching operations, the Contractor is to maintain the soil saturated while limiting runoff. Contractor is to monitor depth of soil saturation to plan periods of drying appropriately.

D. Contractor is responsible for temporary measures required to retrofit the planter area irrigation system for leaching by installing spray nozzles on bubbler pop ups, installing temporary sprinklers, temporary lateral pipes or relocating sprinkler or other improvements required to insure good coverage of all planter areas for the purposes of leaching. Once leaching has been completed, contractor is to remove temporary improvements and restore the system to conform to the project documents.

3.4 PLANTING

A. Water plants immediately upon delivery to site. Maintain in moist condition until planted.

B. Space plants uniformly as shown on plans. The Contractor is to stake the locations of plants and tree locations prior to layout of irrigation system for review and approval by the Landscape Architect and District in the field prior to trenching. Contractor is to use color coded flags to stake trees and plant materials by variety. After the plant layout has been approved, the Contractor is to stake the bubbler locations for each plant and tree. Bubblers are to be located on the uphill side of the plant within the plant basin. Landscape Architect or District may move, add or delete plants or trees in the field and the Contractor is to adjust the work as required at no additional cost to the District. Contractor is not to proceed with irrigation or planting operations, until the planting locations have been approved by the Landscape Architect and District in the field.

C. Cut cans by cutting vertically on two opposite sides of can with can cutter, or as recommended by the nursery for the type and size of containers supplied with the plant materials. Do not damage plant.

D. Plant immediately after removal from the can or flat. Position the top of the plant root ball 1" above finish grade. Backfill as follows:
1. (85%) native soil.
2. (15%) nitrified humus.
3. Azaleas and camellias are to have an additional 2 cu. ft. Camellia Mix in backfill.
4. Agriform / Best plant tabs as indicated on plans. Place plant tabs beside root ball as recommended by the fertilizer manufacturer. Construct a watering well one foot radius from stem or trunk that will allow water to fill well at least 3" deep for shrubs and two foot radius from trunk that will allow water to fill well at least 4" deep for trees. Fill water well at least six times by hand after planting.

E. Fertilize all ground cover areas with post-plant commercial slow release fertilizer 19-6-12 upon completion of planting, and every 30 days through the first growing season at a rate of 5 lbs per 1000 square feet, or as recommended by the soil test results.

F. At completion of planting, all non-turf planted areas are to receive a three inch (3") compacted layer of organic or inorganic topdressing mulch as designated on the Planting Plan. Landscape areas not designated to receive decomposed granite are to have a 3” compacted layer of premium walk on bark installed supplied by Superior Soil Supplements, contact Andrea Fike (559) 904-3372. Wash excess bark or decomposed granite off leaves and do not engulf stems of trees, plants and ground cover.

G. Lawn Installation (Hydroseed):
1. The turf areas, as indicated on the plans, shall be hydroseeded in one operation after all weed removal, soil preparation, grading and irrigation system have been completely installed and approved. Trees are to be installed after the turf has been established. Stake tree locations during turf establishment.
2. Hydromulch mixing shall be performed in a tank with a built-in continuous agitation and recirculation system of sufficient capacity to produce a homogeneous slurry of fiber, fertilizer, water, and additives in the specified proportion. Hydroseeding Slurry Mix:

   a. Mulch: Agrono-Mulch @ 1500 lbs per acre. As distributed by Agrono-Tec Seed Co., Fresno, California, (559) 277-2444.

b. Binder: Agrono-Tac @ 120 lbs per acre.
Fiber Plus @ 25 lbs per acre.
c. Fertilizer: Soluble time release granular mixture of 24-4-8 @ 250 lbs per acre.
d. Seed – Bermudagrass Turf: PanAm Improved Seeded Bermudagrass (4 lbs per 1,000 sq ft) and Perennial Ryegrass (8 lbs per 1,000 sq ft) Blend. Seed at a rate of 12.0 lbs per 1,000 sq ft.

Soil must be kept continually moist until the hydroseed is germinated, but puddling is not tolerated. Seedlings are perishable and may die if not kept moist during this critical establishment period. It is the Contractors responsibility to carefully monitor the irrigation cycles on a daily basis to insure the success of the planting. Contractor is to continuously reseed weak areas as required.

3. The final seed mix is subject to change. Verify the final approved seed mixes with the Owners authorized representative prior to seeding. The seed mix will be adjusted to account for the use, drought tolerance, and the time of year to be installed.
4. The area to be seeded shall be slightly moist after the last watering and final weeding operations. The grading must be approved prior to hydroseeding. The site must be free draining prior to hydroseeding.
5. The area to be seeded shall be hydromulched with a discharge system that will apply the slurry to the areas to be treated at a continuous, uniform rate. The tank shall have a minimum capacity of 1000 gallons. Nozzle applying the slurry shall be held close enough to the areas to be planted to distribute the slurry in a uniform coating on the surface. A green marker dye shall be used to show such coverage.
6. The turf area establishment work is to proceed as follows. Time periods noted are from the date of hydroseed planting.

   a. Weeks 1 thru 4: Fertilize once (week 3 or week 4) with Best 19-6-12 with polyon 43 at a rate of 3.0 lbs per 1,000 sq ft (130 lbs per acre) to keep hydroseed in a healthy growth state and mow once (week 4) with reel mower with roller (Toro 5210, or approved equal) to stimulate the lateral turf growth and increase density.
   b. Weeks 5 thru 15: Fertilize every other week (weeks 6, 8, 10, 12 & 14) with Best 19-6-12 with polyon 43 at a rate of 3.0 lbs per 1,000 sq ft (130 lbs per acre). Mow 2 times weekly with reel mower with roller (Toro 5210, or approved equal) to stimulate the lateral turf growth and increase density. Mowing height to be 5/8” to 3/4” of an inch.
   c. Weeks 16 thru 17: Fertilize as required to keep turfgrass in a healthy condition. Mow 1-2 times weekly with reel mower with roller (Toro 5210, or approved equal) and raise turfgrass mowing height to 1” to complete the maintenance period.

7. The allowable planting window for Bermudagrass hydroseed starts on May 1st and extends thru May 30th annually. Planting after May 30th or before May 1st is not permitted. Contractor is to schedule the work to insure that the planting is completed within this planting window.
8. In addition to normal weekly maintenance, a minimum of one trained workman shall be on the site 4 hrs per day after planting the hydroseed and through the maintenance period. The hydroseeded areas shall be watered immediately and kept damp during the entire establishment period. Areas that are drying out too soon due to wind or other causes shall be watered by hand until the whole grass area comes up in a uniform and even covering of grass. Care shall be used to not overwater, which would create erosion. All erosion scars are to be repaired the same day.
9. The contractor is to carefully observe the newly planted grass to keep moist and in a

healthy growing condition. The contractor is to water and fertilize as needed to keep the turf in a vigorous healthy condition.

10. The contractor is to protect the newly planted turf areas from foot traffic as needed. The contractor is to continuously replant and repair damaged and weak areas.

H. Lawn Installation (Sod):

1. The turf areas, as indicated on the plans, shall be sodded (use big roll sod in larger areas) in one operation after all weed removal, soil preparation, grading and irrigation system have been completely installed and approved. Trees are to be installed after the turf has been established. Stake tree locations during turf establishment.
2. The allowable planting window for sod starts on April 1st and extends thru June 30th annually. Planting after June 30th or before April 1st is not permitted. Contractor is to schedule the work to insure that the planting is completed within this planting window. Do not plant in excessively hot weather or when unseasonably hot weather is forecast in the near future.
3. Finish grade is to be smooth and firm to prevent differential settlement. Sod is to be laid in staggered rows (brick like pattern). Edges are to be firmly butted together to insure soil to soil contact between sod pieces. Sodded areas are to be rolled (water roller) to remove air pockets and insure good soil contact.
4. The area to be sodded shall be slightly moist after the last watering and final weeding operations. The grading must be approved prior to sodding. The site must be free draining prior to sodding.
5. The turf area establishment work is to proceed as follows. Time periods noted are from the date of sod planting.
   a. *Weeks 1 thru 4:* Fertilize once (week 2 or week 3) with Best 19-6-12 with polyon 43 at a rate of 4.6 lbs per 1,000 sq ft (200 lbs per acre) to keep sod in a healthy growth state and mow once per week with reel mower with roller (Toro 5210, or approved equal) to stimulate the lateral turf growth and increase density.
   b. *Weeks 5 thru 12:* Fertilize twice (weeks 7 & 12) with Best 19-6-12 with polyon 43 at a rate of 4.6 lbs per 1,000 sq ft (200 lbs per acre). Mow 2 times weekly with reel mower with roller (Toro 5210, or approved equal) to stimulate the lateral turf growth and increase density. Mowing height to be 5/8” to 3/4” of an inch.
   c. *Weeks 13 thru 17:* Fertilize once (week 16 or week 17) to keep turfgrass in a healthy condition. Mow 1-2 times weekly with reel mower with roller (Toro 5210, or approved equal) and raise turfgrass mowing height to 1” to complete the maintenance period.
6. A minimum of one trained workman shall be on the site 8 hrs per day after sodding and through the maintenance period. The sodded areas shall be watered immediately and kept damp during the entire establishment period. Areas that are drying out too soon due to wind or other causes shall be watered by hand until the whole grass area is established in a uniform manner. Care shall be used to not overwater, which would create erosion and fungus. All erosion scars are to be repaired the same day.
7. The contractor is to carefully observe the newly planted grass to keep moist and in a healthy growing condition. The contractor is to water and fertilize as needed to keep the turf in a vigorous healthy condition.
8. The contractor is to protect the newly sodded area from foot traffic as needed. The contractor is to continuously resod and repair damaged areas as required.

3.5 STAKING AND TYING

A. Remove nursery stakes and ties.

B. Install tree stakes 18" deep on windward and leeward sides of tree and tie to tree with 4 ties. Install ties loose enough to avoid injuring cambium layer of tree and to allow limited movement.

C. Remove nursery ties from shrubs and espaliered plants and install new plastic ties in a loose manner so new plant growth will not girdle the branch or stem.

3.6 MAINTENANCE

A. Maintain planted areas during the progress of the work and through the maintenance period. In addition to normal weekly maintenance a minimum of one trained workman shall be on the site 4 hrs per day after planting of the hydroseeded turf until the fourth mowing and as needed through the maintenance period.

B. The maintenance period begins when the work is substantially completed and accepted by the Owner. The turf areas are to be completely planted and show active growth and reasonable coverage before the specified maintenance period can begin. The maintenance period shall be for one hundred twenty days (120) days, after substantial completion by the Owner. The Owner and Landscape Architect shall be notified a minimum of 10 days prior to the time that the work is ready for final inspection. This final inspection is required before the maintenance period can begin. The contractor is responsible to provide all materials and labor to maintain the site for the maintenance period at no cost to the Owner. The maintenance period may be extended at no cost to the Owner should prevailing site conditions not warrant final acceptance by the Owner. The site should be in a weed free condition, the lawns should be established, vigorous, have minimum 99% coverage, be weed free, and fertilized, and all plants and trees are to be in good condition. The maintenance period will be extended in one month increments until the Contractor brings the site into compliance at no additional cost to the Owner.

C. During the maintenance period the contractor shall provide the following services, but is not limited to the services outlined below.
   1. Maintain surfaces and supply additional top soil where necessary, including areas affected by erosion.
   2. Water to ensure uniform hydroseed turf growth and to keep surface of soil damp. Fertilize as specified on a monthly, or as needed basis.
   3. Apply water slowly so that surface of soil will not puddle and crust.
   4. Maintain turf & planted areas weed free. Hand weed or use chemicals at the Contractor's option.
   5. Mow and maintain the turf areas, and pick up grass clippings to be hauled off site at the Contractors expense.

3.7 CLEAN-UP

A. Remove rubbish, trash, and debris resulting from the operation at the end of each working day.

B. Wash paved surfaces clean.

C. Maintenance period will begin with acceptance of installation by the Owner and will continue as noted in article 3.06.

3.8 EXTRA LANDSCAPE MATERIALS

A. Contractor shall supply the following extra materials to be installed at the direction of the Landscape Architect during the project at any time. Each item is to include all associated materials (landscape and irrigation) and all appurtenances associated with the item, including material, labor and equipment costs for a complete installation in accordance with the project documents at no additional cost to the Owner. Should any items not be installed as part of the project, the remaining items are to be delivered to Owner or a credit issued at the Owner's option as part of the project completion documentation.

1. Ten (10): One gallon size plants (Planting Plan varieties)
2. Twenty (20): Five gallon size plants (Planting Plan varieties)
3. Five (5): Fifteen gallon size plants (Planting Plan varieties)
4. Five (5): Fifteen gallon size trees (Planting Plan varieties)
5. Three (3): 36" box size trees (Planting Plan varieties)

B. All work is to be in compliance with all project specifications and construction details at no additional cost to the Owner.

END OF SECTION

SECTION 32 84 00 LANDSCAPE IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all materials, labor, equipment and services necessary to furnish and install Landscape Irrigation System, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded. The extent of the underground landscape irrigation system is shown on the drawings. The Contractor shall carefully review the plans and specifications and if they feel that more equipment is needed, they shall include that in the bid. All extra work to achieve full coverage shall be at the Contractors expense. Sprinkler systems shall be complete, operative, automatic and provide full coverage of the planted areas.

B. Irrigation systems shall be constructed to the sizes, grades and locations shown on the plans. Irrigation pipelines shown on the plans are essentially diagrammatic. Locations of all irrigation improvements shall be established by the Contractor at the time of construction. Typical spacing of the sprinklers are shown on the plans and shall not be exceeded, except by written permission of the Owner's authorized representative.

C. The system has been designed to a pressure as indicated in these specifications. The Contractor shall test the mainline prior to starting any work and verify that such pressure does exist. If it does not, the Contractor shall notify the Owner at once for a ruling before starting work. If the Contractor does not test prior to starting work, all corrective work shall be at the Contractors expense.

1.2 RELATED SPECIFICATION SECTIONS

A. Division 31 EARTHWORK

B. 32 90 00 LANDSCAPE CONSTRUCTION

C. Division 03 CONCRETE

D. Division 26 ELECTRICAL

1.3 STANDARDS

A. Materials and installation shall conform with all State and Local codes and regulations governing the trades included in this work. Requirements of these plans and specifications not conforming therewith, but exceeding code requirements, then the plans and specifications shall govern.

AD3

1.4 EXPLANATION AND EXAMINATION OF SPECIFICATIONS AND PLANS

A. Due to the scale of the Drawings, it is not possible to indicate offsets, fittings, etc. which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of their work and plan their work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed in the most direct and workmanlike manner so that conflicts between irrigation systems, planting, utilities, and architectural features will be avoided.

B. Notes on Drawings: Work called for on the Drawings by notes shall be furnished and installed whether or not specifically mentioned in the Specifications.

C. It shall be the responsibility of the Contractor to carefully examine the site, plans and specifications relating to this work for completeness, accuracy and clarity. Any conflict, error, or clarification shall be immediately brought to the attention of the Owner's authorized representative in writing to obtain a ruling. Failure to do so prior to bidding shall result in any corrective work necessary shall be completed at the Contractor's expense.

D. It is the intent of these specifications and plans to form a guide to accomplish the work of installing a complete sprinkler system which will operate in an efficient and satisfactory manner according to the workmanlike standards established for the irrigation industry. Therefore, any items not specifically noted, but necessary for a complete installation, shall be furnished and installed under this contract.

E. Manufacturer printed instructions shall also be a part of these specifications and shall prevail over these specifications. The Contractor shall be responsible to provide such details and instructions to the inspecting person for approval or rulings.

F. All general and specific notes shown on the drawings and details herein shall take precedence over these specifications. All work designated on the drawings by notes shall be furnished and installed.

1.5 PERMITS AND INSPECTIONS

A. The Contractor shall obtain and pay required fees to any governmental or public agency. Permits for the installation or construction or the work included under this Contract, which are required by legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. Contractor shall also arrange for and pay costs in connection with inspections and examination required by these authorities.

1.6 GUARANTEE

A. Irrigation system shall be guaranteed for a period of one year from the date of final acceptance. Any repairs required are to be completed by the Contractor in a timely manner at no additional cost to the Owner.

1.7 OPERATIONS AND MAINTENANCE INSTRUCTIONS / RECORD DOCUMENTS

A. Two copies of equipment operations, maintenance instructions, and wire diagrams shall be

furnished to the Owner prior to final acceptance. Two copies of control valve station charts (color coded reduced Irrigation Plan with plastic waterproof lamination) showing watering zones and stationing shall be provided and mounted in the controller pedestal.

B. The Contractor shall furnish one set of reproducible Record Documents (As-Built drawings) in form of 24 lb bright white bond paper.
   1. Label first page of each document, or set of documents, "RECORD DRAWINGS" in neat large printed letters on lower right hand corner. Record information concurrently with construction progress. Do not conceal any work until required information is recorded on a daily basis.
   2. Drawings: Legibly mark to record actual construction:
      a. Horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements. Give sufficient horizontal and vertical dimensions to accurately trace route and invert of each concealed line or item. Accurately locate each capped, plugged, or stubbed line.
      b. Field changes of dimension and detail.
      c. Changes made by Field Order, by Addenda, or by Change Order.
      d. Details not on original Contract Drawings
   3. Deliver all Record Documents (As-Builts) to Landscape Architect. Accompany submittal with transmittal letter in duplicate, containing:
      a. Date.
      b. Project title.
      c. Contractor's name and address.
      d. Title and number of each Record Document (As-Built).
      e. Signature of Contractor or his authorized representative.

1.8 SUBMITTALS

A. Within the required time period stated, the Contractor shall submit six (6) copies of complete lists of proposed materials to Landscape Architect including source, manufacturers name and catalog numbers.

B. Shop drawings shall follow (six copies) for equipment including dimensions, capacities, and other characteristics listed in product specifications. Materials and equipment shall not be ordered until given written approval by Landscape Architect.

C. The specified irrigation booster pump has a long lead time (approximately eight weeks) and the irrigation booster pump submittal is to be submitted in a timely manner after the contract award and ordered to avoid project delays.

1.9 DEFINITIONS

A. Piping: All pipe fittings, valves, and accessories as required for a complete piping system.

B. PVC: Polyvinyl Chloride.

C. Agencies and Organizations:
   1. ASTM American Society for Testing and Materials
   2. AWWA American Water Works Association
   3. IAPMO International Association of Plumbing and Mechanical Officials

AD3

4. CEC California Electrical Code
5. UL Underwriter's Laboratories

1.10 UNDERGROUND OBSTRUCTION

A. The Contractor shall verify all underground obstructions, and / or utilities, existing or proposed, prior to trenching. Contractor shall avail themselves of any “as built” drawings of the site, Underground Service Alert (USA) 1-800-227-2600 and records of existing and proposed site work. This shall also include verifying between proposed irrigation work and existing / proposed underground utilities. Contractor shall call for a ruling by the Owner’s Authorized Representative prior to work to obtain a ruling in the event of a conflict.

B. The Contractor, after availing themselves to the existing record drawings, Underground Service Alert and coordination with other trades installing underground utilities and excavation operations incurs and damages any existing utility not identified, the Contractor shall stop work and notify the inspector on site, obtain a ruling and repair the damage.

1.11 WORKMANSHIP

A. The Contractor shall have experience and demonstrated ability in the installation of landscapes of this type. No work shall be completed without supervision by a qualified foreman. All work shall be installed by skilled persons proficient in the trades required, in a neat, orderly and organized manner, with the recognized standards of craftsmanship developed for the industry and as described in the plans, specifications and manufacturers installation instructions.

1.12 CONSTRUCTION OBSERVATION

A. The Contractor is to coordinate construction observation site visits with the Landscape Architect and District Maintenance Department during the appropriate phases of construction, or as required by the Landscape Architect. The Contractor is to schedule site visits a minimum of one week in advance at the required phases of construction. The following outlines the phases of construction which require a site visit, however it is not limited to the following construction phases:
1. Preconstruction meeting
2. Staking of plant and tree locations prior to irrigation installation.
3. Staking of sprinklers and mainline routing.
4. Mainlines, wiring, lateral pipes, & valve manifolds prior to backfill.
5. Irrigation coverage test and rough grading.
6. Trees & plants prior to installation, still in containers.
7. Fine grading of turf areas prior to sod and hydroseed installation.
8. Substantial completion to start maintenance.
9. Final acceptance after successful maintenance period.

B. The Owner will pay for initial construction observation visits, however, any additional visits required due to non-compliance, incomplete work, or substandard performance will be paid by the contractor at a cost of $600.00 per extra visit.

1.13 PROTECTION TO THE PUBLIC HEALTH AND WELFARE

A. The Contractor in the course of their work shall make every effort to guard the public health, safety and welfare during construction. This shall include erection of barricades, night warning lights and all necessary devices required to protect the public health and welfare or as required by existing governmental codes. The Contractor shall accept any and all liabilities arising from accident or injury on the job and after construction. All equipment which protrudes above grade shall be installed against a structure or an appropriate barricade shall be erected to protect public safety.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials and equipment to be used shall be as outlined on the irrigation legend, or as described in the irrigation notes and irrigation specifications. All materials shall be new and unused.

B. All specified materials, products and manufacturers are relevant to describe the required quality and features of a particular component of the irrigation system, however, the specific product or manufacturer noted is to be construed to be followed by the words, “or approved equal."

2.2 PIPELINES / SLEEVES

A. Irrigation Piping:
1. 2" thru 3": Pressure pipe / upstream of control valve (mainline pipe): PVC Schedule 40 solvent weld pipe, PVC Material ASTM D1784, Cell Class 12454B, Pipe Design ASTM D1785 & compliance with all NSF & IAPMO (UPC) requirements.
2. 4” thru 10”: Pressure pipe / upstream of control valve (mainline pipe): PVC Class 200 gasketed pipe, pressure rating 200 psi, SDR 21, PVC Material ASTM D1784, Cell Class 12454B, Pipe Design ASTM D2241 & Gasket Material ASTM F477.
3. 1" thru 21/2": Circuit pipe / downstream of control valve (lateral pipe): PVC Schedule 40 solvent weld pipe, PVC Material ASTM D1784, Cell Class 12454B, Pipe Design ASTM D1785 & compliance with all NSF & IAPMO (UPC) requirements.
4. 2" and larger: Sleeving under paving: 2” thru 3” sleeves are to be PVC Schedule 40 solvent weld pipe, PVC Material ASTM D1784, Cell Class 12454B, Pipe Design ASTM D1785 & compliance with all NSF & IAPMO (UPC) requirements. 4” and larger sleeves are to be PVC Class 200 solvent weld pipe, pressure rating 200 psi, SDR 21, PVC Material ASTM D1784, Cell Class 12454B & Pipe Design ASTM D2241.
5. Pipe shall be continuously and permanently marked with the following information: Manufacturer's name or trademark, nominal pipe size, schedule and type of pipe, pressure rating in PSI and (NSF, IAPMO & AWWA) seals of approval.

B. Plastic pipe shall be as called for on the plan and extruded from PVC 1120/1220 and shall meet commercial standards CS 256-63. Class and schedule of pipe shall be as called for in the plans. Strict conformance with the manufacturers recommended installation instructions is required. Painted galvanized steel (schedule 40), threaded bronze nipples, copper or painted ductile iron pipe is to be used for any pipe installed above grade. Fittings for above grade piping are to be consistent with pipeline material. Sun burned pipe or pipe that has been

abused in shipping and handling is not to be used.

C. The Contractor is to install concrete thrust blocks as outlined in the thrust block detail and as recommended by the pipe & fitting manufacturers to secure all changes in direction or dead ends of all mainline pipe. The Contractor is to use rebar as needed if necessary to insure the stability of the pipe. Where concrete thrust blocks cannot be installed against continuous native subgrade, the Contractor is to install ductile iron mechanical joint restraints. No bending, or curving of pipe will be allowed, except as permitted by the pipe manufacturer. Pipe manufacturer must be approved prior to ordering materials.

D. Where piping on the plans is shown under paved areas, but is running parallel and adjacent to planted areas, the intent of the plans is to install the piping in the planted area. PVC sleeves of appropriate type depending upon size are to be used with all pipe and wire installed under hardscaped surfaces over eight feet (8'-0") wide or wider.

E. Where pipeline routing changes occur in the field, the Contractor is to size the pipe so that a flow velocity of 5.0 feet per second is NOT exceeded. The minimum pipe size is 3/4" and 11/4" pipe is not used due to its limited flow range. The following is a basic guide for sizing lateral pipes in the field:
1. 3/4" Pipe – Not Used
2. 1" Pipe - 0 gpm thru 12.0 gpm
3. 11/2" Pipe - 12.1 gpm thru 30.0 gpm
4. 2" Pipe - 30.1 gpm thru 46.0 gpm
5. 21/2" Pipe - 46.1 gpm thru 85 gpm.

2.3 PIPELINE FITTINGS

A. Fittings:
1. For PVC solvent weld plastic pipe, 2" thru 3" mainline fittings: PVC Schedule 80 socket fittings (ASTM A2564, D2466, D2464 & D2467), Type 1, Grade 1. All mainline fittings are to be PVC Schedule 80 type with solvent weld or threaded connections.
2. For PVC class 200 gasketed pipe, 4” thru 8” mainline fittings: Ductile iron deep bell gasketed fittings as manufactured by LEEMCO, or approved equal. See manufacturers instructions and recommendations. No angular deflection of mainline pipe at the fitting bell end is allowed. For automatic valve connections to large mainline (4” thru 8”) pipe, Romac 202N ductile iron service saddle with double stainless steel straps may be used.
3. For PVC solvent weld plastic pipe, 1" thru 21/2" lateral fittings: PVC Schedule 40 socket fittings (ASTM A2564, D2466, D2464 & D2467), Type 1, Grade 1. All lateral fittings (downstream remote control valve) not specifically noted as PVC Schedule 80 type in the specifications or irrigation details are to be PVC schedule 40 type with solvent weld or threaded connections.
4. For connections between main lines and remote control valves: Schedule 80 PVC fittings and TOE nipples (threaded one end), see Irrigation Details. No male adaptors are allowed to be used on the project. Use PVC schedule 80 TOE nipples for threaded to solvent weld connections.
5. When connection is plastic to metal, Schedule 80 TOE nipple shall be used.
6. Teflon tape shall be used on all small diameter (½" to 3") threaded connections. No liquid or paste pipe thread sealants are allowed.

B. Risers to irrigation heads: Shall be as noted on Irrigation Details.

C. Solvent Weld Adhesive: Weld-On cement & primer appropriate for size & type of pipe and fittings. See manufacturers instructions and recommendations. Note weather and temperature limitations for use. Use primer for all joints, mainline and lateral pipe connections.

2.4 VALVES / CONTROL WIRE

A. Automatic Control Valves: Globe / Angle valves operated by low-power solenoid, normally closed, with manual flow adjustment. Sizes and types as shown on drawings. Low voltage electrical connections to valves shall have a minimum 36" coiled loop to each valve in valve box, see details. Valves shall be installed in a heavy duty plastic valve box with bolt down lid. Install one valve per valve box, no exceptions. Remote control valves are to have a solenoid that is compatible with Baseline two-wire / decoder system.

B. Two-Wire Communication Cable: Baseline biline 14-2 as manufactured by Paige #7072D Black & Red, or approved equal. Two-wire communication cable is to be installed in 1 1/2” PVC electrical conduit with long sweep ells into and exiting each valve box. Two-wire communication cable is to have a junction / pull box installed at all changes in direction and at a maximum of 150 ft apart for longer straight runs. Two-wire communication cable is to be a minimum of 18” below grade.

C. Two-wire Splices / Connectors – 2 Wire Path: All wire splices / connectors to be 3M DBY-6 / DBR-6 waterproof splice kits and spare wire ends. All splices are to be located in a valve box and no direct bury splices are allowed.

D. Control Wire Connectors – 2 Wire Path: Valve to decoder wire connectors and all other splices are to be 3M DBY-6 / DBR-6 waterproof splice kits and spare wire ends. All splices are to be located in a valve box and no direct bury splices are allowed.

E. Control Wire Marking: T. Christy Enterprise, Inc. Waterproof Irrigation I.D. Tag or approved equal (714) 771-4172.

F. Control Valve Boxes: Old Castle / Carson heavy duty plastic valve boxes with heavy duty bolt down lids, or approved equal. See Irrigation Details for model numbers and sizes.

G. Control Valve Box Marking: Heat imprinting with appropriate controller and station number or valve box identification for other improvements. All valve boxes are to be marked to indicate contents.

2.5 IRRIGATION HEADS

A. Spray Head: Molded plastic body with plastic nozzles. Refer to schedule on drawings. Manufacturer's numbers are listed with description.

B. Rotor Head: Molded plastic and stainless steel construction. Gear driven with lockable arc adjustment and matched precipitation rate nozzles. Refer to schedule on drawings. Manufacturer's numbers are listed with description.

C. Irrigation heads adjacent to concrete walks, mow strips or other paved areas shall be offset 3" to permit edging without damage to irrigation equipment. Irrigation heads are to be set at grade. Irrigation heads are to be adjusted so that no spray hits buildings, fences, walls, or hardscaped

surfaces. Install anti-drain check valves under all irrigation heads that weep or show drainage after operation. Irrigation heads adjacent to buildings and fences or walls shall be offset 12" – 18" at District's option to limit overspray and to prevent weed growth along fence lines. Rotor sprinklers adjacent to buildings shall be offset 2'-0" – 3'-0" at District's option to eliminate overspray onto adjacent building. Irrigation heads are to be set flush at finish grade.

2.6 GATE VALVES

A. 1" thru 3" Size: Class 125 bronze gate valve, 200 psi WOG, manufactured domestically made of cast bronze material and cross handle with non rising stem as manufactured by NIBCO, or approved equal. Solid wedge with screw in bonnet gate valve with threaded connections resistant to dezincification. Contractor is to provide Owner with two (2) "T" handle operation keys.

B. 4" thru 8" Size: Resilient seat ductile iron gasketed joint gate valve rated for a minimum of 200 psi, manufactured domestically by NIBCO, Waterous or approved equal. Contractor is to provide Owner with two (2) "T" handle operation keys.

2.7 QUICK COUPLER VALVES

A. Two piece valve with heavy duty brass construction with vinyl cover and single lug operation. Contractor is to supply Owner with five (5) quick coupler keys and five (5) hose swivels. See Irrigation Legend and Details for detailed descriptions.

2.8 CENTRAL CONTROL SYSTEM

A. Contractor is to provide data collection, data entry, programming and setup as required for the Baseline online system (Base Manager Plus) and is to provide two (2) 5 year subscriptions to Base Manager Plus for the District (total of 10 years). Contractor is to provide all setup required for Et control of the irrigation system with online weather data. Contractor is to follow all Baseline requirements and be Base Line certified prior to starting work and have system installation certified by an authorized Baseline representative for the extended warranty. Contractor is responsible for training up to 4 persons appointed by the District in the use of this online central system.

For existing Baseline controllers being modified as part of the project by having valves added, Contractor is to provide data collection, data entry, programming and changes to existing programming as required for the existing Baseline online system (Base Manager Plus).

2.9 HAND HELD RADIO SYSTEM

A. Contractor is to assist District to access Baseline online system (Base Manager Plus) via District provided iPad's or cellular smart phones capable of connecting with the internet for remote activation of the irrigation system. Contractor is to install Baseline app and provide all setup and support for the remote activation of the system. Contractor is also to provide all setup and support to install the Baseline app on up to four (4) District provided smart phones / tablets to make them capable of remote activation of the irrigation system.

2.10 FIELD SATELLITE CONTROLLER

A. Irrigation controller shall be as specified on the plans. Pedestal mount shall have a concrete base. The installation shall be in accordance with the manufacturers instructions and recommendations. All electrical connections to the controller shall be the responsibility of the Contractor and shall be UL approved and meet all applicable codes and regulations. All wiring from the electrical source to controller shall be installed in UL approved electrical conduit. Contractor is responsible for training up to four persons appointed by the Owner in the operation of the field satellite controllers.

B. Contractor is to install Campus network cable with internet access to the irrigation controller. Irrigation controller is to be ethernet ready.

C. Contractor is to connect new Baseline controller ‘E’ to the existing Flow Station and complete all programming changes needed so Baseline controller ‘E’ can work with existing flow sensing equipment, master valve and pump start for the High School (north) pump station. Provide all modules and programming required, contact Mark Huntzinger (760) 484-4907 from Baseline for technical support.

2.11 IRRIGATION BOOSTER PUMP STATION

A. Existing Irrigation Booster Pump Station is existing and is to remain and protect.

2.12 VALVE BOXES

A. All valves, manual or automatic shall have a valve box, set flush with grade. All valve boxes shall be of heavy duty plastic construction with heavy duty bolt down lids. Valve boxes are to be manufactured by Old Castle / Carson, or approved equal. Maximum of one (1) valve per valve box, no exceptions. Placement of the valves within the valve boxes shall allow for proper servicing and maintenance space, or the installation will be rejected.

2.13 AIR RELIEF VALVES

A. Air relief valves shall be installed at high elevation areas of the mainline pipe and at dead end runs. Air relief valves are to be located in the field where high elevation points can be determined. Contractor is to submit a shop drawing showing the proposed installation locations for review and approval.

2.14 BACKFLOW PREVENTION DEVICES

A. The backflow prevention device is existing and is to remain and protect.

2.15 OTHER MATERIALS

A. Materials not specifically indicated but necessary for proper execution of this work shall be of the first quality as selected by the Contractor subject to the acceptance of Architect.

AD3

B. All materials appearing in the legend and details of the irrigation drawings are part of this job. Contractor is responsible for installation according to drawings and details. The system shall efficiently and uniformly irrigate all areas and perform as required by these plans and specifications.

PART 3 - EXECUTION

3.1 IRRIGATION SYSTEM DESIGN

A. Irrigation system is designed for a minimum water pressure of 75 psi at the discharge of the irrigation booster pump.

B. Verify the design pressure provided at P.O.C. prior to system installation and report any discrepancies in writing to the Architect. Failure to inform the Architect of any discrepancy in design pressure seven working days prior to installation of the irrigation system shall institute the responsibility of corrective action to the Contractor, at no expense to the Owner.

3.2 IRRIGATION STAKING

A. The location of all sprinklers, valves, piping and other irrigation improvements shall be staked out by the Contractor. All staking and measurements shall be taken from permanent objects, buildings, or other permanent hardscape features including survey bench markers, and are NOT to be taken from non-permanent boundaries such as turf boundaries which are subject to modification. All measurements shall be made in feet and inches, rounding to the nearest inch. All variations from the plans are to be continuously updated on a daily basis on the record (as built) drawings. The Contractor is to present the areas staked to the Landscape Architect for review and approval prior to starting work. The Contractor is to make the adjustments in staking requested by the Landscape Architect at no additional cost to the Owner.

B. In turf and planter areas, the Contractor is to stake the tree and shrub locations prior to layout of the irrigation system to get approval from the Landscape Architect and District in the field prior to trenching. Contractor is to use color coded flags to stake plant materials by variety. Landscape Architect or District may move plants, delete or add plants during the staking review process. Contractor is to make changes in the field and on the as built plans at no additional cost to the Owner. After the plant layout has been staked, reviewed, adjusted and approved, the Contractor is to stake the bubbler locations for each plant or tree. Bubblers are to be located within the plant water basin on the uphill side of the plant or tree. Bubblers that are too far from the plant or tree will need to be relocated within an acceptable difference. The plant or tree rootball is to have direct access to irrigation water from the intended bubbler. Sloppy or non-compliant work will be rejected.

3.3 EXCAVATION, BACKFILL

A. Trenches for irrigation pipelines and sleeves shall be excavated either by hand or machine and shall be of sufficient width to permit proper handling and installation of the pipe and fittings. The backfill shall be compacted and evened off with the adjacent soil level. Select fill material or sand shall be used if soil conditions are rocky, or have debris. No material over 3/8" shall be allowed near the pipe, 6" below it, or 6" above the pipe. Backfill shall be made early in the

morning when the soil and pipe temperatures are the same. Pipe to be installed with a minimum cover of 24" for mainline pipe and 12" for lateral pipe with spray heads and 18" for lateral pipe with rotors. Backfill shall be in 6" (lifts) increments. Each (lift) increment shall be compacted as needed to prevent settlement with tamping machine. Backfill material is to be brought to the optimum moisture content prior to starting compaction operations.

B. Contractor shall compact trench fill material as required to prevent settling of trenches. Contractor is to guarantee trenches against settling for a period of one year from the date of final acceptance by the Owner. Contractor is to fill, compact and seed settled trenches during this time at no additional cost to the Owner.

C. All pipe in the same trench shall have a minimum clearance of 6" from each other. Pipelines are not to be stacked vertically in the same trench. Pipes and wires or conduit are to have a minimum clearance of 12" from each other. Final fill over trenches shall be compacted to a level grade with no depressions.

3.4 ROAD, DRIVEWAY, PARKING LOT AND SIDEWALK PIPELINE CROSSINGS

A. Any pipe, wire or communication cable that crosses any hardscaped surface eight feet (8'-0") or wider, shall be installed in a PVC sleeve of appropriate type base on size that is a minimum of two times larger than the pipe or wire bundle being sleeved. Sleeves 2” thru 3” size are to be PVC schedule 40 pipe sleeves and Sleeves 4” and larger are to be installed in PVC Class 200 pipe sleeves. Sleeves are to have a minimum trench cover of 18" deep. Pipelines and wires that are to be installed below existing hardscaped improvements are to be installed in a sleeve as noted above, by horizontal directional boring. No cutting and patching of any hardscaped surface will be permitted without written permission of the Owner’s authorized representative. Newly paved areas are to be protected and preserved from construction damage. Jacking and hydraulic (water jet) driving are not permitted. The minimum sleeve size is two (2") inch. The Contractor is to verify the inside and outside diameters of pipes and wire bundles being sleeved to insure proper fit and installation. Irrigation pipelines and wires are to be installed in separate sleeves. No more than one (1) irrigation pipeline is allowed per pipe sleeve. Low voltage wires may be bundled with communication cable and installed in an appropriate size wire sleeve in conformance with NEC requirements for wires installed in conduit.

B. If approval to cut and patch a hardscaped surface has been obtained, the Contractor shall make cuts by a pavement / concrete saw or other approved means. Where any cutting or breaking of hardscaped surface work is necessary, it shall be removed and replaced by the Contractor conforming to all prevailing project specifications and requirements. Cuts are to be made along existing scoring lines or other markings to minimize negative visual aesthetics. Barriers and night lighting shall be erected to protect the public health welfare and safety. If approval to cut and patch a hardscaped surface is denied, the Contractor shall make the crossing by using horizontal directional boring. All materials and labor for all sleeves and crossings, whatever method, are to be supplied by the Contractor at no additional cost to the Owner.

C. Backfill shall be compacted to 95%. The Owner reserves the right to test such backfill. If the backfill does not meet the required 95% compaction, the Contractor shall recompact the trench. The Contractor shall pay for all additional testing until the work meets the specifications.

D. Sleeve legend and call outs on the plan are for the convenience of the District and Contractor is responsible for the proper sleeving of all pipes and wire in accordance with the above standards whether the sleeve is called out or not and is to be of appropriate size regardless of sleeve

legend callout.

3.5 PIPING INSTALLATION

A. General: Support piping without strain on joints or fittings and allow for piping expansion and contraction. "Snake" pipe into trench in accordance with manufacturer's recommendations to allow for expansion. Lay on solid sub-base, uniformly sloped.

B. The Contractor shall examine all other portions of working drawing and plan trenching and pipe routing and depth so that no conflicts will arise between irrigation and any other work. Any corrective action will be the Contractor's responsibility at no further expense to the Owner. Contractor is to endeavor to route mainline pipes a minimum of fifteen feet (15’-0”) from trees and is to get permission to install mainline pipe closer in tight locations from the Districts Authorized Representative.

C. Joints:
1. PVC Solvent Weld: Pipe shall be cut square and reamed to full size. Check for assembly prior to solvent weld. Remove excess solvent. All assembly shall be in accordance with manufacturer's recommendations, including use of primer on 1" pipe or larger.
2. Steel or PVC Schedule 40 Threaded: Pipe shall be cut square and reamed to full size. Threads shall be full cut, true and tapered. Teflon tape suitable for conveyed fluid shall be applied to male thread only.
3. Open Ends: Open ends of piping shall be capped during progress to preclude foreign matter. All pipe shall be assembled free from dirt and pipe scale.

D. The Contractor shall thoroughly flush all mainline and lateral piping prior to the installation of irrigation heads. Flush entire piping system of all debris.

3.6 IRRIGATION HEAD INSTALLATION

A. Head spacing on drawings is diagrammatic. Head spacing and patterns shall be adjusted to provide complete and adequate coverage without overspray on non-planted areas. Flush all lines prior to installation of the sprinkler heads.

3.7 CONTROL WIRE

A. Protect two-wire path by running along side mainline piping, maintain minimum 6" separation to mainline. Do not tape wire together when encased in sleeve or conduit. Minimum cover shall be 24 inches. Connect wires together at valve manifold with 3M DBY-6 / DBR-6 splice kits as required. Tag all control wire splices with approved control wire marker at splices in valve box and in controller. Install junction boxes at all changes in direction and at 150 ft for long straight runs.

3.8 CONTROL VALVE BOX MARKING

A. Imprint valve box lid by heat imprinting with appropriate controller and station number.

AD3

3.9 TESTING

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Owner. Mainlines are to be center loaded with the joints exposed. Should any joints be covered before such tests, the Contractor shall, at their expense, uncover, test, and repair the work and that of other contractors to original conditions. Leaks and defects shown by tests shall be repaired and entire work re-tested. Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the test.

B. Piping Upstream of control valves (Mainline): Maintain 100 PSI water pressure for a duration of four (4) hours. There shall be no drop in pressure during test except that due to ambient temperature changes. Perform test with control valves installed.

3.10 CONSTRUCTION OBSERVATION

A. Observation of Work:
1. Installation and operations must be approved by the Landscape Architect.
2. In no event shall the Contractor cover up or otherwise remove from view any work under this contract without prior approval of the Landscape Architect. Any work covered prior to inspection shall be opened to view by the Contractor at their expense.

B. Construction Observation: Periodic site visits shall be required for basic operations and installations during progression of the project. Such site visits will include, but not necessarily be limited to, the following items:
1. Preconstruction meeting.
2. Staking of plant and tree locations prior to irrigation installation.
3. Staking of sprinklers and mainline routing.
4. Mainline, wiring, lateral pipes & valve manifolds prior to backfill.
5. Irrigation coverage test and rough grading.
6. Trees & plants prior to installation, still in containers.
7. Fine grading of turf areas prior to installing sod and hydroseed.
8. Substantial completion to start maintenance.
9. Final acceptance after successful maintenance period.
10. The Owner will pay for initial construction observation visits, however, any additional visits required due to non-compliance, incomplete work, or substandard performance will be paid by the contractor at a cost of $600.00 per extra visit.

C. Coverage Test: When the irrigation system is completed, the Contractor in the presence of the Landscape Architect shall perform a coverage test of water afforded in the planting areas. The Contractor shall furnish all materials and labor required to correct any inadequacies of coverage disclosed. The Contractor shall inform the Landscape Architect of any deviation from the plan required due to wind, planting, soil, or site conditions that bear on proper coverage. If such corrections or additions are required in the irrigation system, the Contractor shall make all adjustments and corrections without any extra cost to the Owner.

D. Completion of Work: Prior to substantial completion and the start of the maintenance period, the Contractor shall deliver to the Owner a complete set of as built drawings on 24 lbs bright white bond paper, two (2) sets of manuals covering all materials in the irrigation system with a list of local vendors, two (2) keys to each controller, two (2) sets of all tools required to maintain system in tool boxes, five (5) quick coupler keys, five (5) hose swivels, two (2) mainline gate valve “T” wrenches for each type required, waterproof color coded controller

diagrams and extra equipment listed below not installed as part of the project. Irrigation system shall be fully automatic, operable and provide full coverage of the planting areas. In judging the work, no allowance for deviation from the original plans and specifications will be made unless already approved in writing at proper time. Should it become necessary, due to developed conditions, to occupy any portion of the work before the Contract is fully completed, such occupancy shall not constitute acceptance. The Contractor will not be responsible for any damage caused by the Owner's work forces.

3.11 EXTRA IRRIGATION EQUIPMENT

A. The Contractor shall supply the following extra equipment to be installed at the direction of the Landscape Architect during the project. Each item is to include all piping, wiring, fittings, appurtenances, labor and equipment costs for a complete installation at no additional cost to the Owner. Should any items not be installed as part of the project, the remaining items are to be delivered to Owner as part of project completion documentation.

1. Ten (10): Six inch pop up spray sprinklers.
2. Ten (10): Small I-20 six inch pop up rotor sprinklers.
3. Five (5): Large I-25 pop up rotor sprinklers.
4. Five (5): Large I-25 pop up high speed rotor sprinklers.
5. Three (3): 1" electric valve.
6. Three(3): 11/2" electric valve.
7. Three (3): 2" electric valves.
8. Three (3): Quick coupler valves.
9. Two (2): Air relief valve.
10. Ten (10): 1 Station Baseline Decoders.
11. Twenty (20): 3M DBY-6 / 3M DBR-6 splice kits.

B. All work is to be in compliance with all project specifications and construction details at no additional cost to the Owner. Items not installed as part of the project are to be delivered to the Owner as part of project close out procedures (turn over items).

3.12 MAINTENANCE

A. Adjustments: Irrigation system shall be maintained and adjusted as required to provide proper coverage throughout the 120 day maintenance period. Irrigation system maintenance shall commence upon approval of substantial completion following irrigation installation, planting operations, and general site clean up. Maintenance shall be continued until final acceptance.

B. Irrigation controller shall be set during this time with Owner. Training for persons appointed by the Owner is to be completed during this time. Final acceptance of the project will NOT occur until all training of Owner’s personnel is completed.

END OF SECTION

AD3

SECTION 321200– PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all pavement materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 09 91 00 PAINTING
   5. 10 14 53 ROAD AND PARKING SIGNAGE
   6. 31 20 00 EARTHWORK
   7. 31 31 00 SOIL TREATMENT
   8. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   9. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
   2. a. ASTM American Society of Testing and Materials
   3. b. FS Federal Specifications
   4. c. RIS Redwood Inspection Service
   5. d. SS-CDOT Standard Specifications, California Department of Transportation

1.3 SUBMITTALS

A. Submit in accordance with Specification Section – SUBMITTAL PROCEDURES:

B. Product Data.
   1. Provide technical data and tested physical and performance properties on any products provided in PART 2.
      a. Aggregate Base, Tack Coat, Asphalt Concrete, Sealers, Coating System, Markings, Wheel Stops, Joint Sealant, and Headers.
   2. Submit manufacturer's full color range (including any standard and premium colors) for selection by the Architect.

C. Samples.
   1. Provide 3 inch long samples of each color of Markings[and Coatings].
   2. Provide 12 inch square sample of each Geosynthetic Interlayer.

D. Quality Assurance/Control Submittals:
   1. Design Data:
      a. Provide Job-Mix Design for each proposed Job-Mix indicating aggregate gradation for the sieve sizes specified and the amount (percent by dry weight of aggregate) of asphalt to be used.
   2. Test Reports:
      a. Compaction of Aggregate base test results.
      b. In-place compacted thickness of aggregate base and asphalt paving.
      c. Stockpiled pulverized asphalt.
         1) Sieve Analysis
         2) Maximum Density/Optimum Moisture
         3) Resistance Value
   3. Certificates:
      a. Contractor's Letterhead Statement
      b. Applicator's Letterhead Statement
      c. Statement of installer’s qualifications

E. Closeout Submittals:
      a. Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
      b. Warranties:
         1) Contractor's General Warranty.
         2) Manufacturer's Warranty.
         3) Installer's Warranty.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Certificates:
   1. Provide Contractor's Letterhead Statement certifying work provided meets or exceeds the requirements of this Section.
   2. Provide Applicator's Letterhead Statement certifying products are in accordance with the manufacturer's specifications and standards requirements.

D. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of any construction or aggregate base rock preparation.
    a. Coordinate the work with all other related work being performed.
    b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
    c. Review requirements of work performed by others that rely on substrates exposed by selective demolition work.
    d. Review areas where existing construction is to remain and requires protection.
    e. Review demolition waste disposal and material recycling procedures.
2. Progress: Scheduled by the Contractor during the performance of the work.
    a. Review for proper installation of work progress.
    b. Identify any installation problems and acceptable corrective measures.
    c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
    a. Inspect and identify any problems that may impede issuance of warranties.
    b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from defects or other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, grade, source location and date of manufacture.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
    a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.6 PROJECT CONDITIONS

A. Environmental requirements:
1. Dust control:
    a. Perform work in a manner as to minimize the spread of dust and flying particles.
    b. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other work.
2. Burning:
    a. No burning will be allowed on-site.
3. Rain:
    a. Work under this section shall not be started or continue under threat of rain.
    b. Asphalt Concrete shall not be placed when the surface is wet or frozen.
4. Temperature:
    a. Actual selection of Asphaltic Concrete by the applicator depends on the time of the year for the application and whether or not High or Low temperature Asphaltic Concrete is used. Verify anticipated temperature ranges and verify with the Architect prior to selection.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.7 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty period One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the specification section - WARRANTIES, but the period of time shall be for One (1) year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified walk seal product manufacturer:
      a. DALTON ENTERPRISES, INC. "Plushtex 900-14".
   2. Specified coating system product manufacturer:
      a. QUEST CONSTRUCTION PRODUCTS "StreetBond150".
   3. Specified traffic paint product manufacturer:
      a. ENNIS TRAFFIC SAFETY SOLUTIONSStandard Dry Waterborne Traffic Paint.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Aggregate Base:
   1. Three-fourths (3/4") inch grade, Class 2, in accordance with SS-CDOT Section 26, "Aggregate Bases".

B. Tack Coat:

1. Asphaltic Emulsion:
   a. Type SSI or CSSI, slow-setting per SS-CDOT Section 94 “Asphaltic Emulsions”.

C. Primer Coat:
1. Asphaltic Emulsion:
   a. Type SSI asphalt emulsion per SS-CDOT Section 94 "Asphaltic Emulsions" diluted with water to 5 parts water to 1 part asphaltic emulsion.

D. Asphalt Concrete:
1. Asphalt Binder:
   a. Type PG 64-10 per SS-CDOT Section 92 "Asphalts".
2. Aggregate:
   a. Type B in accordance with SS-CDOT Section 39 "Hot Mix Asphalt".
      1) Provide one-half inch (1/2") aggregate at playcourt, tennis and basketball courts, walkways, and playground areas.
      2) Provide three-fourths inch (3/4") aggregate at on-site parking lots, roadways, and driveways.

E. Sealers:
1. Seal Coat:
   a. In accordance with SS-CDOT Section 37-2 "Seal Coats" and Section 94 "Asphaltic Emulsions".
      1) Section 37-2.04 "Payment" is exempt from this specification.
   b. Asphaltic emulsion shall be any of the slow-setting grades.
   c. Water shall be potable.
   d. Screenings shall be Fine, 1/4" max..
2. Slurry Seal:
   a. In accordance with SS-CDOT Section 37-3"Slurry Seal and Micro-Surfacing• " and Section 94 "Asphaltic Emulsions".
      1) Section 37-3.04 "Payment• is" exempt from this specification.
   b. Asphaltic emulsion shall be either Grade QS1h anionic or Grade CQS1h cationic.
   c. Water shall be potable.
   d. Aggregate shall be [Type I][Type II][Type III] rock dust or sand such as plaster sand.
      1) Total Percentage Passing Sieves

SIEVE SIZE	PERCENTAGE		
	TYPE I	TYPE II	TYPE III
3/8•	--	100	100
NO. 4	100	94-100	70-90
NO. 16	60-90	40-70	28-50
NO. 18	90-100	65-90	45-70
NO. 30	40-65	25-50	19-34
NO. 200	10-20	05-15	05-15

   e. Mineral filler shall be any combination of type I, II, or III cement.

F. Coating System
1. Manufacturer's standard system formulated for exterior application on asphalt paving surfaces.
   a. Waterborne, epoxy modified acrylic coating.
   b. Shall meet the following minimum performance characteristics:
      1) Taber Wear Abrasion Dry 0.98 g/1000 cycles min.

a) Per ASTM D 4060 "Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser".

2) Taber Wear Abrasion Wet 3.4 g/1000 cycles min.

a) Per ASTM D 4060 "Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser".

3) Shore Hardness 63 type D min.

a) Per ASTM D 2240 "Standard Test Method for Rubber Property – Durometer Hardness".

4) Permeance 3.45 g/m. sq/hr max. (52 miles).

a) Per ASTM D 1653 "Standard Test Methods for Water Vapor Transmission of Organic Coating Films".

c. Color selection as indicated in attached Appendix.

2.3 ACCESSORIES

A. Markings:

1. Paint:

a. In accordance with SS-CDOT Section 84-3 "Painted Traffic Stripes and Pavement Markings".

1) Section 84-3.04 "Payment" is exempt from this specification.

b. Waterborne latex paint meeting Federal Specification TT-P-1952E, Type II.

B. Wheel Stops:

1. Pre-cast, air-entrained concrete meeting 2500 psi minimum compressive strength at 28 days.
2. Each wheel stop shall be [48][60] inches long, 6 inches high, and 9 inches wide.
3. Provide chamfered corners and drainage slots on the underside.
4. Provide two dowel holes per stop for anchoring to substrate.

a. Each dowel shall be 3/4 inch diameter galvanized steel a minimum of 12 inches in length.

C. Joint Sealant:

1. Hot-applied, single component, polymer-modified bituminous sealant meeting ASTM D 6690 "Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements", Type I, II, or III.

D. Headers:

1. Rough Sawn, Construction Heart grade redwood per RIS.
2. RIS Grade mark shall appear on each piece of header lumber.
3. Stakes shall be rough sawn redwood.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.

a. Verify subgrade has been compacted to relative compaction required and is within allowable moisture content.

b. Verify gradients and elevations of base are correct.
c. Verify stockpiled pulverized asphalt is suitable for using as Class 2 aggregate base by reviewing test reports.

2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
2. Do not begin work until [sub-grade][existing pavement] is in a condition satisfactory to the Architect [and Geotechnical Engineer].

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Completely proof-roll subgrade and/or aggregate base to identify soft pockets and areas of excess yielding.
   a. Do not proof-roll when wet or saturated conditions exist.
   b. Excavate soft spots, unsatisfactory subgrade or base, and areas of excessive pumping or rutting and replace with compacted backfill per Specification Section - EARTHWORK or Aggregate Base.
2. Coordinate with Specification Section – SOIL TREATMENT for application of herbicides.
3. Prepare surface in accordance with manufacturer's written instructions and recommendations.
4. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
5. Clean existing pavement surface of loose and deleterious material.
6. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
   a. Mill to a depth of [1-1/2 inches][2 inches][3 inches].
   b. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.
   c. Control rate of milling to prevent tearing of existing asphalt course.
   d. Repair or replace curbs, manholes, and other construction damaged during cold milling.
   e. Keep milled pavement surface free of loose material and dust.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.

B. Layout:
1. Lines shall be straight and true.

C. New Pavement:
   1. Aggregate Base:
      a. Install Aggregate Base over approved sub-grade.
      b. Thickness shall be as indicated.
      c. Compaction of each layer shall be not less than 95 percent as determined by Caltrans California Test Method No. 216 "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates", in accordance with SS-CDOT.
      d. Recycled Asphalt as Aggregate Base:
         1) Remove deleterious debris, organics and pieces larger than 3 inches encountered within the stockpile before placement.
   2. Tack Coat:
      a. Apply uniformly to vertical surfaces abutting or projecting into new asphalt concrete paving at a rate of 0.05 to 0.15 gal/sq. yd including concrete curbs and utility boxes.
         1) Allow tack coat to cure undisturbed before applying asphalt concrete paving.
         2) Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
   3. Asphaltic Concrete paving:
      a. Contact Architect [and Geotechnical Engineer] 72 hours prior to installation.
      b. Thickness shall be as indicated.
         1) Where thickness exceeds 2 inches, place in no less than two layers.
      c. Compaction Equipment:
         1) In accordance with SS-CDOT Section 39 "Hot Mix Asphalt". At small difficult areas, equipment may be altered as approved by the Architect [and Geotechnical Engineer].
      d. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities, and be true to grade, slope and cross-section so that no standing water occurs.
      e. Tolerances:
         1) Flatness: Maximum variation of 1/4 inch measured with a 12 foot straight edge.
         2) Thickness: Not less than specified thickness.

D. Refinish Pavement:
   1. Crack and Joint Filling:
      a. Clean cracks and joints in existing asphalt concrete pavement.
      b. Use tack coat asphaltic emulsion to seal cracks and joints less that 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
      c. Use Joint Sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

E. Reconstruct Pavement:
   1. Crack and Joint Filling:
      a. Clean cracks and joints in existing asphalt concrete pavement.
      b. Use tack coat asphaltic emulsion to seal cracks and joints less that 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
      c. Use Joint Sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
   2. Aggregate Base:
      a. Install Aggregate Base over approved sub-grade.
      b. Thickness shall be as indicated.

c. Compaction of each layer shall be not less than 95 percent as determined by Caltrans California Test Method No. 216 "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates", in accordance with SS-CDOT.

3. Tack Coat:
   a. Apply uniformly to vertical surfaces abutting or projecting into new asphalt concrete paving at a rate of 0.05 to 0.15 gal/sq. yd including concrete curbs and utility boxes.
      1) Allow tack coat to cure undisturbed before applying asphalt concrete paving.
      2) Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
4. Asphaltic Concrete paving:
   a. Contact Architect [and Geotechnical Engineer] 72 hours prior to installation.
   b. Thickness shall be as indicated.
      1) Where thickness exceeds 2 inches, place in no less than two layers.
   c. Compaction Equipment:
      1) In accordance with SS-CDOT Section 39 "Hot Mix Asphalt". At small difficult areas, equipment may be altered as approved by the Architect [and Geotechnical Engineer].
   d. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities, and be true to grade, slope and cross-section so that no standing water occurs.
   e. Tolerances:
      1) Flatness: Maximum variation of 1/4 inch measured with a 12 foot straight edge.
      2) Thickness: Not less than specified thickness.

F. Patching:
1. Crack and Joint Filling:
   a. Clean cracks and joints in existing asphalt concrete pavement.
   b. Use tack coat asphaltic emulsion to seal cracks and joints less that 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
   c. Use Joint Sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
2. Aggregate Base:
   a. Install Aggregate Base over approved sub-grade.
   b. Thickness shall be as indicated.
   c. Compaction of each layer shall be not less than 95 percent as determined by Caltrans California Test Method No. 216 "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates", in accordance with SS-CDOT.
3. Tack Coat:
   a. Apply uniformly to vertical surfaces abutting or projecting into new asphalt concrete paving at a rate of 0.05 to 0.15 gal/sq. yd including concrete curbs and utility boxes.
      1) Allow tack coat to cure undisturbed before applying asphalt concrete paving.
      2) Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
4. Asphaltic Concrete paving:
   a. Contact Architect [and Geotechnical Engineer] 72 hours prior to installation.
   b. Thickness shall be as indicated.
      1) Where thickness exceeds 2 inches, place in no less than two layers.
   c. Compaction Equipment:

1) In accordance with SS-CDOT Section 39 "Hot Mix Asphalt". At small difficult areas, equipment may be altered as approved by the Architect [and Geotechnical Engineer].

d. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities, and be true to grade, slope and cross-section so that no standing water occurs.

e. Tolerances:

1) Flatness: Maximum variation of 1/4 inch measured with a 12 foot straight edge.

2) Thickness: Not less than specified thickness.

G. Wheel Stops:

1. Securely attach Wheel Stops to pavement with not less than two dowels embedded at one-quarter to one-third points after all products have been applied to finished surface. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

3.4 APPLICATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:

1. Lines shall be straight and true.

C. New Pavement:

1. Sealers:

a. Allow Asphaltic Concrete to cure 21 days minimum.

b. Broom clean asphaltic concrete.

c. Apply in accordance with SS-CDOT Section 37 "Bituminous Seals"

d. The finished surface shall be smooth and uniform in appearance.

1) Apply Fog Seal [at all pavement] [where indicated] at the application rate of 0.02 to 0.06 gal/sq. yd.

2) Apply Walk Seal [re-surfacing mix] [leveling mix] where indicated.

3) Apply two Slurry Seal coats [at all pavement][where indicated] according to approved mix design.

a) When the first coat is dry enough to walk on without picking the material up, a second coat shall be applied without mineral filler.

b) If existing depressions are such that the aggregate still protrudes after the second coat of asphalt based sealer has been applied, the Contractor shall apply a third coat when so directed be the Architect [and the Geotechnical Engineer].

2. Coating System:

a. Apply [three layers of top coating with a total dry film thickness of 15 mil] [two layers of base coating and two layers of top coating with a dry film thickness of 19 mil] where indicated.

b. The pavement surface shall be completely dry and clean prior to application of coating system.

c. The first layer of coating shall be spray applied then broomed to work the coating material into the pavement surface. Subsequent layer applications shall be sprayed then broomed or rolled.
d. Each application of coating material shall be allowed to dry to the touch before applying the next layer.
e. Do not allow traffic until coating system has completely dried and cured.

D. Refinish Pavement:
1. Sealers:
a. Allow Asphaltic Concrete at patch conditions to cure 21 days minimum.
b. Broom clean asphaltic concrete.
c. Apply in accordance with SS-CDOT Section 37 "Bituminous Seals".
d. The finished surface shall be smooth and uniform in appearance.
e. Sealer type:
1) Apply Flush Seal asphaltic emulsion [at all pavement] [where indicated] at the application rate of 0.02 to 0.06 gal/sq. yd.
a) Spread sand before asphaltic emulsion begins to set.
2) Apply Seal Coat where indicated at the application rate of [0.30-0.40 gal/sq. yd. for coarse screenings][0.25-0.40 gal/sq. yd. for medium screenings][0.25-.0.35 gal/sq. yd. for medium fine screenings][0.15-0.30 gal/sq. yd for fine screenings].
a) Spread screenings before asphaltic emulsion begins to set.
3) Apply two Slurry Seal coats [at all pavement][where indicated] according to approved mix design.
a) When the first coat is dry enough to walk on without picking the material up, a second coat shall be applied without mineral filler.
b) If existing depressions are such that the aggregate still protrudes after the second coat of asphalt based sealer has been applied, the Contractor shall apply a third coat when so directed be the Architect [and the Geotechnical Engineer].
4) Apply Parking Area Seal [at all pavement][where indicated] according to approved mix design.
2. Coating System:
a. Apply [three layers of top coating with a total dry film thickness of 15 mil] [two layers of base coating and two layers of top coating with a dry film thickness of 19 mil] where indicated.
b. The pavement surface shall be completely dry and clean prior to application of coating system.
c. The first layer of coating shall be spray applied then broomed to work the coating material into the pavement surface. Subsequent layer applications shall be sprayed then broomed or rolled.
d. Each application of coating material shall be allowed to dry to the touch before applying the next layer.
e. Do not allow traffic until coating system has completely dried and cured.

E. Reconstruct Pavement:
1. Sealers:
a. Allow Asphaltic Concrete to cure 21 days minimum.
b. Broom clean asphaltic concrete.
c. Apply in accordance with SS-CDOT Section 37 "Bituminous Seals".
d. The finished surface shall be smooth and uniform in appearance.
e. Sealer type:

1) Apply Fog Seal [at all pavement][where indicated] at the application rate of 0.02 to 0.06 gal/sq. yd.
2) Apply Walk Seal [re-surfacing mix][leveling mix] where indicated.
3) Apply two Slurry Seal coats [at all pavement][where indicated] according to approved mix design.
   a) When the first coat is dry enough to walk on without picking the material up, a second coat shall be applied without mineral filler.
   b) If existing depressions are such that the aggregate still protrudes after the second coat of asphalt based sealer has been applied, the Contractor shall apply a third coat when so directed be the Architect [and the Geotechnical Engineer].

2. Coating System:
   a. Apply [three layers of top coating with a total dry film thickness of 15 mil][two layers of base coating and two layers of top coating with a dry film thickness of 19 mil] where indicated.
   b. The pavement surface shall be completely dry and clean prior to application of coating system.
   c. The first layer of coating shall be spray applied then broomed to work the coating material into the pavement surface. Subsequent layer applications shall be sprayed then broomed or rolled.
   d. Each application of coating material shall be allowed to dry to the touch before applying the next layer.
   e. Do not allow traffic until coating system has completely dried and cured.

F. Patch Pavement:
1. Sealers:
   a. Allow Asphaltic Concrete to cure 21 days minimum.
   b. Broom clean asphaltic concrete.
   c. Apply in accordance with SS-CDOT Section 37 "Bituminous Seals".
   d. The finished surface shall be smooth and uniform in appearance.
   e. The new asphalt concrete shall be flush with adjacent existing pavement.
   f. Sealer type:
      1) Apply Fog Seal [at all pavement][where indicated] at the application rate of 0.02 to 0.06 gal/sq. yd.
      2) Apply Walk Seal [re-surfacing mix][leveling mix] where indicated.
      3) Apply two Slurry Seal coats [at all pavement][where indicated] according to approved mix design.
         a) When the first coat is dry enough to walk on without picking the material up, a second coat shall be applied without mineral filler.
         b) If existing depressions are such that the aggregate still protrudes after the second coat of asphalt based sealer has been applied, the Contractor shall apply a third coat when so directed be the Architect [and the Geotechnical Engineer].

G. Markings:
1. Allow Asphalt Concrete and Seal coats to cure per manufacturers recommendations before applying paint.
2. Sweep and clean surface to eliminate loose material and dust.
3. Apply uniform, straight, and true markings with equipment designed for pavement markings. Edges and ends shall be sharp and clean
4. Apply with a minimum dry film thickness of 15 mils.
5. Colors, lengths, and widths as indicated.
   a. Width Tolerance shall be plus or minus 1/8 inch.

6. Allow markings to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

3.5 REPAIR

A. Markings:
1. Remove and replace markings that are applied at less than minimum material rates, deviate from true alignment, exceed length and width tolerances, or show light spots, smears, or other deficiencies.
2. When removing markings avoid damage to the surface which the marking was applied. Use carefully controlled sand blasting, approved grinding equipment, or other approved method.

B. FIELD QUALITY CONTROLSite Tests:
1. As required by local jurisdiction for off-site development.
2. Compaction of aggregate base:
   a. Per CAL Test Method 216-00 "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates".
3. In-place compacted thickness:
   a. Core and measure thickness of aggregate base and asphalt paving per ASTM D 3549 "Standard Test Method for Thickness of Height of compacted Bituminous Paving Mixture Specimens".
   b. Core and measure at high and low elevation points of each road section and parking lot.
   c.
4. Stockpiled pulverized asphalt as aggregate base:
   a. Sieve Analysis shall be performed per ASTM C 136 "Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates".
   b. Maximum Density /Optimum Moisture per CAL Test Method 216-00 "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates".
   c. Resistance Value per CAL Test Method 301” Method of Test for Determining the Resistance "R Value of Treated and Untreated Bases, Subbases and Basement Soils by the Stabilometer".
5. Drainage:
   a. Water shall not be able to accumulate at any point and the surface shall be free to drain to drainage inlets or gutters.
   b. The paving contractor shall water flood the surface with the use of a water truck. If, after 30 minutes on a 70 degree F day, "bird baths" are evident in a depth more than 0.01 foot, the paving contractor and the Owner's representative will determine the best method of correction.
   c. A 10 foot straightedge shall be used to check for high spots and ridges. High spots and ridges out of compliance shall be reduced by a remedy determined by the paving contractor and the Owner's representative.
6. Should a section of the work be not acceptable on the basis of inadequate compaction and/or the mixture becomes loose and broken, mixed with dirt, out of tolerance, or in any other way defective, it shall be repaired or removed and replaced with fresh mixture and immediately compacted to conform to the surrounding area to the satisfaction of the Owner.

C. Inspection:
1. As required by local jurisdiction for off-site development.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.

3. No work shall be done without the inspections required.

3.6 CLEANING

A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS.
   1. Clean any soiled surfaces immediately.
   2. In accordance with manufacturer's instructions and recommendations.

3.7 PROTECTION

A. Protection from traffic:
   1. No traffic shall occur over pavement until all materials have fully cured.
   2. Maintain in a manner acceptable to manufacturer and installer.
   3. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly applied materials.
   4. Maintain and protect installed improvements without damage or deterioration until execution of Substantial Completion.

END OF SECTION

SECTION 32 18 16 - CLAY INFIELD SURFACING

PART 1 - GENERAL

1.1 SCOPE

A. Drawings and general provisions of the Contract, including General Conditions apply to work of this section.

B. The Contractor shall provide all materials, labor and equipment to complete the work that includes but is not limited to the following:
   1. Subgrade excavation, grading and preparation of areas receiving skinned surfacing.
   2. Skinned infield and warning track surfacing.
   3. Mound clay at pitching rubber and homeplates.

1.2 Related Sections:

A. Section 312000: Earthwork: Excavation, Filling and Grading

1.3 DEFINITIONS

A. Definitions are described in ASTM F2107 – Standard Guide for Construction and Maintenance of Skinned Areas on Sports Fields.

1.4 REGULATORY REQUIREMENTS

A. Hauling Routes and Restrictions: Comply with requirements of governing authorities having jurisdiction over the Work.

B. Fees: Pay fees and post bonds for import, export and/or disposal of earth and rock materials as required by authorities having jurisdiction over the Work.

1.5 SUBMITTALS

A. Submit in accordance with 01 33 00.

B. Source Data: Submit the source location or manufacturer of the surfacing material.

C. Submit a one gallon bag sample of each type of materials and provide a sieve analysis for each per ASTM D422 or C136 as appropriate.

1.6 QUALITY ASSURANCE

A. Obtain acceptance of the proposed surfacing materials prior to import.

1.7 DELIVERY, STORAGE AND HANDLING

A. Do not install surfacing materials during rainy or windy conditions.

AD6

1.8 ADDITIONAL MATERIALS FOR OWNER'S USE

A. Provide the following additional materials for surfacing repair, deliver and offload to a designated Owner storage area as directed.
   1. Eight (8) cubic yards of each type of surfacing material
   2. Six (6) - 50 pound bags of mound clay

PART 2 - PRODUCTS

2.1 SKINNED INFIELD SURFACING

A. Skinned infield surfacing material shall be Rosenbalm 60/40 mix, Gail Materials Pro-Gold Infield mix or equal.

2.2 WARNING TRACK SURFACING

A. Warning track surfacing material shall be Rosenbalm Warning Track mix with Stabilizer, Gail Materials Pro-Gold Organic-Lock Cinder Warning Track Mix, or equal

2.3 MOUND CLAY

A. Clay manufactured for baseball/softball use for stabilizing the surfaces at pitcher's rubbers and batting/catchers boxes shall be Hilltopper Mound Clay by Stabilizer Solutions, Pro's Choice Pro Mound, or equal.

2.4 BALLFIELD PLATES and BASES

A. See Section 11 68 33.

PART 3 - EXECUTION

3.1 PREPARATION

A. Locate, identify and protect all existing above or below grade utilties from damage.
B. The subgrade shall be laser graded to elevations below the finish grades for the minimum surfacing section depth as indicated on the Drawings. The subgrade shall be scarified to a minimum depth of 6", compacted and/or rolled to a minimum 90% relative density. Subgrade shall then be dragged or floated to provide a uniform surface, free from any irregularities.

AD6

3.2 INSTALLATION OF SKINNED SURFACING

A. Place the specified necessary depth of material over the subgrade to the required finish grades. Maintain optimal moisture levels for compaction. Compact the material with suitable compaction equipment to provide at least 90% relative compaction. Surface shall be filled as required and rolled to a firm, smooth, uniform plane surface with proper drainage and slopes.

B. Laser grade the top surface to a tolerance of ¼ inch, plus or minus, over any 10 foot distance. Drag the top surface to produce a ¼ inch cap of loose surfacing material.

3.3 INSTALLATION OF MOUNDING CLAY

A. After the skinned surfacing has been installed and compacted, excavate the area to receive mounding clay to a depth of 3.5 inches. Moisted the subgrade if dry prior to the installation of mounding clay.

B. Install the mound clay per the manufacturer's specifications. Place in maximum 2" lifts, compacting with a hand tamper. Repeat with the second lift until mound clay is 0.5 inches below the finished grade of the skinned surfacing. Cover the mounding clay with skinned surfacing material and roll or tamp to compact. Finish shall be firm, smooth and flush to the adjacent surfaces, and dressed in the same manner as the surrounding surface.

3.4 TURFGRASS & SKINNED INFIELD/WARNING TRACK EDGES

A. Prevent skinned surfacing material buildup at the edge ("lip") of the adjoining turfgrass. Remove any buildup at the lip by a rigid-tooth rake or a rotating coarse brush specifically designed for such use. Do not use a high pressure water stream. Dress the area directly adjacent to the lip to match the rest of the skinned area.

3.5 HOMEPLATE, BASES AND PITCHING RUBBERS

A. Install new in-ground items per the manufacturer's recommendations as described in Section 11 68 33. Install plugs in anchors.

3.6 PROTECTION & CLEANUP

A. Protect the Work of this section until District acceptance. Repair and/or replace at the Contractor's expense any damage to existing improvements to the satisfaction of the Owner.

B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

AD6

SECTION 321919 – ORNAMENTAL METAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to completely install all Ornamental Metal materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. ALL DIVISION 00 SPECIFICATION SECTIONS.
   2. ALL DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 08 70 00 HARDWARE
   5. 09 91 00 PAINTING
   6. 31 20 00 EARTHWORK
   7. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   8. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. ASTM American Society of Testing Materials
      b. AWS American Welding Society
      c. NAAMM National Association Of Architectural Metal Manufacturers
      d. NFPA National Fire Protection Association

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.
   1. Lightning Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.
   2. Gate system: engineer gate system according to opening width.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data.
      a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
   2. Shop Drawings.

a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
b. Provide wiring diagrams for power, signal and control wiring.
c. Layout of fence and gates with dimensions, details, and finishes of component accessories and post foundations.

3. Samples.
   a. Provide 3 inch square sample of each color selected.
   b. Provide 12 inch lineal samples of each lineal piece of trim material specified.
4. Quality Assurance/Control Submittals:
   a. Manufacturer's Written Instructions:
      1) Submit three (3) copies of manufacturer's written instructions.
5. Closeout Submittals in accordance with the following:
   a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
   b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
   c. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.

1.6 PROJECT CONDITIONS

A. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.7 OWNER'S INSTRUCTIONS

A. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below:
   1. Test and adjust controls and any safeties. Replace damaged or malfunctioning controls and equipment.
      a. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty that includes language indicating the products will be free from cracking, peeling, blistering and corroding as indicated for the Warranty Period:
      a. Warranty Period Fifteen (15) Years.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period **Five (5) years.**

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer, or approved equivalent:
      a. BUILDERS FENCE COMPANY.
      b. Acceptable alternative manufacturers:
         1) AMERISTAR.
         2) MASTER HALCO.
   2. Specified hinge product manufacturer, or approved equivalent:
      a. McMASTER-CARR at Service Gates.
      b. LOXINOX at Man Gates.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Steel and Iron, typical:
   1. Plates, Shapes, and Bars: ASTM A 36 “Standard Specification for Carbon Structural Steel”.
   2. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A 29 “Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for”, Grade 1010.
   3. Tubing:
      a. Galvanized-Steel Sheet: ASTM A 653 “Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process• ,structural quality, Grade 50, with G90 coating.
         1) Posts zinc coated outside and painted inside, are unacceptable.
   4. Steel Sheet:
      a. Galvanized-Steel Sheet: ASTM A 653 “Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process• ,structural quality, Grade 50, with G90 coating.
      b. Uncoated Steel Sheet:
         1) Hot-Rolled Steel Sheet, ASTM A 1011 “Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength”, Structural Steel, Grade 45.
         2) Cold-Rolled Steel Sheet, ASTM A 1008 “Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable”, Structural Steel, Grade 50.
   5. Bars: Hot-rolled steel strip, ASTM A 1011 “Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength”, Commercial Steel, Type B.
   6. Castings: Either gray or malleable iron unless otherwise indicated.
      a. Gray Iron: ASTM A 48 “Specification for Gray Iron Castings”, Class 30.
      b. Malleable Iron: ASTM A 47 “Specification for Ferritic Malleable Iron Castings”.

2.3 COMPONENTS

A. Fence:
   1. Posts (Line, End, Corner, and Gate):
      a. Provide Square Tubing.
      b. Metal shall be Steel Sheet, hot-dip galvanized after fabrication.
      c. Size shall be per drawings.
      d. Cap top of posts with flat style formed galvanized metal, weather tight closures. Weld to posts.
   2. Rails (Top, Intermediate, and Bottom):
      a. Provide Square Tubing.
      b. Metal shall be Steel Sheet, hot-dip galvanized after fabrication.
      c. Size shall be per drawings.
   3. Pickets:
      a. Provide Square Tubing.
      b. Metal shall be Steel Sheet, hot-dip galvanized after fabrication.
      c. Size shall be per drawings.
      d. Cap top and bottom of pickets with flat style formed galvanized metal, weather tight closures. Weld to pickets.

B. Gates:
1. Frames for man-gates and service gates:
   a. Provide Square Tubing.
   b. Metal shall be Steel Sheet, hot-dip galvanized after fabrication.
   c. Size shall be per drawings.
   d. Miter cut and weld gate frames.
2. Truss:
   a. Provide galvanized 5/8” round diagonal tie-rod and turnbuckle at service gate frames.
   b. Weld to gate frame
3. Hardware:
   a. Singe Man Gate Hinges
      1) Hinges shall be LOXINOX Mamoth 180, Black.
   b. Double Service Gate Hinges
      1) Hinges shall be hot-dipped galvanized with stainless steel pins. Weld hinges to gate post and gate frame. Size and locate hinges to support load of gate plus 400 lbs.
      2) At service gates, provide a minimum of 4 load-rated heavy-duty butt hinges per leaf.
   c. Closers:
      1) Man Gates
         a) LOXINOX Mamoth 180, Black.
      2) Sevice Gates
         a) Manual.
   d. Exit Device at Man Gates:
      1) Coordinate with Specification Section – HARDWARE.
   e. Locksets:
      1) Coordinate with Specification Section – HARDWARE.
   f. Padlocks:
      1) Coordinate with Specification Section – HARDWARE.
   g. Drop-Rods:
      1) At Service Gates provide hot-dipped galvanized drop-rod assembly comprised of a minimum of two weld-on guides, two weld-on lock tabs for padlock, two drop-rod ground sleeves, and drop-rod for each service gate leaf.
      2) Length of drop-rod as shown on the drawings.
   h. Lockboxes:
      1) Provide weldable hot-dipped galvanized steel lockboxes that coordinate with locksets and cylinders as specified in Specification Section - HARDWARE for size.
   i. Strike Strap:
      1) Provide weldable hot-dipped galvanized strike strap for each leaf of each gate.

2.4 ACCESSORIES

A. Accessories:
1. Metal Panels:
   a. Provide galvanized, perforated metal panels of 16 gage with 3/16” round perforations, staggered at 1/4” centers creating 50% open area. Dimensions as indicated on the drawings.

2. Fasteners:
   a. Where items are not called to be welded, fasten components with tamper-proof stainless steel fasteners sized and spaced per installers and manufacturer's written recommendations.
3. Operating Features:

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Concrete: Coordinate with Specification Section – CAST-IN-PLACE CONCRETE.

C. Nonshrink Grout: Coordinate with Specification Section – CAST-IN-PLACE CONCRETE.

2.6 GROUNDING MATERIALS

A. Grounding Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
   1. Material above Finished Grade: Aluminum.
   2. Material on or below Finished Grade: Aluminum.
   3. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.

B. Grounding connectors and Grounding Rods: Comply with UL 467.
   1. Connectors for Below-Grade Use: Exothermic-welded type.
   2. Grounding Rods: Copper-clad steel.
      a. Size: 5/8 by 96 inches.

2.7 FINISHES

A. Galvanized Finish: Clean welds, mechanical connections, and abraded areas and repair galvanizing to comply with ASTM A 780 "Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings".
   1. Provide an **EM-4** Finish in color as selected by the Architect. Coordinate with Specification Section – PAINTING.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which, affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

C. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

D. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.

B. Layout:
   1. Lines shall be straight and true.

C. General:
   1. Install fence in accordance with manufacturer’s written instructions.
   2. Space posts uniformly at 8’-0” maximum o.c. unless otherwise indicated.
   3. Concrete Set Posts:
      a. Drill hole in firm, undisturbed or compacted soil.
      b. Holes shall have diameter 4 times greater than nominal outside dimension of post, and depths approximately 6” deeper than post bottom.
      c. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads.
      d. Set post bottom 36” (914 mm) below surface when in firm, undisturbed soil.
      e. Place concrete around post in a continuous pour.
      f. Vibrate or tamp for consolidation.
      g. Protect aboveground portion of posts from concrete splatter.
      h. Trowel finish around posts and slope to direct water away from posts.
      i. Gate Posts and Hardware: Set keepers, stops, sleeves and other accessories into concrete.

D. Weld Installation:
   1. Align fence panels between posts. Attach rails to posts by welding. Miter cut rails to fit orientation of posts. Posts shall remain plumb.
   2. Weld pickets to rails and gate frames. Spacing per drawings.
   3. Pickets and posts shall be plumb. The top of pickets and posts shall be level.

4. Cut bottom of pickets to adjust to walk/ground contour as indicated on the drawings.
   a. Replug bottoms when cutting to conform to ground/contours.
5. Install gates plumb, level, and secure for full opening without interference.
6. Pickets on gate frame shall be level to fence panels.
7. Install gates to meet swing directions as indicated on the drawings.
8. Attach gate hardware by means, which will prevent unauthorized removal.
9. Adjust gate hardware form smooth operation.
10. Clean welds and grind smooth. Apply galvanizing repair paint. Field paint per paragraph in Part 2 titled FINISHES within this specification section.

E. Bolt Installation:
1. Check each post for vertical and top alignment, and maintain in position during placement and finishing operation.
2. Align fence panels between posts. Firmly attach rail brackets to posts with 1/4” (6 mm) bolt and lock nut, ensuring panels and posts remain plumb.
3. Do not field-weld.

F. Gate Installation
1. Install gates plumb, level and secure for full opening without interference.
2. Attach hardware by means, which will prevent unauthorized removal.
3. Adjust hardware for smooth operation.

3.4 GROUNDING AND BONDING

A. Fence Grounding: Install at maximum intervals of 1500 feet except as follows:
1. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
   a. Gates and Other Fence Openings: Ground fence on each side of opening.
      1) Bond metal gates to gate posts.
      2) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.

B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of crossing.

C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.

D. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location.

E. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.

F. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.5 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Lubricate hardware**, gate operators,** and other moving parts.

END OF SECTION

1/4 inch diameter, vinyl-coated steel cable, end sticks, center strap and anchor, and all other material necessary to complete installation.

Edwards Sports Product Ltd. is distributed by NJP Sports, Inc., 548 West Arden Avenue, Glendale, California 91203.

2.3 COLORED SURFACING SYSTEM

A. The colored surfacing system shall be in accordance with Section 4, COURT SURFACING SYSTEM.

2.4 PLAYING LINE PAINT

A. The colored surfacing system shall be in accordance with Section 4, COURT SURFACING SYSTEM.

2.5 EXPANSION JOINTS

A. A non extruding pre-molded expansion joint comprised of felt expansion material measuring (3/4") inch wide shall be installed vertically to all court edges at fencing mowstrips. A metal keyway joint shall be installed vertically at the net line spanning the full width and depth of the slab. The bottom edge of the joint materials shall extend into the base rock subgrade and the top edge shall terminate near the concrete surface per the Plan Details.

B. A two-component, pourable, self-leveling, fast curing, polyurethane elastomeric sealant shall be installed above the felt material in conformance with the details shown on plans. Sealant shall be SikaFlex 2C-SL, or approved equal, and installed per the manufacturer's recommendations. Color of sealant shall be approved by District, prior to installation.

C. Edges of joints shall be tooled with an edging tool having a radius of one-half inch (½").

2.6 PORTLAND CEMENT CONCRETE

A. Compressive strength of 3,500 psi at 28 days, portland cement concrete shall be furnished in conformance with this section and Section 3, CONCRETE MATERIALS and placing of these Tennis Court Construction Specifications.

2.7 STEEL REINFORCEMENT

A. Steel rebar shall be furnished and installed in accordance with Section 2, CONCRETE REINFORCEMENT of these Specifications.

2.8 POST-TENSIONING

A. Post-tensioning cables shall consist of seven wire stress-relieved strands, conforming to ASTM A 416, with an ultimate strength of 270 KSI. Strands shall be coated with a permanent rust preventative lubricant and wrapped with plastic sheathing. If strand sheathing is damaged or removed, it is to be repaired by taping.

2.9 AGGREGATE SUB-BASE

A. Class II non-reactive aggregate sub-base shall be furnished and placed in accordance with the general paving specifications that are included in this specification document.

2.10 SUBGRADE

A. Subgrade shall be prepared in accordance with the general paving specifications that are included in this specification document.

2.11 TENNIS COURT LIGHTING SYSTEM

A. Tennis court lighting system shall be provided and installed in accordance with these Specifications and the Electrical Specifications found elsewhere in this document.

2.12 MOISTURE/VAPOR BARRIER

A. The moisture/vapor barrier shall be "Stego Wrap 15-mil Vapor Barrier", manufactured by Stego Industries, LLC, 27442 Calle Arroyo, San Juan Capistrano, CA 92675, or approved equal. The barrier shall be a minimum of 15 mil thickness. The tape product used shall be from the same manufacturer as the barrier. Installation of barrier and tape shall be in accordance with manufacturer's recommendations and Section 2, CONCRETE REINFORCEMENT.

PART 3 - EXECUTION

3.1 PLACING CONCRETE

A. Finished subgrade and footing excavations shall be thoroughly watered 12 to 15 hours prior to placing of concrete.

B. No concrete shall be placed without approval by the Engineer. This operation shall be carried on only in the presence of the Engineer. The Contractor shall give 24 hours advance notice before placing any concrete. Concrete shall be placed and finished in conformance with ACI recommendations for hot or cold weather conditions if present.

C. All tennis court concrete must be placed by pumping. Except for the laser screed, concrete ready mix truck or other vehicles will not be allowed to drive on the reinforcing steel or post-tensioning cables of a court.

D. Once concrete placing is started, it shall be carried through in a continuous, monolithic operation between predetermined expansion joints as shown on the drawings. Under no circumstances shall concrete, which has partially hardened, be deposited in the work. Retempering of concrete will not be allowed.

E. All concrete shall be sufficiently tamped and manipulated in place to insure proper compaction, elimination of air pockets and flow around all reinforcing steel post-tensioning embedded fixtures and into corners of all forms.

F. No concrete shall be placed during rain or dust storms. If such storms should develop immediately after placement of concrete, the finished concrete shall be protected by means of plastic sheeting, canvas, "Sisalkraft" paper or other approved covering. This covering shall be provided on the job site prior to placing concrete.

3.2 FINISHING

A. The Contractor shall submit three samples of the concrete finishing and acrylic color surfacing system for approval. Each sample to be 3' x 3' slab samples as required for selection of texture and color of slab finish. The sample meeting approval will be retained by the Engineer for comparative purposes.

B. The finish surface of the concrete slab shall be brought to a true and even plane by two wood floatings and two steel trowelings. Following this, the slabs shall receive a fine, soft broom finish. The final concrete surface finish texture shall be in accordance with the recommendations of the manufacture of the acrylic color finish system. Only skilled workmen with 5 years of experience in this type of finish are to be employed in concrete finishing work.

C. The Contractor may vary the specified process for slab finishing by obtaining written approval from the Engineer. The Contractor shall submit, in triplicate, a written statement describing any variations he proposes in the specified finishing process, two copies of which will be retained by the Engineer and the third copy returned as approved to the Contractor.

D. The slab shall be finished, shall be true to line, plane and elevations as shown on the drawings. Finished concrete slab surfaces shall not deviate from a flat plane more than 1/8 of 1 inch when tested with a 10 foot straight edge held in any direction. The Contractor shall furnish and maintain in good condition a 10 foot straight edge for use by the Engineer.

E. Any slab showing a greater variation than the specified 1/8 of 1 inch in 10 feet and/or showing voids or separation of the aggregates and/or showing a texture not in conformance with the accepted sample shall be corrected in accordance with the provisions contained in Appendix “A” of these specifications.

3.3 STRESS OF CABLE

A. A maximum of 6” exposed strand is permitted at the anchor. End anchorage devices will conform to Post-Tensioning Institute (PTI) specifications. All dead end anchorages must be power seated. All strands are to be supported on chairs and tied at all intersections or securely supported in beams to prevent vertical and horizontal movement during concrete placement. Cables should be laid out in grids at 3’ on center both ways. Concrete must be well consolidated, especially in the vicinity of strand anchorages. Strands should be anchored at 28.9 KIPS, but may be initially stressed at 33 KIPS. A 9” diameter centered on the strand axis by a 36” length should be allowed for stressing equipment clearance. The stressing process generates tremendous pressures and extreme care should be taken to prevent injury from operator error or failure of equipment or materials.

3.4 CURING

A. Immediately after finishing and final set, the Contractor shall moist-cure concrete without the use of curing compounds. Slab surfaces shall be covered with plastic sheeting, after finishing operation, for protection from injury and for proper curing. Sheeting shall be securely held in place at all edges and throughout the middle area of the sheeting to prevent wind from tearing or uncovering the concrete and to prevent drying out of the concrete during the curing period. The concrete shall be kept continuously wet for a period of at least 14 days after having taken its final set. After the concrete curing period, the Contractor shall remove protective covering from the tennis courts. No mechanical equipment shall be allowed on the courts during the curing period.

3.5 TESTS AND QUALITY CONTROL

A. Aggregate and concrete testing shall be performed by a testing laboratory to be selected by the Engineer after the contract has been awarded.

B. Aggregates shall be tested for and shall meet the requirements of Section 3, CONCRETE MATERIALS AND PLACEMENT. Aggregates shall be sampled at their production source and tested. They shall again be sampled and tested upon delivery to the ready mix plant three to four weeks prior to placement. The tests are as follows:

Test	Test Method	Requirements
Gradation	ASTM C136	ASTM C33
Specific Gravity	ASTM C127 & C128	2.5 (min.)
Potential Reactivity	ASTM C289	Sc/Rc 1.0
Soundness by Sulfate	ASTM C88	8% Loss (max.)
Organic Impurities of Sand	ASTM C40	ASTM C33

C. Plant Inspection - Prior to the batching of concrete, a laboratory representative shall visit the ready-mix plant and verify that aggregate bins have been emptied and thoroughly cleaned of all other materials and that the bins are filled with aggregates from the approved stockpile.

D. Concrete Tests - During placement operations, the Contractor, if requested, shall assist the Engineer in arranging for the performance of the following tests:

Test	Test Method	Requirements
Slump	ASTM C143	First load of each pour and when taking strength specimens, as directed by the Inspector of Record.
Compressive Strength	ASTM C31	Minimum of one set of 3 per ½ tennis court;
Samples		Minimum of one set per hour.

Samples shall be tested for compressive strength; one at seven days, and one at 28 days per set. One cylinder from each set shall be held in reserve. Concrete slump and cylinder compressive strengths shall conform to Section 3, CONCRETE MATERIALS AND PLACEMENT.

Compaction testing of court subgrade, Class II aggregate sub-base material and rock dust base material shall conform to California Test Method No. 216. Minimum compaction requirements for subgrade, Class II aggregate base material is 95% relative compaction.

E. Payment for initial testing for all concrete for compressive strength and initial compaction testing will be made by the Owner. Retesting due to failure of subgrade or Class II aggregate base material to pass compaction test shall be at the expense of the Contractor.

3.6 COURT SURFACING SYSTEM

A. Application of the court surfacing must be made by thoroughly experienced Contractors. Contractor must be able to show tennis court applications that he has completed which have been in use at least two years; and both material and application must be completely satisfactory to the Engineer.

B. The cured concrete slabs shall be approved before any color surfacing is applied. Application is to be in strict accordance with manufacturer's directions on containers.

C. The surface color system shall be furnished and applied as specified in Section 4, COURT SURFACING SYSTEM of these Specifications and in accordance with all manufacturer's application instructions.

3.7 POSTS AND TIE-DOWN EYE

A. Posts and tie-down eyes shall be installed at the locations and in conformance with the details shown on plans. It shall be the Contractor's responsibility to verify all measurements and to insure the proper working out of all details to provide a complete and functional installation.

3.8 GUARANTEE

A. The tennis court slabs, court surfacing system, nets, net posts and tie-down eyes shall be guaranteed for a period of two years from any defects in material and workmanship, and that the work has been done in accordance with the Drawings and Specifications.

SECTION 2 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 RELATED WORK DESCRIBED ELSEWHERE

A. CONCRETE MATERIALS AND PLACING: Section 3 of these Tennis Court Construction Specifications.

1.2 SUBMITTALS

A. The Contractor shall submit the following items for approval by the Engineer prior to commencing any work on the site:

B. 1. Mill test certificates identifying chemical and physical analysis of each load of reinforcing steel delivered. If mill test reports are not available and the quantity of steel for a structure exceeds 5 tons, provide a laboratory test to prove yield strength and bending.

C. 2. Drawings and placing diagrams for each grade slab including dowels and corner bars.

D. 3. On the placing diagrams, show all openings for pipelines and architectural features. Include additional reinforcing at openings and corner bar arrangements at intersecting beams, walls, and footings.

E. 4. Coordinate placing diagrams with the concrete placing schedule.

1.3 C. PRODUCT DELIVERY

A. 1. Deliver reinforcement to project site in bundles marked with tags indicating bar size and length.

B. 2. Store on wooden supports above ground surface.

PART 2 - PRODUCTS

2.1 BARS

A. Bars shall be deformed billet steel conforming to ASTM A 615, Grade 40. Mixing of steel grades will not be allowed.

2.2 TIE WIRE

A. Tie wire shall be annealed steel wire of not less than 16 gauge.

2.3 BAR SUPPORTS

A. Bar support shall be concrete or metal chairs, spacers or hangers. Reinforcing bars shall not be supported by forms.

2.4 CABLE

A. Post tension cable shall be as per Section 1, Part 2, H.

PART 3 - EXECUTION

3.1 PLACEMENT

A. Position reinforcement and cable in accordance with the drawings, secure with wire ties or suitable clips at all intersections, and support by an adequate number of concrete or metal chairs, spacers, or metal hangers such that reinforcing bars do not sag more than one quarter of an inch between supports. Do not place reinforcement or supports in contact with the forms. Bend tie wires away from the forms in order to provide the specified concrete coverage. To secure reinforcement in position, the Contractor may elect to locate bars additional to those shown on the drawings but at no additional payment.

B. Set reinforcing dowels and anchor bolts in place prior to placing concrete. Do not press them into the concrete after the concrete has been placed.

3.2 SPLICES

A. Splice bars only at locations shown on the drawings. Where splices are not detailed, lap bars 36 bar diameters and 18 inches minimum and stagger adjacent splices 48 bar diameters.

3.3 CLEANING

A. Remove dirt, form oil, excessive rust, cement coating from previous pours, and foreign matter that will reduce bond with concrete.

3.4 PROTECTION DURING CONCRETING

A. Keep reinforcing steel in proper position during concrete placement.

3.5 POST TENSIONING

A. Apply post tension on cable as per Section 1, Part 3, C. Contractor shall submit detailed operation procedures and obtain approval from the Engineer on the those procedures prior to construction.

3.6 MOISTURE/VAPOR BARRIER

A. Apply moisture/vapor barrier as per Section 1, Part 2, L. A moisture/vapor barrier shall be furnished and installed prior to installation of any steel and/or cables. All joints/seams both lateral and butt should be overlapped six inches and taped. Once in place no vehicular traffic (except for laser screed) should be allowed on the moisture/vapor barrier nor any other object which could puncture the barrier or otherwise compromise the integrity of the surface. Excessive loads at any time are unacceptable. Installation of barrier and tape shall be in accordance with the manufacturer's recommendations and the provisions contained in Appendix "A" of these specifications.

SECTION 3 - CONCRETE MATERIALS AND PLACING

PART 1 - GENERAL

1.1 RELATED WORK DESCRIBED ELSEWHERE

1. TENNIS COURT CONSTRUCTION: Section 1 of these Tennis Court Construction Specifications.

2. CONCRETE REINFORCEMENT: Section 2 of these Tennis Court Construction Specifications.

3. COURT SURFACING SYSTEM: Section 4 of these Tennis Court Construction Specifications.

1.2 B. SUBMITTALS

The Contractor shall submit the following materials for approval by the Engineer prior to placing any concrete on the site:

1. Prepare mix design for tennis court slabs and prove with laboratory 7-day and 28-day compressive strength tests prior to placing concrete on project.

2. Certificate that cement complies with ASTM C 150: designating type.

3. Certificate that aggregates comply with ASTM C 33 and the requirements of these Specifications.

During construction, the Contractor shall furnish delivery tickets or weighmaster's certificates for Ready Mix Concrete. The certificate shall include weights of cement and each size aggregate, amount of water in the aggregate, and amount of water added at the plant. The amount of water added at the job site shall be written on the certificate at time of delivery.

PART 2 - PRODUCTS

2.1 CEMENT

A. Cement shall be Portland Type II conforming to ASTM C 150.

2.2 AGGREGATES

A. Aggregates shall comply with ASTM C 33 and these Specifications.

2.3 WATER

A. Water used in mixing shall be clear and potable without unusual odor nor salty taste.

2.4 ADMIXTURES

A. No admixtures shall be used unless approved in writing by the Engineer.

2.5 CONCRETE MIX DESIGN

A. Conform to ASTM C 94 except for Section 17 on failure to meet strength requirements. Produce a mixture of cement, aggregates, and water of such consistency that it can be worked easily into the corners and angles of the forms and around the reinforcement without excessive spading and without permitting the materials to segregate or free water to collect on the surface. Adjust the proportions to secure the lowest water-cement ratio consistent with good workability, but no higher than 0.45. Select a source with sufficient aggregate stockpiled to ensure uniform moisture content and grading during any day of operation.

1. Aggregate size: 1 inch maximum.

2. Maximum slump: 4 inches.

3. Compressive strength for tennis court slab concrete: 3500 psi.

2.6 CONCRETE TESTS

A. See Section 1, TENNIS COURT CONSTRUCTION for requirements.

PART 3 - EXECUTION

3.1 READY-MIXED CONCRETE

A. Limit the haul time of central-mixed concrete so that the specified slump is attained without adding water at the site, which will exceed the mix design water-cement ratio. In no case will concrete be allowed to be placed which has been in the mixer truck for a period greater than 1.5 hours from the time that water was first added to the cement at the central-mix plant.

B. Concrete to conform to the Standard Specifications for Ready-Mixed concrete, ASTM Designation C 94. Total volume of materials mixed per batch shall not exceed the rated capacity of the mixer as determined by the standard requirements of the Associated General Contractors of America. All concrete to be in place within 1-1/2 hours after the cement is added to the aggregate.

C. The mixing to be increased if the charging and mixing operations fail to produce a concrete in which the ingredients are consistent and uniform throughout. Water to be added prior to, during, and following the mixer-charging operation. Excessive overmixing, requiring additional water to preserve the concrete consistency will not be permitted. Any mixer that at any time produces unsatisfactory results to be repaired or replaced.

D. Concrete trucks will not be allowed on finished slabs, post tension steel cables or reinforcing steel bars at any time.

3.2 INSPECTION BY CONTRACTOR PRIOR TO CONCRETE PLACING

A. The Contractor shall carry out the following operations prior to placing concrete:

1. Coordinate in advance of concrete placement the sequence of placement to assure that construction joints will occur only as designated and that adequate inspection can be provided.

2. Schedule sufficient equipment for continuous concrete placing, program backup equipment, and the actions to be taken in case of an interruption in placing. Provide extra concrete vibrators. Test the concrete vibrators the day before placing concrete.

3. Assure that excavation is complete, that ice and excess water are removed, and that forms have been cleaned and coated as specified. Moisten the soil subgrade before placing concrete.

4. Check that the post tension cables are secured in their correct positions.

5. Verify that expansion joint material, dowels, ducts, sleeves, hangers, pipes, conduits, bolts, wires, ceiling inserts, and other embedded items are secured in position.

3.3 PLACING CONCRETE

A. The Contractor shall be responsible for insuring that concrete is placed in conformance with the following criteria:

1. Convey concrete from mixer by means of pumping equipment to final position by a method, which will prevent separation or loss of material. Select equipment for pumping, and pneumatically conveying concrete of such size and design as to ensure a practically continuous flow of concrete.

2. Maximum height of concrete free fall is 6 feet in unexposed work and 4 feet in exposed work. Use tremies where the drop exceeds these limits.

3. Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing. Do not deposit large quantities of concrete in one place to be worked along the forms with vibrators.

3.4 CONSOLIDATING CONCRETE

A. Consolidate concrete with mechanical vibrating equipment to eliminate rock pockets and voids, to write each layer with that previously placed, to completely embed reinforcing bars and other fixtures, and to bring just enough fine material to the exposed surfaces to produce a smooth, dense texture.

B. Use a sufficient number of high frequency internal type vibrators to consolidate the concrete within 15 minutes after it is deposited.

C. Concrete must be screeded using a laser screed.

3.5 PLACING CONCRETE DURING ADVERSE WEATHER

A. During hot weather, take the following precautions when placing concrete to avoid early or "flash" setting: Protect the post tension cables and rebars from direct sunlight to prevent heating of cables and rebars, place concrete during cooler hours of the day, apply in a timely manner the specified curing methods.

1. When the weather causes the temperature of the concrete to exceed 80° F, employ ice or other effective means of cooling the concrete during mixing and transportation. Reject any concrete with a temperature as placed in excess of 86° F.

2. Replace all concrete with cracks that occur in line with post tension cables and reinforcing bars. These cracks are typical of "flash" setting of concrete.

3. Provide cold weather equipment for enclosing and heating freshly placed concrete and maintaining the required curing conditions when the air temperature is likely to fall below 40° F.

4. Maintain a concrete temperature as placed during cold weather of not less than 55° F by using mixing water heated to as much as 140° F. Do not permit the heated water to come in contact with the cement before the cement is mixed with the aggregate.

5. Maintain the air and the forms in contact with the concrete at temperatures above 40° F for the first five days after placing and above 35° F for the remainder of the curing period. Provide thermometers to indicate the ambient temperature and the temperature two inches inside the concrete surface.

6. Do not place concrete during rainstorms. Prevent the rain from striking the surface of concrete, which has not yet set hard. Maintain at the site sufficient protective covering.

3.6 EMBEDDED ITEMS

A. Set special castings, channels, and other metal parts to be embedded and nailing blocks, plugs, and strips necessary for the attachment of trim and finish work.

3.7 REMOVAL OF FORMS

A. The minimum time after placing concrete before removing forms for slabs is 24 hours.

B. Immediately after forms are removed, repair and finish any irregularities in the surface of the concrete.

3.8 REUSE OF FORMS

A. Maintain a uniform surface texture on all exposed concrete surfaces by necessary light sanding between uses.

3.9 FINISH METHOD FOR TOP OF HORIZONTAL CONCRETE SURFACES

A. See Section 3 for tennis court finish.

3.10 REPAIR NORMAL DEFECTS WITH DRY-PACK MORTAR

A. Mix a cement mortar with one part cement and three parts plaster sand by volume and only enough water so that the mortar will ball together when molded by slight pressure of the hands. Drive dry-pack mortar into crevices and compact in 3/8-inch thick layers.

B. Repair of shallow areas: Remove all loose aggregate. Remove surface laitance by sandblasting. Apply epoxy bonding compound. Compact dry-pack mortar and finish to match the surface and texture of adjacent concrete. Cure like adjacent concrete.

C. Repair of holes of depth greater than average surface width: Clean hole with water and blow out dust. Compact dry-pack mortar into hole. Finish and cure like adjacent concrete.

SECTION 4 - COURT SURFACING SYSTEM

NOTE:

The portions within Appendix "A" related to the Acrylic Colored Texture Surfacing System are intended to be used as a general guideline. The contractor shall install the Acrylic Colored Texture Surfacing System (product material selection, application and any other related items) in accordance with the Acrylic Colored Texture Surfacing System manufacturer's specifications and recommendations.

PART 1 - SCOPE

1.1 DESCRIPTION

The intended use of this specification is to provide an even-textured acrylic color surfacing for concrete pavement tennis courts as indicated on the Plans. Subgrade, Base, and concrete construction shall be done in a workmanlike manner and in accordance with these Specifications.

1.2 RELATED WORK DESCRIBED ELSEWHERE

A. TENNIS COURT CONSTRUCTION: Section 1 of these Tennis Court Construction Specifications.

B. CONCRETE MATERIALS AND PLACING: Section 3 of these Tennis Court Construction Specifications.

1.3 REFERENCES

A. United States Tennis Association (USTA)

B. American Sport Builders Association (ASBA)

C. International Tennis Federation (ITF)

1.4 QUALITY ASSURANCE

A. All surface coatings products shall be supplied by a single manufacturer.

B. Surfacing shall conform to the guidelines of the ASBA for planarity.

C. The contractor shall record the batch number of each product used on the site and maintain it through the warranty period.

D. The contractor shall provide the inspector, upon request, an estimate of the volume of each product to be used on the site.

E. The manufacturer's representative shall be available to help resolve material questions.

F. System manufacturer shall provide documentation that the surface to be installed has been classified by the ITF as a Class 2 (medium pace) surface.

1.5 Submittals

A. Manufacturer specifications for components, color chart and installation instructions.

B. ITF classification certificate for the system to be installed.

C. Current Material Safety Data Sheets (MSDS).

D. Product substitution: If other than the product specified, the contractor shall submit at least 7 days prior to the bid date a complete type written list of proposed substitutions with sufficient data, drawings, samples and literature to demonstrate to the District's satisfaction that the proposed substitution is of equal quality and utility to that originally specified. Information must include a QUV test of at least 1000 hours illustrating the UV stability of the system. The color system shall have an ITF pace rating in Category 2 (medium-pace). Under no circumstances will components from multiple manufacturers be considered.

PART 2 - MATERIAL

2.1 ACRYLIC COLORED TEXTURE SYSTEM

A. All components of the Acrylic Colored Texture Surfacing System products shall be "Plexipave" from the California Products Corporation (plexipave.com), 150 Dascomb Road, Andover, MA 01810, or District approved equal.

B. Colors shall be "U.S. Open Blue" within the court's "out of bounds" lines and "Dark Green" around the perimeter of the courts to the concrete fence mowstrip edge.

C. The concrete preparer product to be used shall be "Plexipave - Concrete Preparer", and shall comply with Plexipave Specification 10.13 of California Products Corporation.

D. The patch binder product to be used shall be "Plexipave - Court Patch Binder", and shall comply with Plexipave Specification 10.14 of California Products Corporation.

E. The primer product to be used shall be "Plexipave - California Ti-Coat", and shall comply with Plexipave Specification 10.17 of California Products Corporation.

F. The acrylic filler product to be used shall be "Plexipave – Acrylic Resurfacer", and shall comply with Plexipave Specification 10.8 of California Products Corporation.

G. The acrylic colored texture surfacing products to be used shall be "Plexipave – Plexipave Color Base" and "Plexipave – Plexichrome", and shall comply with Plexipave Specification 10.5 and 10.1 of California Products Corporation.

2.2 LINE PAINT

A. The line paint product to be used shall be "Plexipave – Plexicolor Textured Line Paint", and shall comply with Plexipave Specification 10.4 of California Products Corporation.

2.3 WATER

A. Fresh potable water shall be used in all mixtures.

2.4 STORAGE

A. All materials specified for the Acrylic Colored Texture Surfacing System shall be delivered to the site in sealed, properly labeled containers. The acrylic colored texture surfacing system shall not contain any asbestos materials in the material mix.

PART 3 - EXECUTION

3.1 GENERAL

A. The Color Texture System shall be provided with multiple applications in accordance with the following requirements:

1. Prepare court surface for receipt of color system
2. Apply Concrete Preparer (acid-etching)
3. Apply Patch Binder (for filling surface depressions)
4. Apply Primer Coat (tack coat)
5. Apply Acrylic Filler (binder)
6. Apply Acrylic Colored Texture Surface – First Coat
7. Apply Acrylic Colored Texture Surface – Second Coat
8. Apply Acrylic Colored Texture Surface – Third Coat
9. Apply Line Paint

B. The Contractor shall provide the engineer three copies of manufacturer's written installation literature within 30 days after the Notice to Proceed.

3.2 COURT SURFACE PREPARATION

A. Before the color system is applied, all net post sleeves and center strap anchors shall be set in place. All fencing shall likewise be installed and approved gates with locks shall be set and locked so as to provide protection for the finish coatings. The concrete surface shall be to the grade and slope shown in the Plans.

B. Concrete slabs shall cure at least 28 days prior to applying color finish.

C. The surface shall be cleaned of all dirt, dust, mud, loose sand and stones, grease and oil by flushing with high pressure water stream and brooming. Remove all grease and oil by using a strong solution of detergent and water followed by thorough flushing of the surface with water.

D. Any surface depression in greater than the thickness of a nickel as determined by flooding the surface with water and allowing to drain shall be outlined with chalk.

E. Edges adjacent to concrete improvements and landscaping not to be coated with the Acrylic Colored Texture Surfacing System shall be adequately masked with tape or otherwise protected during these applications.

3.3 CONCRETE PREPARER

A. The concrete surface must be acid-etched with the Concrete Preparer solution. The Concrete Preparer is self-neutralizing, and designed to prepare the surface to receive the coating system by forming a water-insoluble reaction in the surface of the concrete. Care should be taken to evenly distribute the acid over the entire surface, avoiding puddles of acid in low areas. The Concrete Preparer shall be applied per the manufacturer's recommendations. After drying, all latent material must be removed from the surface.

3.4 PATCH BINDER

A. When the concrete pavement surface is dry, and prior to applying the Patch Binder, a tack coat shall be applied to all regions directly beneath the areas to be patched. Allow tack coat to dry completely. The tack coat shall be applied per the manufacturer's recommendations.

B. When the concrete pavement surface is dry, the marked depressions shall be leveled with Patch Binder per the manufacturer's recommendations. The patch binder is an acrylic latex bonding liquid designed to mix with Silica Sand and Portland Cement as a patching compound. The patching mix shall be used to repair all surface depressions, ridges, cracks and other irregularities per the manufacturer's recommendations. Steel trowel or wood float the patch so that the texture matches the surrounding area. Never add water to mix. Light misting on surface and edges to feather in is allowed as needed to maintain workability. Allow to dry thoroughly and cure.

C. After patching, the surface shall not deviate from a flat plane more than 1/8 of 1 inch when tested with a 10 foot straight edge held in any direction.

D. Note: No work from this stage on shall commence until the inspector has accepted the surface.

3.5 PRIMER

A. After the surface has been acid-etched and leveled, the concrete surface must have Primer applied per the manufacturer's recommendations. The Primer coat is a clear two-packaged water based epoxy primer, designed to penetrate the concrete with an alkali-resistant polymeric coating that adheres to the irregular texture of the concrete surface.

3.6 ACRYLIC FILLER

A. A coat of Acrylic Filler shall be applied to the surface within 1 to 3 hours of the application of Primer while the primer is still tacky to fingertip touch. The acrylic filler is an asbestos-free, acrylic latex binder that is to be mixed with silica sand, designed to create a filler coat that reduces surface porosity in the concrete surface. The Acrylic Filler shall be applied per the manufacturer's recommendations.

3.7 ACRYLIC COLORED TEXTURE SURFACING

A. The Acrylic Colored Texture Surfacing shall be applied on the clean, dry underlying surface per the manufacturer's recommendations. No application shall be covered by a succeeding application until thoroughly dried. The three coat applications shall be applied at 90 degrees to each other with the last coat applied parallel to the long dimension of the court. The finished surface shall have a uniform appearance and shall be free from ridges and tool marks.

3.8 LINE PAINT

A. Four hours minimum after completion of the Acrylic Color Finish, 2-inch wide, textured playing lines shall be accurately located, marked and painted with textured white Line Paint as specified by the USTA and ASBA and per the manufacturer's recommendations. Mix paint thoroughly before using. Apply White Striping Paint to the clean, dry, color coated surface by brush, roller, airless spray or special marking equipment. The area to be marked shall be taped to insure a crisp line. The California Line Paint shall have a texture similar to the surrounding play surface.

B. Each tennis court has 480 L.F. of lines. All lines are 2 inches wide, except the base line which shall be between 2 inches and 4 inches in uniform width.

3.9 LIMITATIONS

A. All coatings used in the color system specifications are water vehicle products and must be protected from freezing during shipping, storage, application and drying. No parts of the construction involving Acrylic Colored Texture Surfacing System shall be conducted during rainfall or when rain is imminent. Do not apply when rain is likely to occur before coating has dried. Minimum application temperature is 50° F and rising. Do not apply when surface temperature is in excess of 140° F.

END OF SECTION

INTENTIONALLY LEFT BLANK

classified by the ITF as a Class 2 (medium-pace) surface.

1.6 SUBMITTALS

A. Manufacturer specifications for components, color chart and installation instructions.

B. ITF classification certificate for the system to be installed.

C. Current Material Safety Data Sheets (MSDS).

D. Product substitution: If other than the product specified, the contractor shall submit at least 7 days prior to the bid date a complete type written list of proposed substitutions with sufficient data, drawings, samples and literature to demonstrate to the District's satisfaction that the proposed substitution is of equal quality and utility to that originally specified. Information must include a QUV test of at least 1,000 hours illustrating the UV stability of the system. The color system shall have an ITF pace rating in Category 2 (medium-pace). Under no circumstances will components from multiple manufacturers be considered.

PART 2 - MATERIALS

2.1 NOTE

A. All components of the Acrylic Colored Texture Surfacing System products shall be "Plexipave" from the California Products Corporation (plexipave.com), 150 Dascomb Road, Andover, MA 01810, or District approved equal.

B. Colors of tennis court surfacing to be selected by the Owner. Submit color chart for color selection.

2.2 CONCRETE PREPARER

A. The concrete preparer product to be used shall be "Plexipave - Concrete Preparer", and shall comply with Plexipave Specification 10.13 of California Products Corporation.

2.3 PATCH BINDER

A. The patch binder product to be used shall be "Plexipave - Court Patch Binder" or equivalent, and shall comply with Plexipave Specification 10.14 of California Products Corporation.

2.4 PRIMER

A. The primer product to be used shall be "Plexipave - California Ti-Coat" or equivalent, and shall comply with Plexipave Specification 10.17 of California Products Corporation.

2.5 ACRYLIC FILLER

A. The acrylic filler product to be used shall be "Plexipave – Acrylic Resurfacer" or equivalent, and shall comply with Plexipave Specification 10.8 of California Products Corporation.

2.6 ACRYLIC COLORED TEXTURE SURFACING

A. The acrylic colored texture surfacing products to be used shall be “Plexipave – Plexipave Color Base” and “Plexipave – Plexichrome” or equivalent, and shall comply with Plexipave Specification 10.5 and 10.1 of California Products Corporation.

2.7 LINE PAINT

A. The line paint product to be used shall be “Plexipave – Plexicolor Textured Line Paint” or equivalent, and shall comply with Plexipave Specification 10.4 of California Products Corporation.

2.8 WATER

A. Fresh potable water shall be used in all mixtures.
   1. All materials specified for the Acrylic Colored Texture Surfacing System shall be delivered to the site in sealed, properly labeled containers. The acrylic colored texture surfacing system shall not contain any asbestos materials in the material mix.

PART 3 - EXECUTION

3.1 GENERAL

A. The Color Texture System shall be provided with multiple applications in accordance with the following requirements:
   1. Prepare court surface for receipt of color system
   2. Apply Concrete Preparer (acid-etching)
   3. Apply Patch Binder (for filling surface depressions)
   4. Apply Primer Coat (tack coat)
   5. Apply Acrylic Filler (binder)
   6. Apply Acrylic Colored Texture Surface – First Coat
   7. Apply Acrylic Colored Texture Surface – Second Coat
   8. Apply Acrylic Colored Texture Surface – Third Coat
   9. Apply Line Paint

B. Contractor shall provide the engineer three copies of manufacturer's written installation literature within 30 days after the Notice to Proceed.

3.2 COURT SURFACE PREPARATION

A. Before the color system is applied, all net post sleeves and center strap anchors shall be set in place. All fencing shall likewise be installed and approved gates with locks shall be set and locked so as to provide protection for the finish coatings. The concrete surface shall be to the grade and slope shown in the Construction Documents.

B. Concrete slabs shall cure at least 28 days prior to applying color finish.

C. The surface shall be cleaned of all dirt, dust, mud, loose sand and stones, grease and oil by flushing with high pressure water stream and brooming. Remove all grease and oil by using

a strong solution of detergent and water followed by thorough flushing of the surface with water.

D. Any surface depression in greater than the thickness of a nickel as determined by flooding the surface with water and allowing to drain shall be outlined with chalk. Corrections shall be made per Section 3.4 below.

E. Edges adjacent to concrete improvements and landscaping not to be coated with the Acrylic Colored Texture Surfacing System shall be adequately masked with tape or otherwise protected during these applications.

3.3 CONCRETE PREPARER

A. The concrete surface must be acid-etched with the Concrete Preparer solution. The Concrete Preparer is self-neutralizing, and designed to prepare the surface to receive the coating system by forming a water-insoluble reaction in the surface of the concrete. Care should be taken to evenly distribute the acid over the entire surface, avoiding puddles of acid in low areas. The Concrete Preparer shall be applied per the manufacturer's recommendations. After drying, all latent material must be removed from the surface.

3.4 PATCH BINDER

A. When the concrete pavement surface is dry, and prior to applying the Patch Binder, a tack coat shall be applied to all regions directly beneath the areas to be patched. Allow tack coat to dry completely. The tack coat shall be applied per the manufacturer's recommendations.

B. When the concrete pavement surface is dry, the marked depressions shall be leveled with Patch Binder per the manufacturer's recommendations. The patch binder is an acrylic latex bonding liquid designed to mix with Silica Sand and Portland Cement as a patching compound. The patching mix shall be used to repair all surface depressions, ridges, cracks and other irregularities per the manufacturer's recommendations. Steel trowel or wood float the patch so that the texture matches the surrounding area. Never add water to mix. Light misting on surface and edges to feather in is allowed as needed to maintain workability. Allow to dry thoroughly and cure.

C. After patching, the surface shall not deviate from a flat plane more than 1/8 of 1 inch when tested with a 10 foot straight edge held in any direction.

Note: No work from this stage on shall commence until the inspector has accepted the surface.

3.5 PRIMER

A. After the surface has been acid-etched and leveled, the concrete surface must have Primer applied per the manufacturer's recommendations. The Primer coat is a clear two-packaged water based epoxy primer, designed to penetrate the concrete with an alkali-resistant polymeric coating that adheres to the irregular texture of the concrete surface.

3.6 ACRYLIC FILLER

A. A coat of Acrylic Filler shall be applied to the surface within 1 to 3 hours of the application of Primer while the primer is still tacky to fingertip touch. The acrylic filler is an asbestos-free, acrylic latex binder that is to be mixed with silica sand, designed to create a filler coat that reduces surface porosity in the concrete surface. The Acrylic Filler shall be applied per the manufacturer's recommendations.

3.7 ACRYLIC COLORED TEXTURE SURFACING

A. The Acrylic Colored Texture Surfacing shall be applied on the clean, dry underlying surface per the manufacturer's recommendations. No application shall be covered by a succeeding application until thoroughly dried. The three coat applications shall be applied at 90 degrees to each other with the last coat applied parallel to the long dimension of the court. The finished surface shall have a uniform appearance and shall be free from ridges and tool marks.

3.8 LINE PAINT

A. Four hours minimum after completion of the Acrylic Color Finish, 2-inch wide, textured playing lines shall be accurately located, marked and painted with textured white Line Paint as specified by the USTA and ASBA and per the manufacturer's recommendations. Mix paint thoroughly before using. Apply White Striping Paint to the clean, dry, color coated surface by brush, roller, airless spray or special marking equipment. The area to be marked shall be taped to insure a crisp line. The California Line Paint shall have a texture similar to the surrounding play surface.

B. Each tennis court has 480 L.F. of lines. All lines are 2 inches wide, except the base line which shall be between 2 inches and 4 inches in uniform width.

3.9 LIMITATIONS

A. All coatings used in the color system specifications are water vehicle products and must be protected from freezing during shipping, storage, application and drying. No parts of the construction involving Acrylic Colored Texture Surfacing System shall be conducted during rainfall or when rain is imminent. Do not apply when rain is likely to occur before coating has dried. Minimum application temperature is 50º F and rising. Do not apply when surface temperature is in excess of 140º F.

3.10 GUARANTEE

A. The tennis court surfacing system shall be guaranteed for a period of two years from any defects in material and workmanship, and that the work has been done in accordance with the Drawings and Specifications.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 323113 – CHAIN LINK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to furnish and install Chain Link Fencing, Gates, Fittings and Accessories necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. 03 30 00 CAST-IN-PLACE CONCRETE
   4. 10 14 53 ROAD AND PARKING SIGNAGE
   5. 31 20 00 EARTHWORK
   6. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
   7. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. In accordance with the following standards:
      a. CLFMI Chain Link Fence Manufacturer's Institute
      b. UL Underwriters laboratories

1.3 SYSTEM DESCRIPTION

A. Fencing Requirements :
   1. General: Fence installation shall eliminate pinch points and sharp elements.
   2. Cut all bolt threads flush, maximum two threads exposed.
   3. Smooth all rough edges or burrs within fenced play area.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Product Data:
      a. Posts, Rails, and Fittings.
      b. Chain link Fabric, Reinforcements, and Attachments.
      c. Gates, Hardware and Fittings.
      d. Privacy Slats.
   2. Shop Drawings:
      a. Includes dimension plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, gate operation, operational clearances and footings.
      b. Include coordination of the work in this section with that of related work of other sections for proper interface of the completed work.

1) Coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
2) Furnish to contractor as noted under Specification Section - CAST-IN-PLACE CONCRETE for installation of:
a) Hook Bolts.
b) Drop Rod Receiver.

3. Quality Assurance:
a. Certificates:
1) Materials Certification.
2) Installer's Certification.

4. Closeout Submittals in accordance with the following:
a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
1) For gate operators to include in maintenance manuals.
b. Project Record Documents in accordance with Specification Section - PROJECT RECORD Documents.
c. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
b. UL Standard: Provide gate operators that comply with UL 325.
2. Manufacturer/Supplier Qualifications:
a. Company operating in the United States, having U.S. Manufacturing facility/facilities, experienced in successfully producing/supplying products similar to that indicated for this Project for a minimum of five (5) years and with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
3. Installer Qualifications:
a. Company with successful experience installing similar projects and products in accordance with ASTM F 567 "Practice for Installation of Chain-Link Fence", and have at least five (5) years of experience.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.
b. CBC General Requirements:
1) All gates within the Path of Travel (POT) shall meet all applicable accessible requirement specifications for doors, as defined by DSA/ACS and CBC Requirements.
c. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for automatic gate operators on gates that must provide emergency access.

C. Certifications:

1. Materials Certification: Complying with current ASTM specifications for all manufacturerer's materials.
2. Installer's Certification: certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.

D. Preinstallation Meeting
1. Conduct meeting at Project Site.
2. Review coordination of work specified in the Section and elsewhere.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
1. Deliver fabric, posts, rails, and other manufactured items so as not to be damaged or deformed. Package materials for protection during transportation and handling.
2. Each length of chain-link fabric shall be tightly rolled and firmly tied.
3. Each roll shall carry a tag showing the class of coating, the specified sire size, the mesh size, the length and height of fabric in the roll, ASTM A 392 "Specification for Zinc-Coated Steel Chain-Link Fence Fabric" and the name of mark of the manufacturer.

B. Handling:
1. Unload, and store materials in a manner to prevent bending, warping, twisting, and surface damage.

C. Storage:
1. Stack materials on platforms or pallets, covered with suitable weather tight and ventilated covering to ensure dryness. Do not store materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences, and gates shown on the Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.8 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty
2. Manufacturer's standard form in which manufacturer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within the specified warranty period.
   a. Failures include, but are not limited to, deterioration of metals, metal finishes, and other materials beyond normal weathering.
   b. Installer shall have manufacturers signed Certified Installer Agreement as a rider to the warranty.
   c. Warranty Period from date of Substantial Completions: Five (5) Years.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES:
   a. Warranty period Five (5) Years.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fence:
   1. Fabric:
      a. General: Steel Wire Fabric shall comply with ASTM A 392 "Specification for Zinc-Coated Steel Chain-Link Fence Fabric" and CLFMI Product Manual and with requirements indicated.
         1) Steel wire helically wound and interwoven in such a as to provide a continuous mesh without knots or ties.
         2) Fabric to be in one-piece heights measured between top and bottom of outer edge of selvage.
      b. Wire:
         1) Standard: Use 9 gage (0.148 inch) copper bearing steel wire.
         2) Tennis Courts: Use 11 gage (0.148 inch) copper bearing steel wire. Refer to Civil Plans for tennis court requirements.
      c. Mesh Size:
         1) Standard: 2 inch mesh.
         2) Ponding Basin Fencing: 1 1/2 inch mesh.
         3) Tennis Courts: 1 3/4 inch mesh. Refer to Civil Plans for tennis court requirements.
         4) Tennis Court Gates: 1 inch mesh.
      d. Fabric Selvage: Knuckled at both top and bottom edges.
      e. Protective Coating: ASTM A 392 "Specification for Zinc-Coated Steel Chain-Link Fence Fabric", Type II Zinc-Coated, Class 2 - 2.0 oz./sq.ft., galvanized by the hot-dip process after weaving.
         1) Quality to withstand 6 one minute immersions per ASTM A 239 "*Standard Test Method for Locating the Thinnest Spot in a Zinc (Galvanized Coating on Iron or Steel Articles by the Preece Test (Copper Sulfate Dip)"*.
      f. Strength: Wire in completed fabric after galvanization to have 7,000 pounds per square inch minimum tensile strength.
   2. Posts:
      a. General: All posts shall be round, seamless or continuously welded, steel pipe complying with ASTM F 1043 "Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework", Group IA, Table 3, Heavy Industrial Fence Framework, schedule 40 pipe per ASTM F 1083 "Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures".
         1) Protective Coating: Complying with Type A – Zinc Coated, min. 2.0 oz./sq.ft, per ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products", for exterior coating and interior coating after fabrication.
            a) Zinc Coated, min. 4.0 oz./sq.ft, per ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process" for rolled-form shapes.
      b. Line, and Terminal (end, corner, pull and gate) Posts:
         1) 2-3/8 inch O.D. (2.375 inch O.D.) 3.65 pounds per lineal foot.
         2) 2-7/8 inch O.D. (2.875 inch O.D.) 5.79 pounds per lineal foot.
         3) 3-1/2 inch O.D. (3.50 inch O.D.) 7.58 pounds per lineal foot.

4) 4 inch O.D. (4.00 inch O.D.) 9.12 pounds per lineal foot.
5) 4-1/2 inch O.D. (4.50 inch O.D.) 10.80 pounds per lineal foot.
6) 5-9/16 inch O.D. (5.563 inch O.D.) 14.63 pounds per lineal foot.
7) 6-5/8 inch O.D. (6.625 inch O.D.) 18.99 pounds per lineal foot.
8) 8-5/8 inch O.D. (8.625 inch O.D.) 28.58 pounds per lineal foot.

3. Rails:
   a. General: All rails shall be round, seamless or continuously welded, steel pipe complying with ASTM F 1043 "Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework," Group IA, Table 3, Heavy Industrial Fence Framework, schedule 40 pipe per ASTM F 1083 "Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures".
      1) Protective Coating: Complying with Type A – Zinc Coated, min. 2.0 oz./sq.ft, per ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products," for exterior coating and interior coating after fabrication.
         a) Zinc Coated, min. 4.0 oz./sq.ft, per ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process" for rolled-form shapes.
   b. Top, Horizontal and Bottom Rails:
      1) 1-5/8 inch O.D. (1.625 inch O.D.) 2.27 pounds per lineal foot.
4. Tension Wire:
   a. Metallic Coated Steel Wire: Seven gage (0.177 inch diameter), marcelled tension wire complying with ASTM A 824 "Specification for Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence."
   b. Metallic Coating: ASTM A 817 "Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire," Type II Zinc-Coated, Class 5 – 2.0 oz./sq. ft., galvanized by hot-dip process.
5. Hook Bolts:
   a. 3/8 inch diameter galvanized steel.
6. Tie Wires and Hog Rings:
   a. Nine gage (0.148 inch diameter) galvanized steel wire, complying with ASTM F 626 "Specification for Fence Fittings." Galvanized minimum zinc coating of 1.2 oz/sq. ft.
7. Tension Bars:
   a. 1/4 inch thick x 3/4 inch galvanized bar steel, complying with ASTM F 626 "Specification for Fence Fittings". Galvanized minimum zinc coating of 1.2 oz/sq. ft. by hot-dip process after fabrication.
8. Tension Bands:
   a. 7/8 inch by 3/32 inch thick minimum galvanized band steel complying with ASTM F 626 "Specification for Fence Fittings." Galvanized minimum zinc coating of 1.2 oz/sq. ft. by hot-dip process after fabrication.
9. Truss Rod Assembly:
   a. 3/8 inch diameter galvanized steel truss rod and galvanized turnbuckle for adjustment in compliance with ASTM F 626 "Specification for Fence Fittings." Galvanized minimum zinc coating of 1.2 oz/sq. ft. by hot-dip process after threading.
   b. Assembly capable of withstanding a tension of 2,000 lbs.
10. Fittings:
   a. General: In accordance with ASTM F 626 "Specification for Fence Fittings" and shall be hot-dip galvanized with a minimum of minimum of 1.2 oz/sq.ft., of zinc coating of surface area
   b. Line and Terminal Post Caps: Fabricated from pressed steel or cast iron.
      1) Caps shall fit snugly over posts and exclude moisture from inside when tubular post are used.

2) Provide Line Post Cap with loop to receive Tension Wire or Top Rail.

c. Rail and Brace Ends: Fabricated from pressed steel or round steel.

1) Shall be provided when horizontal rail or brace are required.

d. Top Rail Sleeves: Fabricated from pressed steel or round steel.

1) Rail sleeve material shall be a minimum of 0.051 inch in thickness and a minimum of 6 inches in length.

2) Sleeve shall be fabricated to prevent movement along the rail.

e. Rail Clamps: Fabricated from galvanized pressed steel.

1) Line and Corner Boulevard clamps for connecting intermediate and bottom rails in the fence line-to-line posts.

B. Gates:

1. General: All framing members shall be round, seamless or continuously welded, steel pipe complying with ASTM F 1043 "Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework," Group IA, Table 3 Heavy Industrial Fence Framework, schedule 40 pipe per ASTM F 1083 "Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures."

a. All frame corners (perimeter and interior) shall be of welded construction.

b. Frame members shall not be spaced no greater than 8 feet apart vertically and horizontally.

c. Protective Coating: Complying with Type A – Zinc Coated, min. 2.0 oz./sq.ft, per ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products," for exterior coating and interior coating, galvanized after fabrication.

1) Zinc Coated, min. 4.0 oz./sq.ft, per ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process" for rolled-form shapes.

2) Weld joints shall be coated with zinc-rich paint in accordance with ASTM A 780 "Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings."

d. Fabric: Shall be the same as specified for the Fence.

e. Truss Rod Assembly: Shall be the same as specified for the Fence.

2. Swing Gates:

a. General: Gate fabrication shall comply with ASTM F 900 "Specification for Industrial and Commercial Swing Gates."

b. Frame: Galvanized.

1) 1-7/8 inch O.D. (1.875 inch O.D.) 2.72 pounds per lineal foot.

c. Hardware:

1) Hinges: Galvanized malleable iron or heavy gage pressed steel post and frame hinges.

2) Single Leaf Latch: Positive locking gate latch fabricated of 5/16 inch thick by 1-3/4 inch pressed steel, galvanized after fabrication and shall have provision for a padlock.

3) Double Leaf Latch: 5/8 inch diameter galvanized Drop rod arranged to engage the gate stop. Locking devised shall be constructed so the center drop rod cannot be raised when the gate is locked. Latching devices shall have provision for a padlock.

4) Gate Stop: Fabricated from 1 inch diameter galvanized steel pipe and 2 inch galvanized metal washer.

5) Keepers: Fabricated from galvanized malleable steel Gate Holdback and 1-5/8 inch diameter galvanized pipe with post cap.

6) ADA Gate Lock: Rust-proof aluminum/stainless steel lock assembly with latching mechanism, levers (both sides), key lock (lockable from both sides), keepers (latch or stop), post adapters, spacers, chain-link holders, tension bands and fittings as required.
   a) Lock cores per Specification Section – HARDWARE.
7) Exit Door Gate: Galvanized exit door assembly with 16 gage x width as require steel plate, lock box, adjustable receiver bracket, guard and fittings as required.
   a) Surface mounted Panic Bar per Specification Section – HARDWARE.
8) ADA Gate Kick-Plate:
9) 1/4 inch galvanized steel plate, minimum 10" high x width as required.

3. Rolling Gates:
   a. General: Gate fabrication shall comply with ASTM F 1184 "Specification for Industrial and Commercial Slide Gates."
   b. Frame:
      1) 1-7/8 inch O.D. (1.875 inch O.D.) 2.72 pounds per lineal foot.
   c. Pipe Track and Bracket:
      1) 1-5/8 inch O.D. (1.625 inch O.D.) 2.27 pounds per lineal foot.
         a) Galvanized Pipe Track Bracket and fittings as required.
   d. Roller Assembly: Galvanized rear wheels, bolts, nuts, and bracket
   e. Wheel Assembly: Double wheel carrier, galvanized with "U-Bolts" and eight (8) inch hard rubber wheels and fittings as required.
   f. Steel AngleTrack: 1-1/2" x 1-1/2" x 1/8" galvanized steel with welded 3/8 inch diameter "J-Bolts" at 32 inches on center.
   g. Guide Post: Galvanized.
      1) 2-7/8 inch O.D. (2.875 inch O.D.) 5.79 pounds per lineal feet.

C. Privacy Slats:
   1. General:
      a. Direction:
         1) Vertical.
      b. Width: Sized to fit the direction required, and the gage and fabric used.
      c. Length: In as long a length as practicable to keep splicing to a minimum.
         1) Keep waste to a minimum.
   2. Polyethylene Tubular Privacy Slats: Not less than 0.023 inch thick, manufactured for chain-link fences from virgin polyethylene containing UV inhibitor, sized to fit mesh specified for direction indicated; with vandal-resistant fasteners and lock strips.
      a. Standard Color: As selected by the Architect from the manufacturer's standard color list.

D. Concrete:
   1. Footings: Site Concrete as specified in Specification Section – CAST-IN-PLACE CONCRETE.
   2. Non-shrink, Non-metallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107 "Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)." Provide grout, recommended in writing by manufacturer, for exterior applications.
   3. Erosion-Resistant Anchoring Cement: Factor-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure with needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

2.2 Accessories:

A. Gate Operators:

1. General: Provide factory-assembled automatic operating system designed for gate size, type, weight, and operation frequency. Provide operation control system with characteristics suitable for Project conditions, with remote-control stations, safety devices, and weatherproof enclosures; coordinate electrical requirements with building electrical system.
   a. Provide operator designed so motor may be removed without disturbing limit-switch adjustment and without affecting auxiliary emergency operator.
   b. Provide operator with UL approval.
   c. Provide electronic components with built-in troubleshooting diagnostic feature.
   d. Provide unit designed and wired for both right-hand/left-hand opening, permitting universal installation.
   e. Provide controllers, electrical devices, and wiring that comply with requirements specified in Division 26 Sections.
2. Motors: Model CSL24U as manufactured by LiftMaster. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 11 Section "Common Motor Requirements for Equipment."
   a. Motor Sizes: P3 Motor, 24VDC Continuous-Duty motor. Minimum.
3. Gate Operators: Gate Concrete base Post In-ground mounted and as follows:
   a. Mechanical Slide Gate Operators:
      1) Duty: Heavy duty, commercial/industrial.
      2) Gate Speed: Minimum 12 inches per second.
      3) Maximum Gate Weight: 1,500 lbs.
      4) Maximum Gate Length: 50 ft.
      5) Frequency of Use: Continuous duty.
      6) Operating Type: Roller chain, with manual release.
      7) Drive Type: Enclosed worm gear reducers, roller-chain drive.
4. Remote Controls: Electric controls separated from gate and motor and drive mechanism, with NEMA ICS 6, Type 4 enclosure for recessed or flush concrete base pedestal Insert mounting, and with space for additional optional equipment. Provide the following remote-control device(s):
   a. Vehicle Loop Detector: System including automatic closing timer with adjustable time delay before closing, and loop detector designed to open and close gate and reverse gate. Provide electronic detector with adjustable detection patterns, adjustable sensitivity and frequency settings, and panel indicator light designed to detect presence or transit of a vehicle over an embedded loop of wire and to emit a signal activating the gate operator. Provide number of loops consisting of multiple strands of wire, number of turns, loop size, and method of placement at location shown on Drawings, as recommended in writing by detection system manufacturer for function indicated.
      1) Loop: Wire, in size indicated for field assembly, for saw cut with epoxy-grouted installation.
   b. Vehicle Presence Detector: System including automatic closing timer with adjustable time delay before closing, and presence detector designed to open and close gate. Provide retroreflective detector with adjustable detection zone pattern and sensitivity, designed to detect the presence or transit of a vehicle in gate pathway when infrared beam in zone pattern is interrupted, and to emit a signal activating the gate operator.
5. Obstruction Detection Devices: Provide each motorized gate with automatic safety sensor(s). Activation of sensor(s) causes operator to immediately function as follows:

a. Action: Reverse gate in both opening and closing cycles and hold until clear of obstruction.
b. Internal Sensor: Built-in torque or current monitor senses gate is obstructed.
c. Sensor Edge: Contact-pressure-sensitive safety edge, profile, and sensitivity designed for type of gate and component indicated, in locations as follows. Connect to control circuit using gate edge transmitter and operator receiver system.
   1) Along entire gate leaf leading edge.
   2) Along entire gate leaf trailing edge.
   3) Across entire gate leaf bottom edge.
   4) Along entire length of gate posts.
   5) Along entire length of gate guide posts.
d. Photoelectric/Infrared Sensor System: Designed to detect an obstruction in gate's path when infrared beam in the zone pattern is interrupted.

6. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop gate at fully retracted and fully extended positions.
7. Emergency Release Mechanism: Quick-disconnect release of operator drive system of the following type of mechanism, permitting manual operation if operator fails. Design system so control-circuit power is disconnected during manual operation.
   a. Type: Integral fail-safe release, allowing gate to be pushed open without mechanical devices, keys, cranks, or special knowledge.
   b. Type: Mechanical device, key, or crank-activated release.
8. Operating Features:
   a. Digital Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features with capability for monitoring and auditing gate activity. Provide unit that is isolated from voltage spikes and surges.
   b. System Integration: With controlling circuit board capable of accepting any type of input from external devices.
   c. Master/Slave Capability: Control stations designed and wired for gate pair operation.
   d. Automatic Closing Timer: With adjustable time delay before closing and timer cutoff switch].
   e. Open Override Circuit: Designed to override closing commands.
   f. Reversal Time Delay: Designed to protect gate system from shock load on reversal in both directions.
   g. Maximum Run Timer: Designed to prevent damage to gate system by shutting down system if normal time to open gate is exceeded.
9. Accessories:
   a. Battery Backup System: Battery-powered drive and access-control system, independent of primary drive system:
      1) Fail Safe: Gate opens and remains open until power is restored.
      2) Fail Secure: Gate cycles on battery power, then fail safe when battery is discharged.
   b. Instructional, Safety, and Warning Labels and Signs: According to UL 325and Manufacturer's standard for components and features specified.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Layout:
1. Stake locations of fence lines, and terminal (end, corner, pull and gate) posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION

A. General: Construct and install chain-link fencing in compliance with ASTM F 567 "Practice for Installation of Chain-Link Fence" and more stringent requirements indicated.

B. Posts:
1. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
2. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
   a. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
   b. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
      1) Exposed Concrete Footing: Extend 2 inches above grade; shape and smooth to shed water.
      2) Concealed Concrete Footing: Stop 2 inches below bottom of material to allow covering top of footing.
3. Terminal Posts: Locate terminal end, corner, gate posts, and locate terminal pull posts at changes in horizontal or vertical alignment of 30 degrees or more, unless noted otherwise.
   a. End Corner, Pull and Gate Posts shall be braced and trussed for fabric 6 feet or higher, and for fabric 5 feet or higher at fencing without top rail.
4. Line Posts: Space line posts uniformly not to exceed 10 feet on center.

C. Rails:
1. Top Rail: Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal and gate posts, maintaining plumb position and alignment of fencing. Provide expansion couplings as recommended in writing by fencing manufacturer.
   a. Supply in lengths approximately 20 feet long and splice rail using top rail sleeves minimum 6 inches long.
   b. Secure rail to end, corner, pull and gate terminal posts with a brace band and rail end.
2. Brace Rail: Install brace rails between all end, corner, gate, and pull terminal posts and the first line posts, maintaining plumb position and alignment of fencing. Securely attach to post with fittings.
   a. Locate horizontal braces at mid-height of fabric greater than 72 inches in height, on fences with top rail and at two-third fabric height on fences without top rail.
      1) Spacing of brace rails not to exceed 6 feet on center vertically,

3. Horizontal Rail: Install horizontal rails between all line posts, maintaining plumb position and alignment of fencing. Securely attach to posts with fittings.
    a. Locate horizontal rails at mid-height of fabric 12 foot or higher,
        1) Spacing of horizontal rails not to exceed 12 feet on center vertically,
4. Bottom Rails: Install and secure to posts with fittings.

D. Truss Rod Assembly:
1. Diagonally brace all end, corner, pull and gate terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
2. Install so posts are plumb when diagonal rod is under proper tension.

E. Tension Wire:
1. Furnish and be responsible for accurate placement of Hook Bolts for installation in mow strip at mid-point between Line Posts.
2. Pull wire taut, without sags, independently and prior to the Fabric, between the terminal Posts and secured to the terminal Post using a brace band. Secure the tension wire to the chain link fabric with a hog rings a 18 inches on center and to each line post with a tie wire, maintain plumb position and alignment of fencing. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations
    a. Extended along bottom of fence fabric. Install bottom tension wire within 4 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.
    b. Hook Tension Wire thru Hook Bolts.

F. Fabric:
1. Apply Fabric to outside of enclosing framework. Leave a maximum of 2 inches between finish grade or surface and bottom selvage, unless otherwise indicated. Pull Fabric taut and tie to Posts, Rails, and Tension Wires. Anchor to framework so fabric remains under tension after pulling force is released.

G. Tension or Stretcher Bars: Thread through Fabric and secure to end, corner, pull, and gate Posts with Tension Bands and 5/16 inch diameter carriage bolts at 12 inches on center maximum.

H. Tie Wire and Hog Rings: Use wire of proper length to firmly secure Fabric to line Posts, Rails, Truss Rod Assembly and Tension Wire per ASTM F 626 "Specification for Fence Fittings".
1. Fasten Fabric to Line Post with Tie Wire at 12 inches on center maximum.
    a. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric.
    b. Bend ends of wire to minimize hazard to individuals and clothing
2. Fasten Fabric to Rails (top, brace, horizontal and bottom) with Tie Wire at 18inches on center maximum.
3. Fasten Fabric to Tension Wire with Hog Rings, spaced a maximum of 18 inches on center.

I. Gates:
1. General: Installation of gates and gate posts in compliance with ASTM F 567 "Practice for Installation of Chain-Link Fence."
2. Gates shall be level, plumb and secure for full operation without interference.
    a. Attach fabric as for fencing.
    b. Attach hardware using tamper-resistant or concealed means.
    c. Furnish and be responsible for accurate placement of ground-set items in concrete mow strips.

d. Adjust hardware for smooth operation and lubricate where necessary

3. Swing Gates:
   a. Gates have a bottom clearance of 3inch in the closed position, grade permitting.
   b. Hinge and latch offset opening space from the gate frame to the post shall be no greater that 3 inches in the closed position.
   c. Gate leaf holdbacks shall be installed for single gates 5 feet or greater in width and all double gates, unless noted otherwise.
4. Rolling Gates: Install gate according to manufacturer's written instructions, aligned and true to fence line and grade
   a. Gates have a bottom clearance of 3inch in the closed position, grade permitting.

J. Gate Operator Installation:
1. General: Install gate operators according to manufacturer's written instructions, aligned and true to fence line and grade.
2. Excavation for Support Posts Concrete Bases: Hand-excavate holes for bases, in firm, undisturbed soil to dimensions and depths and at locations as required by gate operator component manufacturer's written instructions and as indicated.
3. Concrete Bases: Cast-in-place or precast concrete, depth not less than 12 inches , dimensioned and reinforced according to gate operator component manufacturer's written instructions and as indicated on Drawings.
4. Vehicle Loop Detector System: Cut grooves in pavement and bury and seal wire loop according to manufacturer's written instructions. Connect to equipment operated by detector.
5. Comply with NFPA 70 and manufacturer's written instructions for grounding of electric-powered motors, controls, and other devices.

K. Fasteners:
1. All fasteners shall be installed with the smooth side on the secure side of the fence.
   a. All bolts shall be peened over to prevent removal of the nut.

L. Privacy Slats:
1. Install in accordance with manufacturer's written requirements, in the color and direction as selected by the Architect. Keep lengths of slats as long as practical, and keep waste to a minimum.

3.4 ADJUSTMENT

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Automatic Gate Operators: Energize circuits to electrical equipment and devices. Adjust operators, controls, safety devices, alarms, and limit switches.
1. Hydraulic Operators: Purge operating system, adjust pressure and fluid levels, and check for leaks.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls, alarms, and safeties. Replace damaged and malfunctioning controls and equipment.

C. Lubricate hardware and other moving parts.

3.5 CLEAN UP

A. The area of the fence line shall be left neat and free of any debris caused by the installation of the fence.

END OF SECTION

SECTION 32 90 00 LANDSCAPE CONSTRUCTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all material, labor, equipment and services necessary to do all Landscape Construction work and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded. Work is to include, but is not limited to, the following:
1. Soil Testing
2. Clearing, Ripping and Grading
3. Cultivation, Soil Amending and Leaching
4. Furnish and Plant Plants and Trees
5. Fertilization & Mulching
6. Turfgrass Installation
7. Weeding
8. Staking
9. Clean-up and Maintenance

1.2 RELATED SPECIFICATION SECTIONS

A. Division 31 EARTHWORK

B. 32 8400 LANDSCAPE IRRIGATION

C. Division 03 CONCRETE

D. Division 26 ELECTRICAL

1.3 STANDARDS

A. Materials and installation shall conform with all State and Local codes and regulations governing the trades included in this work. Requirements of these plans and specifications not conforming therewith, but exceeding code requirements, then the plans and specifications shall govern.

1.4 DEFINITIONS

A. The term approved shall mean by the Architect, and only in writing.

1.5 EXAMINATION OF SPECIFICATIONS, PLANS AND SITE

A. It shall be the responsibility of the Contractor to carefully examine the site, plans and specifications relating to this work for completeness, accuracy and clarity. Any conflict, error,

or clarification shall be immediately brought to the attention of the Owner's authorized representative in writing to obtain a ruling. Failure to do so prior to bidding shall result in any corrective work necessary shall be completed at the Contractor's expense.

1.6 PERMITS AND INSPECTIONS

A. The Contractor shall obtain and pay required fees to any governmental or public agency. Permits for the installation or construction or the work included under this Contract, which are required by legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. Contractor shall also arrange for and pay costs in connection with inspections and examination required by these authorities.

1.7 GUARANTEE

A. Guarantee shrubs, ground covers, and lawn as to growth and health for one (1) year after final acceptance by Owner. The contractor is responsible for replacement of plant materials due to theft and vandalism until final acceptance of the project by the Owner after completion of the specified maintenance period.

B. Guarantee trees to live and grow upright for a period of one (1) year after completion and final acceptance by the Owner. The contractor is responsible for replacement of trees due to theft and vandalism until final acceptance of the project by the Owner after completion of the specified maintenance period.

C. Replace plants which lose more than 30% of their original leaves within the below described time limits.

D. Remove and replace plants within 15 days of notification which fail to conform. Replace with materials as originally specified. Guarantee for replaced materials shall begin with date of replanting and shall be as previously described.

1.8 SUBMITTALS

A. Within the required time period stated, the Contractor shall submit six (6) copies of complete lists of proposed materials to Landscape Architect including source, manufacturers name and catalog numbers.

B. Materials and equipment shall not be ordered until given written approval by Landscape Architect.

C. The Contractor shall confirm availability of plant material, supplies and materials for inclusion in the submittal. If a plant is found not to be suitable or available, the Contractor is to submit a list of three to five appropriate substitutions that are available for selection by the Landscape Architect. Plants and trees to be supplied may not be available locally and are to be secured well in advance and substitutions for these plants may not be allowed.

1.9 UNDERGROUND OBSTRUCTION

A. The Contractor shall verify all underground obstructions and / or utilities, existing or proposed prior to making landscape excavations or installing tree stakes. Contractor shall avail themselves of any as built drawings of the site, Underground Service Alert (USA) 1-800-227-2600 and records of existing and proposed site work.

B. If there is a conflict with the utilities and the planting, notify the Landscape Architect for a ruling prior to planting.

1.10 PROJECT CONDITIONS

A. No plants shall be planted in situations that show obvious poor drainage. Such situations shall be brought to the attention of the Landscape Architect and Owner's authorized representative. Generally, the drainage problem is to be corrected prior to installing plant material.

B. All landscape areas are to be deep ripped to a depth of twelve inches (12") below finish grade in two directions. All trees are to have 18" diameter drainage holes that are 10' deep.

C. The Contractor shall guarantee repair of damage to any part of the premises resulting from leaks, defects in materials, equipment or workmanship. The Contractor shall be liable for any and all accidents resulting from their work, including open holes and trenches during construction.

D. During landscape construction operations keep hardscaped surfaces clean and work areas organized.

E. Landscape concrete mow strips are to be installed so that they do not conflict with site drainage or impede drainage away from buildings. Generally, a minimum 2% slope away from buildings is to be maintained for positive site drainage. Concrete mow strips are not to trap water or cause puddling.

1.11 WORKMANSHIP

A. The Contractor shall have experience and demonstrated ability in the installation of landscapes of this type. No work shall be completed without supervision by a qualified foreman. All work shall be installed by skilled persons proficient in the trades required, in a neat, orderly and organized manner, with the recognized standards of craftsmanship developed for the industry and as described in the plans, specifications and manufacturers installation instructions.

1.12 SOIL & WATER TESTING

A. An independent soil testing laboratory, Dellavalle Laboratory, contact Chad Reenders (559) 922-9299, is to test the existing soil after rough grading operations are completed with a complete fertility assay to evaluate the soils ability to maintain and support the ornamental landscaping. Samples from eight (8) locations on the site are to be taken, with two samples from each location, one at four (4") inches in depth, and the second at sixteen (16") inches in depth (sixteen samples). The soil testing laboratory is also to complete a preliminary screening for detrimental agricultural chemical residue that may be present on site, if these results are

positive, notify the Owners authorized representative for a ruling. The contractor is to pay for all required soil tests and consulting time with the soil scientist for detailed recommendations to be submitted to the Owners authorized representative for evaluation.

B. After the soil amending and leaching process has been completed, the Contractor is to take additional samples from the eight (8) locations on the site, with two samples from each location, one at four (4") inches in depth, and the second at sixteen (16") inches in depth (sixteen samples) to evaluate the progress and effectiveness of the soil amending and leaching work. The contractor is to pay for all required soil tests and consulting time with the soil scientist for detailed recommendations to be submitted to the Owners authorized representative for evaluation. If leaching is not required because no detrimental salts are present in the soil, then the second round of testing is required after the installation of the specified amendments to verify the progress of the soil reclamation process. Testing locations are to be determined by the Landscape Architect.

C. Contractor is to get one (1) irrigation water test with an agricultural suitability analysis by Dellavalle Laboratories and submit the results for review.

1.13 CONSTRUCTION OBSERVATION

A. The Contractor is to coordinate construction observation site visits with the Landscape Architect and District Maintenance Department during the appropriate phases of construction, or as required by the Landscape Architect. The Contractor is to schedule site visits a minimum of one week in advance at the required phases of construction. The following outlines the phases of construction which require a site visit, however it is not limited to the following construction phases:

1. Preconstruction meeting
2. Staking of plant and tree locations prior to irrigation installation.
3. Staking of sprinklers and mainline routing.
4. Mainlines, wiring, lateral pipes, & valve manifolds prior to backfill.
5. Irrigation coverage test and rough grading.
6. Trees & plants prior to installation, still in containers.
7. Fine grading of turf areas prior to turf installation.
8. Substantial completion to start maintenance.
9. Final acceptance after successful maintenance period.

B. The Owner will pay for initial construction observation visits, however, any additional visits required due to non-compliance, incomplete work, or substandard performance will be paid by the contractor at a cost of $500.00 per extra visit.

1.14 PROTECTION TO THE PUBLIC HEALTH AND WELFARE

A. The Contractor in the course of their work shall make every effort to guard the public health, safety and welfare during construction. This shall include erection of barricades, night warning lights and all necessary devices required to protect the public health and welfare or as required by existing governmental codes. The Contractor shall accept any and all liabilities arising from accident or injury on the job and after construction. All equipment which protrudes above grade shall be installed against a structure or an appropriate barricade shall be erected to protect public safety.

PART 2 - MATERIALS

2.1 PLANTS

A. Conform to list of plant materials on drawings. Contractor is to provide digital photos of representative example of each plant and tree type to be used and submit to Landscape Architect and District for review and comment. Plants and trees are also to be inspected by Landscape Architect and District when delivered to the site, prior to planting, so non-conforming materials can be identified and rejected prior to planting.

B. Plants shall be the best of their kind and class, and of optimum age, and in conformance with the standards of the American Society of Nurserymen.

C. Plants shall have normal, well-developed branch systems and shall not be root or pot-bound. Do not prune or top trees prior to delivery.

D. Delivery to be made not more than 2 days prior to installation unless nursery area approved by landscape architect is established with an automatic irrigation system.

E. It will be the responsibility of the contractor to place material order(s) sufficiently in advance of planting to assure availability of plants in species and size specified. Plant varieties noted to be available from Mountain States Wholesale Nursery may not be available locally. Contact Mountain States Wholesale Nursery, Wendy Proud at (626) 274-1956 to arrange for plant availability and delivery. Substitutions for these plants and trees will not be made due to lack of advance planning.

F. No substitutions will be made without approval of the Landscape Architect or authorized representative.

2.2 SOIL AMENDMENTS AND TOPDRESSING MULCHES

A. Soil amendments (type and quantity) are to be based on the soil test results and recommendations by the soil testing laboratory. The contractor is to include the amendments outlined in part 3.03 of this Section in the bid price. Prices for the soil amendments are to be quoted as unit prices to be adjusted based upon the recommendation of the testing lab. The contractor is to pay for all required soil tests and consulting time with the soil scientist for detailed recommendations.

B. Organic topdressing mulch: Premium walk on bark as supplied by Superior Soil Supplements (559) 904-3372, contact Andrea Fike. Organic topdressing mulch is to be installed in a 3” compacted layer. Mulch depth is to be evaluated at the beginning and at the end of the maintenance period for compliance with the 3” compacted layer requirement. Contractor is to continuously supplement the topdressing mulch as it settles throughout the specified maintenance period to achieve the specified 3” compacted depth in all designated landscape planter areas at the end of the maintenance period. This is essential to suppress weed growth and will be closely evaluated for compliance.

C. Inorganic topdressing mulch: Gray decomposed granite as supplied by Rosenbalms Rockery, Fresno, CA. Inorganic topdressing mulch is to be installed in a 3” compacted thickness and is to be brought to an optimum moisture content and compacted with a water filled drum roller.

Contractor is to continuously supplement and compact the topdressing mulch as it settles throughout the specified maintenance period to achieve the specified 3” compacted depth in all designated landscape planter areas at the end of the maintenance period. This is essential to suppress weed growth and will be closely evaluated for compliance.

D. Commercial fertilizer (15-15-15), Best Pre-plant fertilizer (6-20-20 XB), slow release fertilizer Best All Season (19-6-12) with Polyon 43.

E. Gypsum (100% purity) and Elemental Soil Sulfur (99% purity) as supplied by Superior Soil Supplements, Hanford, California, (559) 904-3372.

F. Plant fertilizer tabs: Agriform, Best-Tabs or approved equal, quantities as shown below: 1 gallon plant (2 tabs), 5 gallon plant (4 tabs), 15 gallon plant (6 tabs) & box size tree (8 tabs).

G. Global Premium Humate as supplied by Superior Soil Supplements, Hanford, California, (559) 904-3372.

H. Certificates: In addition to any certificates specified, the Contractor shall furnish a certificate with each delivery of bulk material stating the source, quantity, date, and type of material. All certificates shall be delivered to the Owners authorized representative at the time of each delivery.

I. Samples and delivery tags: The contractor is to submit samples of the materials to be used for inspection and approval. Contractor is to submit all soil amendment delivery tags to the DSA Inspector. Delivery tags are to itemize delivered materials with weights and quantities and Supplier name and contact information. Quantities of all soil amendments to be installed are to be verified as being in compliance with the approved soil amendments to be installed on the project. Soil amendments not verified by delivery slips or other reliable manner are to be verified with additional soil testing as outlined in part 1.12 at the Contractors expense, in addition to the specified soil testing.

2.3 ACCESSORIES

A. Tree Stakes: 2 inches by 2 inches by 10 feet long treated lodgepole or natural redwood. Use two stakes per tree. See the tree installation detail.

B. Tree Ties: flexible vinyl "Cinch-Tie", manufactured by V.I.T. Products, San Diego, California, (619) 673-1760, and distributed by Horizon Sales, Pleasanton, California, (510) 462-6602. Use a minimum of four 24" ties per tree. See the tree installation detail.

C. Tree String Trimmer Guard: polyethylene "Trim Guard", manufactured by V.I.T. Products, San Diego, California, (619) 673-1760, and distributed by Horizon Sales, Pleasanton, California, (510) 462-6602. Use one Trim Guard per tree in the lawn areas only.

D. Tree Root Barriers: All trees within ten (10'-0") feet of a hardscaped surface, perimeter fence or building are to have root barriers installed that are 24" deep by 24" wide as manufactured by Root Solutions, Inc. and distributed by Vespro Inc., San Rafael, California, (415) 434-3072. Each 24” box tree is to have up to 16 panels and larger box size trees are to have additional panels as required. If the concrete is only on one side of the tree, then 8 panels (centered on the tree) are to be installed in a straight line along the concrete or boundary as recommended by the manufacturer, or if the concrete is on two sides of the tree, then install 8 panels (centered on

the tree) on two sides or the 16 panels are to be installed around the perimeter concrete, if concrete is on more than two sides of the tree as recommended by the manufacturer.

E. Top Soil: If required, imported topsoil shall be natural, fertile, friable loam, capable of sustaining vigorous plant growth, free of subsoil, roots, grass, excessive amount of weeds, salt, stone and foreign matter; acidity range of pH 5.5 to 7.5; containing a minimum of 4% and a maximum of 25% organic matter. Obtain approval of the Landscape Architect or Authorized representative for placement. The contractor is to submit a topsoil sample to an approved testing lab for a complete fertility assay for approval prior to importing the material on-site.

F. Import Soil: If required, imported fill dirt shall be tested with a fertility assay from Dellavalle Laboratories to certify that the fill dirt is free of salt, boron or other deleterious minerals or matter prior to delivery and placement on the site. Contractor is responsible for all remediation required for the placement of substandard fill dirt containing salt, boron or other deleterious minerals or matter that may require the installation of additional soil amendments, leaching, additional soil testing, replacement of failed plant materials to bring the non-conforming soil into compliance at the Contractors sole expense.

G. Other Materials: Materials not specifically indicated, but necessary for the proper execution of the work, shall be of first quality as selected by the Contractor subject to approval of the Landscape Architect.

2.4 WEED CONTROL

A. Methods and chemicals shall be suitable with regard to season and shall control weeds and shall be approved by all governing agencies.

B. Treatment shall not damage or impede growth of trees, shrubs, and ground covers to be planted, nor kill or damage any existing plant material specified to remain.

C. Applicator shall be a licensed State of California Agricultural Pest Control Operator, Category E, or as required by all governing agencies.

D. Contractor shall obtain required permits from County Agricultural Commissioner. Weed control treatment shall be in accordance with Federal, State of California, County and local codes and regulations, and shall be safe, not cause a health hazard, nor disrupt or inconvenience continuing business operations of the Owner and neighbors, public street, parking lot and sidewalk use or construction activities.

E. Method of treatment shall be strictly in accordance with manufacturer's recommendations.

F. Method of application and chemicals to be reviewed and approved by the Owners representative.

G. Contractor shall ascertain and insure that all planted areas are weed-free prior to planting and maintain the site weed free during construction and maintenance periods.

2.5 STABILIZED DECOMPOSED GRANITE

A. Grey decomposed granite is to be supplied by Rosenbalm Rockery, or approved equal and is to meet gradation specification as determined by ASTM C 136 methodology (Caltrans 202) with sand equivalent as determined by ASTM D 2419 methodology (Caltrans 217) and shall have a minimum of 30.

B. Naturalseal is a stabilizing organic non-toxic binder, buff in color and without a marked odor. The swell volume shall have a minimum of 35 ml/g with a minimum mucilliod content of 80 percent. The light extraneious matter shall not exceed a maximum of 20 percent with the heavy extraneous matter not exceeding 5 percent. The material shall be screened with 90 – 100 percent passing a 200 mesh sieve.

C. Decomposed granite is derived from the crushing and screening of naturally friable granite. The blending of course sand with rock dust is not an equal product. The granite is screened to include stone particles of 3/8” minus. The particles that pass the 200 screen mesh as determined by ASTM methodology shall not exceed 18 percent. The sand equivalent shall be a minimum of 30 and the R-value shall be a minimum of 70.

D. Stabilizing organic binder Naturalseal as distributed by Rosenbalm Rockery Inc. shall have a minimum swell volume of 32 ml/gm. The binder shall be incorporated with the granite fines by the use of a pug mill that includes a weight belt feeder that insures the proper ratio of binder to granite fines. Blending with the use of a bucket loader or similar is not acceptable. For pathways the binder shall be blended at the rate of 12 lbs per ton of granite fines. For parking lots or roadways the binder shall be incorporated at the rate of 14 lbs per ton.

E. For pathways, stabilized decomposed granite shall be placed to a minimum depth of 3” compacted thickness. For driveways or vehicular roadways stabilized decomposed granite shall be placed to a minimum depth of 4” compacted thickness.

F. For each 2” lift evenly spread the material over designated area. Grade and smooth as outlined on the plans. Thoroughly water entire area so that the entire depth of the material is moist. After a period of +/- 6 hours compact the final lift with a 1,000 – 3,000 lbs static drum roller. Allow for a sufficient curing period of +/- 4 days prior to use.

PART 3 - EXECUTION

3.1 SITE INSPECTION

A. Locate cables, conduit, piping, and other obstacles prior to beginning excavation. Notify Owners representative of obstacles requiring relocation.

B. Remove rocks and other similar underground obstructions to depths necessary to permit proper installation of lawns and planting.

C. Verify that landscape irrigation system has been properly installed and is fully operational.

D. Verify dimensions shown on plan and notify Owners representative of any discrepancy.

E. Review plant list and consult Owners representative with any questions or concerns.

3.2 GRADING

A. Contractor is to remove weeds and debris from site prior to starting grading operations and is to maintain the site weed free throughout the progress of construction.

B. Contractor is to work soil in a manner which does not cause excessive compaction or clods which will not break easily. Apply water as necessary to obtain optimum moisture content for tilling and planting. The Contractor is to coordinate deep ripping of all landscape areas to a depth of twelve inches (12") to break up compacted areas to improve drainage.

C. After the grades have been reestablished after irrigation trench backfill and prior to planting, the Contractor is to heavily irrigate the site to the point of producing runoff to verify that the site is free draining without puddles or low spots. Contractor is to address grading problems and repeat the test until all puddles and areas of standing water drain within one half hour (1/2 hr). Contractor is to fill settled areas as required. Planting shall not proceed until all grading corrections have been completed and the areas have been retested to confirm conformance.

D. The contractor is responsible for the grading of all planting areas. The grades shall be gently flowing with no abrupt changes. The contractor is responsible to insure that the planting areas have adequate soil and is to fill low areas as needed. The contractor is to grade the areas to drain as intended by the site grading plan by the Project Civil Engineer. Typically the planter areas are to be slightly crowned or cross sloped to insure positive drainage away from planted areas to the perimeter to drain as intended by the Site Drainage Plan. No standing water will be permitted in planter areas where plants and trees are located. Slope surfaces away from buildings at a 2% slope with no pockets of standing water. The contractor is responsible for all import or export of soil and removal of debris, trash, or other elements off site at Contractors expense to provide the Owner with a completed landscape project at no additional cost to the Owner.

E. Provide neat, smooth, and uniform finish grade. Final soil elevations in perimeter areas are to be as noted below. Grades may taper from perimeter areas over a smooth gradual transition.
   1. Sodded Turf Areas: 3/4" below the adjacent sidewalks or other hardscape features.
   2. Hydroseeded Turf Areas: 3/4” below the adjacent sidewalks or other hardscape features.
   3. Planter Areas: 3” below the adjacent sidewalks or other hardscape features.

F. Notify Owners representative upon completion of grading for approval and to verify the smoothness and accuracy of fine grading and clod-free condition of planting surface. No planting is to be started prior to obtaining the approval of the fine grading from the Owners authorized representative.

G. Install concrete mow strips between all turf and planter boundaries. Install the mow strips as shown in the Concrete Mow Strip Detail and as outlined in the project plans and specifications. Contractor is to insure that concrete mow strips do not interfere with site drainage and do not trap water or cause puddling.

3.3 SOIL PREPARATION

A. Soil Amendments, Cultivation and Weed Control:
   1. The contractor is to cultivate the soil amendments into the top eight (8") inches of soil. The following soil amendment types and quantities are to be included in the bid. Pending the results of the soil tests, and recommendations of the soil testing laboratory,

adjustments to the types and quantities of soil amendments to be used may be necessary. The contract price will be adjusted according to the actual soil amendments installed on the project. The contractor is to include the following soil amendments as part of the bid:

a. Lawn Areas:
   1) Gypsum (100% purity) (Preplant), (4 tons per acre).
   2) Soil Sulfur (100% purity) (Preplant), (1/2 ton per acre).
   3) Best Triple Pro Fertilizer (Preplant) - (15-15-15), (500 lbs per acre).
   4) Best Preplant Fertilizer (Preplant) - (6-24-24 XB), (500 lbs per acre).
   5) Global Premium Humate (Preplant), (250 lbs per acre).
   6) Best All Season Fertilizer with Polyon 43 (Maintenance) - (19-6-12), maintenance applications and rates as follows:

      Sodded Turf Areas: (200 lbs per acre) per maintenance application. Minimum of four maintenance applications required for bid. Fertilize sodded areas monthly. Actual application will conform to soil test results.

      Hydroseeded Turf Areas: (130 lbs per acre) per maintenance application. Minimum of eight maintenance applications required for bid. Fertilize hydroseed areas every other week. Actual application will conform to soil test results.

   7) Pelletized Gypsum, (Maintenance) - (1 tons per acre). One maintenance application required for bid. Actual application will conform to soil test results.
   8) Terra C Premium Humate, (Maintenance) - (250 lbs per acre). One maintenance application required for bid. Actual application will conform to soil test results.

b. Planter Areas:
   1) Nitrified Aged Fir Humus (forest product) (Preplant), (4 cu. yds. per 1000 sq. ft.).
   2) Gypsum (100% purity) (Preplant), (4 tons per acre).
   3) Soil Sulfur (100% purity) (Preplant), (1/2 ton per acre).
   4) Best Triple Pro Fertilizer (Preplant), (15-15-15), 500 lbs per acre.
   5) Best Preplant Fertilizer (Preplant), (6-24-24 XB), (500 lbs per acre).
   6) Global Premium Humate (Preplant), (250 lbs per acre).
   7) Best All Season Fertilizer with Polyon 43 (Maintenance) - (19-6-12), maintenance applications and rates as follows:

      Planter Areas: (200 lbs per acre) per maintenance application. Minimum of four maintenance applications required for bid. Fertilize planter areas monthly. Actual application will conform to soil test results.

   8) Pelletized Gypsum, (Maintenance) - (1 tons per acre). One maintenance application required for bid. Actual application will conform with soil test results.
   9) Global Premium Humate, (Maintenance) - (250 lbs per acre). One maintenance application required for bid. Actual application will conform to soil test results.

2. The Owners authorized representative and Contractor shall negotiate the differences in

costs according to the materials required based upon the recommendations of the soil testing laboratory. No labor difference in cost will be allowed for application of the corrected materials to be used.

3. Soil Amending – Application #1: If salt is present in the soil test results, Contractor is to apply and incorporate the following soil amendments into the soil – Gypsum, Soil Sulfur and Nitrified Aged Fir Humus (planter areas only). Contractor is to reestablish site grades (smooth areas without displacing amendments) and leach the soils for four to six weeks.
4. Contractor is to retest the site soils as noted in 1.12 (B) above, if salt is present in the soil test results and leaching is required.
5. Soil Amending – Application #2: Contractor is to apply and incorporate the following soil amendments into the soil – Preplant Fertilizers and Humate amendments. Contractor is to reestablish site grades (smooth areas without displacing amendments) and leach the soils for one to two weeks.
6. If there are no or low salts in the soil test reports and leaching is not required, then the Contractor can combine Preplant Soil Amendment Applications #1 & #2 and delete the leaching requirement and issue a credit to the District.
7. After cultivation, water the site until the first weed crop is established. Cultivate or treat with chemicals to assure a weed-free condition.
8. Planting beds may be established after the second cultivation and final fine grading has been inspected and approved.

B. Planting holes:

1. All 15 gallon size trees or larger, are to have one 18” diameter hole drilled up to ten (10’) deep to insure proper drainage. Holes are to be off set with tree root balls “benched” into the top of the hole to prevent the tree against settlement.
2. Holes are to be excavated three times the size of the rootball. The contractor is to slightly off-set the drainage holes to prevent settling of plants after installation. The contractor is to guarantee that the trees and shrubs will not settle below grade. Trees in turf grass areas are to be planted after the hydroseeded turf and sod has become established and no longer requires excessive irrigation, which may cause undue stress to the trees.
3. Holes are to be in damp (but not saturated) and friable condition with all hidden obstructions removed before planting. The backfill is to be mixed thoroughly as specified adjacent to the planting hole prior to planting.

C. Leaching: Leaching of the soils is a critical element in how fast the soils will be reclaimed. The Contractor is to expedite the irrigation installation during the early stages of the project to allow leaching operations with the irrigation system at the earliest possible time in the project schedule. The Contractor is to provide labor and materials as needed to leach soils with irrigation water in areas that will not delay the progress of other site improvements. During leaching operations, the Contractor is to maintain the soil saturated while limiting runoff. Contractor is to monitor depth of soil saturation to plan periods of drying appropriately.

D. Contractor is responsible for temporary measures required to retrofit the planter area irrigation system for leaching by installing spray nozzles on bubbler pop ups, installing temporary sprinklers, temporary lateral pipes or relocating sprinkler or other improvements required to insure good coverage of all planter areas for the purposes of leaching. Once leaching has been completed, contractor is to remove temporary improvements and restore the system to conform to the project documents.

3.4 PLANTING

A. Water plants immediately upon delivery to site. Maintain in moist condition until planted.

B. Space plants uniformly as shown on plans. The Contractor is to stake the locations of plants and tree locations prior to layout of irrigation system for review and approval by the Landscape Architect and District in the field prior to trenching. Contractor is to use color coded flags to stake trees and plant materials by variety. After the plant layout has been approved, the Contractor is to stake the bubbler locations for each plant and tree. Bubblers are to be located on the uphill side of the plant within the plant basin. Landscape Architect or District may move, add or delete plants or trees in the field and the Contractor is to adjust the work as required at no additional cost to the District. Contractor is not to proceed with irrigation or planting operations, until the planting locations have been approved by the Landscape Architect and District in the field.

C. Cut cans by cutting vertically on two opposite sides of can with can cutter, or as recommended by the nursery for the type and size of containers supplied with the plant materials. Do not damage plant.

D. Plant immediately after removal from the can or flat. Position the top of the plant root ball 1" above finish grade. Backfill as follows:
1. (85%) native soil.
2. (15%) nitrified humus.
3. Azaleas and camellias are to have an additional 2 cu. ft. Camellia Mix in backfill.
4. Agriform / Best plant tabs as indicated on plans. Place plant tabs beside root ball as recommended by the fertilizer manufacturer. Construct a watering well one foot radius from stem or trunk that will allow water to fill well at least 3" deep for shrubs and two foot radius from trunk that will allow water to fill well at least 4" deep for trees. Fill water well at least six times by hand after planting.

E. Fertilize all ground cover areas with post-plant commercial slow release fertilizer 19-6-12 upon completion of planting, and every 30 days through the first growing season at a rate of 5 lbs per 1000 square feet, or as recommended by the soil test results.

F. At completion of planting, all non-turf planted areas are to receive a three inch (3") compacted layer of organic or inorganic topdressing mulch as designated on the Planting Plan. Landscape areas not designated to receive decomposed granite are to have a 3” compacted layer of premium walk on bark installed supplied by Superior Soil Supplements, contact Andrea Fike (559) 904-3372. Wash excess bark or decomposed granite off leaves and do not engulf stems of trees, plants and ground cover.

G. Lawn Installation (Hydroseed):
1. The turf areas, as indicated on the plans, shall be hydroseeded in one operation after all weed removal, soil preparation, grading and irrigation system have been completely installed and approved. Trees are to be installed after the turf has been established. Stake tree locations during turf establishment.
2. Hydromulch mixing shall be performed in a tank with a built-in continuous agitation and recirculation system of sufficient capacity to produce a homogeneous slurry of fiber, fertilizer, water, and additives in the specified proportion. Hydroseeding Slurry Mix:

   a. Mulch: Agrono-Mulch @ 1500 lbs per acre. As distributed by Agrono-Tec Seed Co., Fresno, California, (559) 277-2444.

b. Binder: Agrono-Tac @ 120 lbs per acre.
Fiber Plus @ 25 lbs per acre.
c. Fertilizer: Soluble time release granular mixture of 24-4-8 @ 250 lbs per acre.
d. Seed – Bermudagrass Turf: PanAm Improved Seeded Bermudagrass (4 lbs per 1,000 sq ft) and Perennial Ryegrass (8 lbs per 1,000 sq ft) Blend. Seed at a rate of 12.0 lbs per 1,000 sq ft.

Soil must be kept continually moist until the hydroseed is germinated, but puddling is not tolerated. Seedlings are perishable and may die if not kept moist during this critical establishment period. It is the Contractors responsibility to carefully monitor the irrigation cycles on a daily basis to insure the success of the planting. Contractor is to continuously reseed weak areas as required.

3. The final seed mix is subject to change. Verify the final approved seed mixes with the Owners authorized representative prior to seeding. The seed mix will be adjusted to account for the use, drought tolerance, and the time of year to be installed.
4. The area to be seeded shall be slightly moist after the last watering and final weeding operations. The grading must be approved prior to hydroseeding. The site must be free draining prior to hydroseeding.
5. The area to be seeded shall be hydromulched with a discharge system that will apply the slurry to the areas to be treated at a continuous, uniform rate. The tank shall have a minimum capacity of 1000 gallons. Nozzle applying the slurry shall be held close enough to the areas to be planted to distribute the slurry in a uniform coating on the surface. A green marker dye shall be used to show such coverage.
6. The turf area establishment work is to proceed as follows. Time periods noted are from the date of hydroseed planting.

   a. Weeks 1 thru 4: Fertilize once (week 3 or week 4) with Best 19-6-12 with polyon 43 at a rate of 3.0 lbs per 1,000 sq ft (130 lbs per acre) to keep hydroseed in a healthy growth state and mow once (week 4) with reel mower with roller (Toro 5210, or approved equal) to stimulate the lateral turf growth and increase density.
   b. Weeks 5 thru 15: Fertilize every other week (weeks 6, 8, 10, 12 & 14) with Best 19-6-12 with polyon 43 at a rate of 3.0 lbs per 1,000 sq ft (130 lbs per acre). Mow 2 times weekly with reel mower with roller (Toro 5210, or approved equal) to stimulate the lateral turf growth and increase density. Mowing height to be 5/8” to 3/4” of an inch.
   c. Weeks 16 thru 17: Fertilize as required to keep turfgrass in a healthy condition. Mow 1-2 times weekly with reel mower with roller (Toro 5210, or approved equal) and raise turfgrass mowing height to 1” to complete the maintenance period.

7. The allowable planting window for Bermudagrass hydroseed starts on May 1st and extends thru May 30th annually. Planting after May 30th or before May 1st is not permitted. Contractor is to schedule the work to insure that the planting is completed within this planting window.
8. In addition to normal weekly maintenance, a minimum of one trained workman shall be on the site 4 hrs per day after planting the hydroseed and through the maintenance period. The hydroseeded areas shall be watered immediately and kept damp during the entire establishment period. Areas that are drying out too soon due to wind or other causes shall be watered by hand until the whole grass area comes up in a uniform and even covering of grass. Care shall be used to not overwater, which would create erosion. All erosion scars are to be repaired the same day.
9. The contractor is to carefully observe the newly planted grass to keep moist and in a

healthy growing condition. The contractor is to water and fertilize as needed to keep the turf in a vigorous healthy condition.

10. The contractor is to protect the newly planted turf areas from foot traffic as needed. The contractor is to continuously replant and repair damaged and weak areas.

H. Lawn Installation (Sod):

1. The turf areas, as indicated on the plans, shall be sodded (use big roll sod in larger areas) in one operation after all weed removal, soil preparation, grading and irrigation system have been completely installed and approved. Trees are to be installed after the turf has been established. Stake tree locations during turf establishment.
2. The allowable planting window for sod starts on April 1st and extends thru June 30th annually. Planting after June 30th or before April 1st is not permitted. Contractor is to schedule the work to insure that the planting is completed within this planting window. Do not plant in excessively hot weather or when unseasonably hot weather is forecast in the near future.
3. Finish grade is to be smooth and firm to prevent differential settlement. Sod is to be laid in staggered rows (brick like pattern). Edges are to be firmly butted together to insure soil to soil contact between sod pieces. Sodded areas are to be rolled (water roller) to remove air pockets and insure good soil contact.
4. The area to be sodded shall be slightly moist after the last watering and final weeding operations. The grading must be approved prior to sodding. The site must be free draining prior to sodding.
5. The turf area establishment work is to proceed as follows. Time periods noted are from the date of sod planting.
   a. *Weeks 1 thru 4:* Fertilize once (week 2 or week 3) with Best 19-6-12 with polyon 43 at a rate of 4.6 lbs per 1,000 sq ft (200 lbs per acre) to keep sod in a healthy growth state and mow once per week with reel mower with roller (Toro 5210, or approved equal) to stimulate the lateral turf growth and increase density.
   b. *Weeks 5 thru 12:* Fertilize twice (weeks 7 & 12) with Best 19-6-12 with polyon 43 at a rate of 4.6 lbs per 1,000 sq ft (200 lbs per acre). Mow 2 times weekly with reel mower with roller (Toro 5210, or approved equal) to stimulate the lateral turf growth and increase density. Mowing height to be 5/8” to 3/4” of an inch.
   c. *Weeks 13 thru 17:* Fertilize once (week 16 or week 17) to keep turfgrass in a healthy condition. Mow 1-2 times weekly with reel mower with roller (Toro 5210, or approved equal) and raise turfgrass mowing height to 1” to complete the maintenance period.
6. A minimum of one trained workman shall be on the site 8 hrs per day after sodding and through the maintenance period. The sodded areas shall be watered immediately and kept damp during the entire establishment period. Areas that are drying out too soon due to wind or other causes shall be watered by hand until the whole grass area is established in a uniform manner. Care shall be used to not overwater, which would create erosion and fungus. All erosion scars are to be repaired the same day.
7. The contractor is to carefully observe the newly planted grass to keep moist and in a healthy growing condition. The contractor is to water and fertilize as needed to keep the turf in a vigorous healthy condition.
8. The contractor is to protect the newly sodded area from foot traffic as needed. The contractor is to continuously resod and repair damaged areas as required.

3.5 STAKING AND TYING

A. Remove nursery stakes and ties.

B. Install tree stakes 18" deep on windward and leeward sides of tree and tie to tree with 4 ties. Install ties loose enough to avoid injuring cambium layer of tree and to allow limited movement.

C. Remove nursery ties from shrubs and espaliered plants and install new plastic ties in a loose manner so new plant growth will not girdle the branch or stem.

3.6 MAINTENANCE

A. Maintain planted areas during the progress of the work and through the maintenance period. In addition to normal weekly maintenance a minimum of one trained workman shall be on the site 4 hrs per day after planting of the hydroseeded turf until the fourth mowing and as needed through the maintenance period.

B. The maintenance period begins when the work is substantially completed and accepted by the Owner. The turf areas are to be completely planted and show active growth and reasonable coverage before the specified maintenance period can begin. The maintenance period shall be for one hundred twenty days (120) days, after substantial completion by the Owner. The Owner and Landscape Architect shall be notified a minimum of 10 days prior to the time that the work is ready for final inspection. This final inspection is required before the maintenance period can begin. The contractor is responsible to provide all materials and labor to maintain the site for the maintenance period at no cost to the Owner. The maintenance period may be extended at no cost to the Owner should prevailing site conditions not warrant final acceptance by the Owner. The site should be in a weed free condition, the lawns should be established, vigorous, have minimum 99% coverage, be weed free, and fertilized, and all plants and trees are to be in good condition. The maintenance period will be extended in one month increments until the Contractor brings the site into compliance at no additional cost to the Owner.

C. During the maintenance period the contractor shall provide the following services, but is not limited to the services outlined below.
   1. Maintain surfaces and supply additional top soil where necessary, including areas affected by erosion.
   2. Water to ensure uniform hydroseed turf growth and to keep surface of soil damp. Fertilize as specified on a monthly, or as needed basis.
   3. Apply water slowly so that surface of soil will not puddle and crust.
   4. Maintain turf & planted areas weed free. Hand weed or use chemicals at the Contractor's option.
   5. Mow and maintain the turf areas, and pick up grass clippings to be hauled off site at the Contractors expense.

3.7 CLEAN-UP

A. Remove rubbish, trash, and debris resulting from the operation at the end of each working day.

B. Wash paved surfaces clean.

C. Maintenance period will begin with acceptance of installation by the Owner and will continue as noted in article 3.06.

3.8 EXTRA LANDSCAPE MATERIALS

A. Contractor shall supply the following extra materials to be installed at the direction of the Landscape Architect during the project at any time. Each item is to include all associated materials (landscape and irrigation) and all appurtenances associated with the item, including material, labor and equipment costs for a complete installation in accordance with the project documents at no additional cost to the Owner. Should any items not be installed as part of the project, the remaining items are to be delivered to Owner or a credit issued at the Owner's option as part of the project completion documentation.

1. Ten (10): One gallon size plants (Planting Plan varieties)
2. Twenty (20): Five gallon size plants (Planting Plan varieties)
3. Five (5): Fifteen gallon size plants (Planting Plan varieties)
4. Five (5): Fifteen gallon size trees (Planting Plan varieties)
5. Three (3): 36" box size trees (Planting Plan varieties)

B. All work is to be in compliance with all project specifications and construction details at no additional cost to the Owner.

END OF SECTION

SECTION 32 84 00 LANDSCAPE IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all materials, labor, equipment and services necessary to furnish and install Landscape Irrigation System, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded. The extent of the underground landscape irrigation system is shown on the drawings. The Contractor shall carefully review the plans and specifications and if they feel that more equipment is needed, they shall include that in the bid. All extra work to achieve full coverage shall be at the Contractors expense. Sprinkler systems shall be complete, operative, automatic and provide full coverage of the planted areas.

B. Irrigation systems shall be constructed to the sizes, grades and locations shown on the plans. Irrigation pipelines shown on the plans are essentially diagrammatic. Locations of all irrigation improvements shall be established by the Contractor at the time of construction. Typical spacing of the sprinklers are shown on the plans and shall not be exceeded, except by written permission of the Owner's authorized representative.

C. The system has been designed to a pressure as indicated in these specifications. The Contractor shall test the mainline prior to starting any work and verify that such pressure does exist. If it does not, the Contractor shall notify the Owner at once for a ruling before starting work. If the Contractor does not test prior to starting work, all corrective work shall be at the Contractors expense.

1.2 RELATED SPECIFICATION SECTIONS

A. Division 31 EARTHWORK

B. 32 90 00 LANDSCAPE CONSTRUCTION

C. Division 03 CONCRETE

D. Division 26 ELECTRICAL

1.3 STANDARDS

A. Materials and installation shall conform with all State and Local codes and regulations governing the trades included in this work. Requirements of these plans and specifications not conforming therewith, but exceeding code requirements, then the plans and specifications shall govern.

AD3

1.4 EXPLANATION AND EXAMINATION OF SPECIFICATIONS AND PLANS

A. Due to the scale of the Drawings, it is not possible to indicate offsets, fittings, etc. which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of their work and plan their work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed in the most direct and workmanlike manner so that conflicts between irrigation systems, planting, utilities, and architectural features will be avoided.

B. Notes on Drawings: Work called for on the Drawings by notes shall be furnished and installed whether or not specifically mentioned in the Specifications.

C. It shall be the responsibility of the Contractor to carefully examine the site, plans and specifications relating to this work for completeness, accuracy and clarity. Any conflict, error, or clarification shall be immediately brought to the attention of the Owner's authorized representative in writing to obtain a ruling. Failure to do so prior to bidding shall result in any corrective work necessary shall be completed at the Contractor's expense.

D. It is the intent of these specifications and plans to form a guide to accomplish the work of installing a complete sprinkler system which will operate in an efficient and satisfactory manner according to the workmanlike standards established for the irrigation industry. Therefore, any items not specifically noted, but necessary for a complete installation, shall be furnished and installed under this contract.

E. Manufacturer printed instructions shall also be a part of these specifications and shall prevail over these specifications. The Contractor shall be responsible to provide such details and instructions to the inspecting person for approval or rulings.

F. All general and specific notes shown on the drawings and details herein shall take precedence over these specifications. All work designated on the drawings by notes shall be furnished and installed.

1.5 PERMITS AND INSPECTIONS

A. The Contractor shall obtain and pay required fees to any governmental or public agency. Permits for the installation or construction or the work included under this Contract, which are required by legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. Contractor shall also arrange for and pay costs in connection with inspections and examination required by these authorities.

1.6 GUARANTEE

A. Irrigation system shall be guaranteed for a period of one year from the date of final acceptance. Any repairs required are to be completed by the Contractor in a timely manner at no additional cost to the Owner.

1.7 OPERATIONS AND MAINTENANCE INSTRUCTIONS / RECORD DOCUMENTS

A. Two copies of equipment operations, maintenance instructions, and wire diagrams shall be

furnished to the Owner prior to final acceptance. Two copies of control valve station charts (color coded reduced Irrigation Plan with plastic waterproof lamination) showing watering zones and stationing shall be provided and mounted in the controller pedestal.

B. The Contractor shall furnish one set of reproducible Record Documents (As-Built drawings) in form of 24 lb bright white bond paper.
   1. Label first page of each document, or set of documents, "RECORD DRAWINGS" in neat large printed letters on lower right hand corner. Record information concurrently with construction progress. Do not conceal any work until required information is recorded on a daily basis.
   2. Drawings: Legibly mark to record actual construction:
      a. Horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements. Give sufficient horizontal and vertical dimensions to accurately trace route and invert of each concealed line or item. Accurately locate each capped, plugged, or stubbed line.
      b. Field changes of dimension and detail.
      c. Changes made by Field Order, by Addenda, or by Change Order.
      d. Details not on original Contract Drawings
   3. Deliver all Record Documents (As-Builts) to Landscape Architect. Accompany submittal with transmittal letter in duplicate, containing:
      a. Date.
      b. Project title.
      c. Contractor's name and address.
      d. Title and number of each Record Document (As-Built).
      e. Signature of Contractor or his authorized representative.

1.8 SUBMITTALS

A. Within the required time period stated, the Contractor shall submit six (6) copies of complete lists of proposed materials to Landscape Architect including source, manufacturers name and catalog numbers.

B. Shop drawings shall follow (six copies) for equipment including dimensions, capacities, and other characteristics listed in product specifications. Materials and equipment shall not be ordered until given written approval by Landscape Architect.

C. The specified irrigation booster pump has a long lead time (approximately eight weeks) and the irrigation booster pump submittal is to be submitted in a timely manner after the contract award and ordered to avoid project delays.

1.9 DEFINITIONS

A. Piping: All pipe fittings, valves, and accessories as required for a complete piping system.

B. PVC: Polyvinyl Chloride.

C. Agencies and Organizations:
   1. ASTM American Society for Testing and Materials
   2. AWWA American Water Works Association
   3. IAPMO International Association of Plumbing and Mechanical Officials

AD3

4. CEC California Electrical Code
5. UL Underwriter's Laboratories

1.10 UNDERGROUND OBSTRUCTION

A. The Contractor shall verify all underground obstructions, and / or utilities, existing or proposed, prior to trenching. Contractor shall avail themselves of any “as built” drawings of the site, Underground Service Alert (USA) 1-800-227-2600 and records of existing and proposed site work. This shall also include verifying between proposed irrigation work and existing / proposed underground utilities. Contractor shall call for a ruling by the Owner’s Authorized Representative prior to work to obtain a ruling in the event of a conflict.

B. The Contractor, after availing themselves to the existing record drawings, Underground Service Alert and coordination with other trades installing underground utilities and excavation operations incurs and damages any existing utility not identified, the Contractor shall stop work and notify the inspector on site, obtain a ruling and repair the damage.

1.11 WORKMANSHIP

A. The Contractor shall have experience and demonstrated ability in the installation of landscapes of this type. No work shall be completed without supervision by a qualified foreman. All work shall be installed by skilled persons proficient in the trades required, in a neat, orderly and organized manner, with the recognized standards of craftsmanship developed for the industry and as described in the plans, specifications and manufacturers installation instructions.

1.12 CONSTRUCTION OBSERVATION

A. The Contractor is to coordinate construction observation site visits with the Landscape Architect and District Maintenance Department during the appropriate phases of construction, or as required by the Landscape Architect. The Contractor is to schedule site visits a minimum of one week in advance at the required phases of construction. The following outlines the phases of construction which require a site visit, however it is not limited to the following construction phases:
1. Preconstruction meeting
2. Staking of plant and tree locations prior to irrigation installation.
3. Staking of sprinklers and mainline routing.
4. Mainlines, wiring, lateral pipes, & valve manifolds prior to backfill.
5. Irrigation coverage test and rough grading.
6. Trees & plants prior to installation, still in containers.
7. Fine grading of turf areas prior to sod and hydroseed installation.
8. Substantial completion to start maintenance.
9. Final acceptance after successful maintenance period.

B. The Owner will pay for initial construction observation visits, however, any additional visits required due to non-compliance, incomplete work, or substandard performance will be paid by the contractor at a cost of $600.00 per extra visit.

1.13 PROTECTION TO THE PUBLIC HEALTH AND WELFARE

A. The Contractor in the course of their work shall make every effort to guard the public health, safety and welfare during construction. This shall include erection of barricades, night warning lights and all necessary devices required to protect the public health and welfare or as required by existing governmental codes. The Contractor shall accept any and all liabilities arising from accident or injury on the job and after construction. All equipment which protrudes above grade shall be installed against a structure or an appropriate barricade shall be erected to protect public safety.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials and equipment to be used shall be as outlined on the irrigation legend, or as described in the irrigation notes and irrigation specifications. All materials shall be new and unused.

B. All specified materials, products and manufacturers are relevant to describe the required quality and features of a particular component of the irrigation system, however, the specific product or manufacturer noted is to be construed to be followed by the words, “or approved equal."

2.2 PIPELINES / SLEEVES

A. Irrigation Piping:
1. 2" thru 3": Pressure pipe / upstream of control valve (mainline pipe): PVC Schedule 40 solvent weld pipe, PVC Material ASTM D1784, Cell Class 12454B, Pipe Design ASTM D1785 & compliance with all NSF & IAPMO (UPC) requirements.
2. 4” thru 10”: Pressure pipe / upstream of control valve (mainline pipe): PVC Class 200 gasketed pipe, pressure rating 200 psi, SDR 21, PVC Material ASTM D1784, Cell Class 12454B, Pipe Design ASTM D2241 & Gasket Material ASTM F477.
3. 1" thru 21/2": Circuit pipe / downstream of control valve (lateral pipe): PVC Schedule 40 solvent weld pipe, PVC Material ASTM D1784, Cell Class 12454B, Pipe Design ASTM D1785 & compliance with all NSF & IAPMO (UPC) requirements.
4. 2" and larger: Sleeving under paving: 2” thru 3” sleeves are to be PVC Schedule 40 solvent weld pipe, PVC Material ASTM D1784, Cell Class 12454B, Pipe Design ASTM D1785 & compliance with all NSF & IAPMO (UPC) requirements. 4” and larger sleeves are to be PVC Class 200 solvent weld pipe, pressure rating 200 psi, SDR 21, PVC Material ASTM D1784, Cell Class 12454B & Pipe Design ASTM D2241.
5. Pipe shall be continuously and permanently marked with the following information: Manufacturer's name or trademark, nominal pipe size, schedule and type of pipe, pressure rating in PSI and (NSF, IAPMO & AWWA) seals of approval.

B. Plastic pipe shall be as called for on the plan and extruded from PVC 1120/1220 and shall meet commercial standards CS 256-63. Class and schedule of pipe shall be as called for in the plans. Strict conformance with the manufacturers recommended installation instructions is required. Painted galvanized steel (schedule 40), threaded bronze nipples, copper or painted ductile iron pipe is to be used for any pipe installed above grade. Fittings for above grade piping are to be consistent with pipeline material. Sun burned pipe or pipe that has been

abused in shipping and handling is not to be used.

C. The Contractor is to install concrete thrust blocks as outlined in the thrust block detail and as recommended by the pipe & fitting manufacturers to secure all changes in direction or dead ends of all mainline pipe. The Contractor is to use rebar as needed if necessary to insure the stability of the pipe. Where concrete thrust blocks cannot be installed against continuous native subgrade, the Contractor is to install ductile iron mechanical joint restraints. No bending, or curving of pipe will be allowed, except as permitted by the pipe manufacturer. Pipe manufacturer must be approved prior to ordering materials.

D. Where piping on the plans is shown under paved areas, but is running parallel and adjacent to planted areas, the intent of the plans is to install the piping in the planted area. PVC sleeves of appropriate type depending upon size are to be used with all pipe and wire installed under hardscaped surfaces over eight feet (8'-0") wide or wider.

E. Where pipeline routing changes occur in the field, the Contractor is to size the pipe so that a flow velocity of 5.0 feet per second is NOT exceeded. The minimum pipe size is 3/4" and 11/4" pipe is not used due to its limited flow range. The following is a basic guide for sizing lateral pipes in the field:
1. 3/4" Pipe – Not Used
2. 1" Pipe - 0 gpm thru 12.0 gpm
3. 11/2" Pipe - 12.1 gpm thru 30.0 gpm
4. 2" Pipe - 30.1 gpm thru 46.0 gpm
5. 21/2" Pipe - 46.1 gpm thru 85 gpm.

2.3 PIPELINE FITTINGS

A. Fittings:
1. For PVC solvent weld plastic pipe, 2" thru 3" mainline fittings: PVC Schedule 80 socket fittings (ASTM A2564, D2466, D2464 & D2467), Type 1, Grade 1. All mainline fittings are to be PVC Schedule 80 type with solvent weld or threaded connections.
2. For PVC class 200 gasketed pipe, 4” thru 8” mainline fittings: Ductile iron deep bell gasketed fittings as manufactured by LEEMCO, or approved equal. See manufacturers instructions and recommendations. No angular deflection of mainline pipe at the fitting bell end is allowed. For automatic valve connections to large mainline (4” thru 8”) pipe, Romac 202N ductile iron service saddle with double stainless steel straps may be used.
3. For PVC solvent weld plastic pipe, 1" thru 21/2" lateral fittings: PVC Schedule 40 socket fittings (ASTM A2564, D2466, D2464 & D2467), Type 1, Grade 1. All lateral fittings (downstream remote control valve) not specifically noted as PVC Schedule 80 type in the specifications or irrigation details are to be PVC schedule 40 type with solvent weld or threaded connections.
4. For connections between main lines and remote control valves: Schedule 80 PVC fittings and TOE nipples (threaded one end), see Irrigation Details. No male adaptors are allowed to be used on the project. Use PVC schedule 80 TOE nipples for threaded to solvent weld connections.
5. When connection is plastic to metal, Schedule 80 TOE nipple shall be used.
6. Teflon tape shall be used on all small diameter (½" to 3") threaded connections. No liquid or paste pipe thread sealants are allowed.

B. Risers to irrigation heads: Shall be as noted on Irrigation Details.

C. Solvent Weld Adhesive: Weld-On cement & primer appropriate for size & type of pipe and fittings. See manufacturers instructions and recommendations. Note weather and temperature limitations for use. Use primer for all joints, mainline and lateral pipe connections.

2.4 VALVES / CONTROL WIRE

A. Automatic Control Valves: Globe / Angle valves operated by low-power solenoid, normally closed, with manual flow adjustment. Sizes and types as shown on drawings. Low voltage electrical connections to valves shall have a minimum 36" coiled loop to each valve in valve box, see details. Valves shall be installed in a heavy duty plastic valve box with bolt down lid. Install one valve per valve box, no exceptions. Remote control valves are to have a solenoid that is compatible with Baseline two-wire / decoder system.

B. Two-Wire Communication Cable: Baseline biline 14-2 as manufactured by Paige #7072D Black & Red, or approved equal. Two-wire communication cable is to be installed in 1 1/2” PVC electrical conduit with long sweep ells into and exiting each valve box. Two-wire communication cable is to have a junction / pull box installed at all changes in direction and at a maximum of 150 ft apart for longer straight runs. Two-wire communication cable is to be a minimum of 18” below grade.

C. Two-wire Splices / Connectors – 2 Wire Path: All wire splices / connectors to be 3M DBY-6 / DBR-6 waterproof splice kits and spare wire ends. All splices are to be located in a valve box and no direct bury splices are allowed.

D. Control Wire Connectors – 2 Wire Path: Valve to decoder wire connectors and all other splices are to be 3M DBY-6 / DBR-6 waterproof splice kits and spare wire ends. All splices are to be located in a valve box and no direct bury splices are allowed.

E. Control Wire Marking: T. Christy Enterprise, Inc. Waterproof Irrigation I.D. Tag or approved equal (714) 771-4172.

F. Control Valve Boxes: Old Castle / Carson heavy duty plastic valve boxes with heavy duty bolt down lids, or approved equal. See Irrigation Details for model numbers and sizes.

G. Control Valve Box Marking: Heat imprinting with appropriate controller and station number or valve box identification for other improvements. All valve boxes are to be marked to indicate contents.

2.5 IRRIGATION HEADS

A. Spray Head: Molded plastic body with plastic nozzles. Refer to schedule on drawings. Manufacturer's numbers are listed with description.

B. Rotor Head: Molded plastic and stainless steel construction. Gear driven with lockable arc adjustment and matched precipitation rate nozzles. Refer to schedule on drawings. Manufacturer's numbers are listed with description.

C. Irrigation heads adjacent to concrete walks, mow strips or other paved areas shall be offset 3" to permit edging without damage to irrigation equipment. Irrigation heads are to be set at grade. Irrigation heads are to be adjusted so that no spray hits buildings, fences, walls, or hardscaped

surfaces. Install anti-drain check valves under all irrigation heads that weep or show drainage after operation. Irrigation heads adjacent to buildings and fences or walls shall be offset 12" – 18" at District's option to limit overspray and to prevent weed growth along fence lines. Rotor sprinklers adjacent to buildings shall be offset 2'-0" – 3'-0" at District's option to eliminate overspray onto adjacent building. Irrigation heads are to be set flush at finish grade.

2.6 GATE VALVES

A. 1" thru 3" Size: Class 125 bronze gate valve, 200 psi WOG, manufactured domestically made of cast bronze material and cross handle with non rising stem as manufactured by NIBCO, or approved equal. Solid wedge with screw in bonnet gate valve with threaded connections resistant to dezincification. Contractor is to provide Owner with two (2) "T" handle operation keys.

B. 4" thru 8" Size: Resilient seat ductile iron gasketed joint gate valve rated for a minimum of 200 psi, manufactured domestically by NIBCO, Waterous or approved equal. Contractor is to provide Owner with two (2) "T" handle operation keys.

2.7 QUICK COUPLER VALVES

A. Two piece valve with heavy duty brass construction with vinyl cover and single lug operation. Contractor is to supply Owner with five (5) quick coupler keys and five (5) hose swivels. See Irrigation Legend and Details for detailed descriptions.

2.8 CENTRAL CONTROL SYSTEM

A. Contractor is to provide data collection, data entry, programming and setup as required for the Baseline online system (Base Manager Plus) and is to provide two (2) 5 year subscriptions to Base Manager Plus for the District (total of 10 years). Contractor is to provide all setup required for Et control of the irrigation system with online weather data. Contractor is to follow all Baseline requirements and be Base Line certified prior to starting work and have system installation certified by an authorized Baseline representative for the extended warranty. Contractor is responsible for training up to 4 persons appointed by the District in the use of this online central system.

For existing Baseline controllers being modified as part of the project by having valves added, Contractor is to provide data collection, data entry, programming and changes to existing programming as required for the existing Baseline online system (Base Manager Plus).

2.9 HAND HELD RADIO SYSTEM

A. Contractor is to assist District to access Baseline online system (Base Manager Plus) via District provided iPad's or cellular smart phones capable of connecting with the internet for remote activation of the irrigation system. Contractor is to install Baseline app and provide all setup and support for the remote activation of the system. Contractor is also to provide all setup and support to install the Baseline app on up to four (4) District provided smart phones / tablets to make them capable of remote activation of the irrigation system.

2.10 FIELD SATELLITE CONTROLLER

A. Irrigation controller shall be as specified on the plans. Pedestal mount shall have a concrete base. The installation shall be in accordance with the manufacturers instructions and recommendations. All electrical connections to the controller shall be the responsibility of the Contractor and shall be UL approved and meet all applicable codes and regulations. All wiring from the electrical source to controller shall be installed in UL approved electrical conduit. Contractor is responsible for training up to four persons appointed by the Owner in the operation of the field satellite controllers.

B. Contractor is to install Campus network cable with internet access to the irrigation controller. Irrigation controller is to be ethernet ready.

C. Contractor is to connect new Baseline controller ‘E’ to the existing Flow Station and complete all programming changes needed so Baseline controller ‘E’ can work with existing flow sensing equipment, master valve and pump start for the High School (north) pump station. Provide all modules and programming required, contact Mark Huntzinger (760) 484-4907 from Baseline for technical support.

2.11 IRRIGATION BOOSTER PUMP STATION

A. Existing Irrigation Booster Pump Station is existing and is to remain and protect.

2.12 VALVE BOXES

A. All valves, manual or automatic shall have a valve box, set flush with grade. All valve boxes shall be of heavy duty plastic construction with heavy duty bolt down lids. Valve boxes are to be manufactured by Old Castle / Carson, or approved equal. Maximum of one (1) valve per valve box, no exceptions. Placement of the valves within the valve boxes shall allow for proper servicing and maintenance space, or the installation will be rejected.

2.13 AIR RELIEF VALVES

A. Air relief valves shall be installed at high elevation areas of the mainline pipe and at dead end runs. Air relief valves are to be located in the field where high elevation points can be determined. Contractor is to submit a shop drawing showing the proposed installation locations for review and approval.

2.14 BACKFLOW PREVENTION DEVICES

A. The backflow prevention device is existing and is to remain and protect.

2.15 OTHER MATERIALS

A. Materials not specifically indicated but necessary for proper execution of this work shall be of the first quality as selected by the Contractor subject to the acceptance of Architect.

AD3

B. All materials appearing in the legend and details of the irrigation drawings are part of this job. Contractor is responsible for installation according to drawings and details. The system shall efficiently and uniformly irrigate all areas and perform as required by these plans and specifications.

PART 3 - EXECUTION

3.1 IRRIGATION SYSTEM DESIGN

A. Irrigation system is designed for a minimum water pressure of 75 psi at the discharge of the irrigation booster pump.

B. Verify the design pressure provided at P.O.C. prior to system installation and report any discrepancies in writing to the Architect. Failure to inform the Architect of any discrepancy in design pressure seven working days prior to installation of the irrigation system shall institute the responsibility of corrective action to the Contractor, at no expense to the Owner.

3.2 IRRIGATION STAKING

A. The location of all sprinklers, valves, piping and other irrigation improvements shall be staked out by the Contractor. All staking and measurements shall be taken from permanent objects, buildings, or other permanent hardscape features including survey bench markers, and are NOT to be taken from non-permanent boundaries such as turf boundaries which are subject to modification. All measurements shall be made in feet and inches, rounding to the nearest inch. All variations from the plans are to be continuously updated on a daily basis on the record (as built) drawings. The Contractor is to present the areas staked to the Landscape Architect for review and approval prior to starting work. The Contractor is to make the adjustments in staking requested by the Landscape Architect at no additional cost to the Owner.

B. In turf and planter areas, the Contractor is to stake the tree and shrub locations prior to layout of the irrigation system to get approval from the Landscape Architect and District in the field prior to trenching. Contractor is to use color coded flags to stake plant materials by variety. Landscape Architect or District may move plants, delete or add plants during the staking review process. Contractor is to make changes in the field and on the as built plans at no additional cost to the Owner. After the plant layout has been staked, reviewed, adjusted and approved, the Contractor is to stake the bubbler locations for each plant or tree. Bubblers are to be located within the plant water basin on the uphill side of the plant or tree. Bubblers that are too far from the plant or tree will need to be relocated within an acceptable difference. The plant or tree rootball is to have direct access to irrigation water from the intended bubbler. Sloppy or non-compliant work will be rejected.

3.3 EXCAVATION, BACKFILL

A. Trenches for irrigation pipelines and sleeves shall be excavated either by hand or machine and shall be of sufficient width to permit proper handling and installation of the pipe and fittings. The backfill shall be compacted and evened off with the adjacent soil level. Select fill material or sand shall be used if soil conditions are rocky, or have debris. No material over 3/8" shall be allowed near the pipe, 6" below it, or 6" above the pipe. Backfill shall be made early in the

morning when the soil and pipe temperatures are the same. Pipe to be installed with a minimum cover of 24" for mainline pipe and 12" for lateral pipe with spray heads and 18" for lateral pipe with rotors. Backfill shall be in 6" (lifts) increments. Each (lift) increment shall be compacted as needed to prevent settlement with tamping machine. Backfill material is to be brought to the optimum moisture content prior to starting compaction operations.

B. Contractor shall compact trench fill material as required to prevent settling of trenches. Contractor is to guarantee trenches against settling for a period of one year from the date of final acceptance by the Owner. Contractor is to fill, compact and seed settled trenches during this time at no additional cost to the Owner.

C. All pipe in the same trench shall have a minimum clearance of 6" from each other. Pipelines are not to be stacked vertically in the same trench. Pipes and wires or conduit are to have a minimum clearance of 12" from each other. Final fill over trenches shall be compacted to a level grade with no depressions.

3.4 ROAD, DRIVEWAY, PARKING LOT AND SIDEWALK PIPELINE CROSSINGS

A. Any pipe, wire or communication cable that crosses any hardscaped surface eight feet (8'-0") or wider, shall be installed in a PVC sleeve of appropriate type base on size that is a minimum of two times larger than the pipe or wire bundle being sleeved. Sleeves 2” thru 3” size are to be PVC schedule 40 pipe sleeves and Sleeves 4” and larger are to be installed in PVC Class 200 pipe sleeves. Sleeves are to have a minimum trench cover of 18" deep. Pipelines and wires that are to be installed below existing hardscaped improvements are to be installed in a sleeve as noted above, by horizontal directional boring. No cutting and patching of any hardscaped surface will be permitted without written permission of the Owner’s authorized representative. Newly paved areas are to be protected and preserved from construction damage. Jacking and hydraulic (water jet) driving are not permitted. The minimum sleeve size is two (2") inch. The Contractor is to verify the inside and outside diameters of pipes and wire bundles being sleeved to insure proper fit and installation. Irrigation pipelines and wires are to be installed in separate sleeves. No more than one (1) irrigation pipeline is allowed per pipe sleeve. Low voltage wires may be bundled with communication cable and installed in an appropriate size wire sleeve in conformance with NEC requirements for wires installed in conduit.

B. If approval to cut and patch a hardscaped surface has been obtained, the Contractor shall make cuts by a pavement / concrete saw or other approved means. Where any cutting or breaking of hardscaped surface work is necessary, it shall be removed and replaced by the Contractor conforming to all prevailing project specifications and requirements. Cuts are to be made along existing scoring lines or other markings to minimize negative visual aesthetics. Barriers and night lighting shall be erected to protect the public health welfare and safety. If approval to cut and patch a hardscaped surface is denied, the Contractor shall make the crossing by using horizontal directional boring. All materials and labor for all sleeves and crossings, whatever method, are to be supplied by the Contractor at no additional cost to the Owner.

C. Backfill shall be compacted to 95%. The Owner reserves the right to test such backfill. If the backfill does not meet the required 95% compaction, the Contractor shall recompact the trench. The Contractor shall pay for all additional testing until the work meets the specifications.

D. Sleeve legend and call outs on the plan are for the convenience of the District and Contractor is responsible for the proper sleeving of all pipes and wire in accordance with the above standards whether the sleeve is called out or not and is to be of appropriate size regardless of sleeve

legend callout.

3.5 PIPING INSTALLATION

A. General: Support piping without strain on joints or fittings and allow for piping expansion and contraction. "Snake" pipe into trench in accordance with manufacturer's recommendations to allow for expansion. Lay on solid sub-base, uniformly sloped.

B. The Contractor shall examine all other portions of working drawing and plan trenching and pipe routing and depth so that no conflicts will arise between irrigation and any other work. Any corrective action will be the Contractor's responsibility at no further expense to the Owner. Contractor is to endeavor to route mainline pipes a minimum of fifteen feet (15’-0”) from trees and is to get permission to install mainline pipe closer in tight locations from the Districts Authorized Representative.

C. Joints:
1. PVC Solvent Weld: Pipe shall be cut square and reamed to full size. Check for assembly prior to solvent weld. Remove excess solvent. All assembly shall be in accordance with manufacturer's recommendations, including use of primer on 1" pipe or larger.
2. Steel or PVC Schedule 40 Threaded: Pipe shall be cut square and reamed to full size. Threads shall be full cut, true and tapered. Teflon tape suitable for conveyed fluid shall be applied to male thread only.
3. Open Ends: Open ends of piping shall be capped during progress to preclude foreign matter. All pipe shall be assembled free from dirt and pipe scale.

D. The Contractor shall thoroughly flush all mainline and lateral piping prior to the installation of irrigation heads. Flush entire piping system of all debris.

3.6 IRRIGATION HEAD INSTALLATION

A. Head spacing on drawings is diagrammatic. Head spacing and patterns shall be adjusted to provide complete and adequate coverage without overspray on non-planted areas. Flush all lines prior to installation of the sprinkler heads.

3.7 CONTROL WIRE

A. Protect two-wire path by running along side mainline piping, maintain minimum 6" separation to mainline. Do not tape wire together when encased in sleeve or conduit. Minimum cover shall be 24 inches. Connect wires together at valve manifold with 3M DBY-6 / DBR-6 splice kits as required. Tag all control wire splices with approved control wire marker at splices in valve box and in controller. Install junction boxes at all changes in direction and at 150 ft for long straight runs.

3.8 CONTROL VALVE BOX MARKING

A. Imprint valve box lid by heat imprinting with appropriate controller and station number.

AD3

3.9 TESTING

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Owner. Mainlines are to be center loaded with the joints exposed. Should any joints be covered before such tests, the Contractor shall, at their expense, uncover, test, and repair the work and that of other contractors to original conditions. Leaks and defects shown by tests shall be repaired and entire work re-tested. Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the test.

B. Piping Upstream of control valves (Mainline): Maintain 100 PSI water pressure for a duration of four (4) hours. There shall be no drop in pressure during test except that due to ambient temperature changes. Perform test with control valves installed.

3.10 CONSTRUCTION OBSERVATION

A. Observation of Work:
1. Installation and operations must be approved by the Landscape Architect.
2. In no event shall the Contractor cover up or otherwise remove from view any work under this contract without prior approval of the Landscape Architect. Any work covered prior to inspection shall be opened to view by the Contractor at their expense.

B. Construction Observation: Periodic site visits shall be required for basic operations and installations during progression of the project. Such site visits will include, but not necessarily be limited to, the following items:
1. Preconstruction meeting.
2. Staking of plant and tree locations prior to irrigation installation.
3. Staking of sprinklers and mainline routing.
4. Mainline, wiring, lateral pipes & valve manifolds prior to backfill.
5. Irrigation coverage test and rough grading.
6. Trees & plants prior to installation, still in containers.
7. Fine grading of turf areas prior to installing sod and hydroseed.
8. Substantial completion to start maintenance.
9. Final acceptance after successful maintenance period.
10. The Owner will pay for initial construction observation visits, however, any additional visits required due to non-compliance, incomplete work, or substandard performance will be paid by the contractor at a cost of $600.00 per extra visit.

C. Coverage Test: When the irrigation system is completed, the Contractor in the presence of the Landscape Architect shall perform a coverage test of water afforded in the planting areas. The Contractor shall furnish all materials and labor required to correct any inadequacies of coverage disclosed. The Contractor shall inform the Landscape Architect of any deviation from the plan required due to wind, planting, soil, or site conditions that bear on proper coverage. If such corrections or additions are required in the irrigation system, the Contractor shall make all adjustments and corrections without any extra cost to the Owner.

D. Completion of Work: Prior to substantial completion and the start of the maintenance period, the Contractor shall deliver to the Owner a complete set of as built drawings on 24 lbs bright white bond paper, two (2) sets of manuals covering all materials in the irrigation system with a list of local vendors, two (2) keys to each controller, two (2) sets of all tools required to maintain system in tool boxes, five (5) quick coupler keys, five (5) hose swivels, two (2) mainline gate valve “T” wrenches for each type required, waterproof color coded controller

diagrams and extra equipment listed below not installed as part of the project. Irrigation system shall be fully automatic, operable and provide full coverage of the planting areas. In judging the work, no allowance for deviation from the original plans and specifications will be made unless already approved in writing at proper time. Should it become necessary, due to developed conditions, to occupy any portion of the work before the Contract is fully completed, such occupancy shall not constitute acceptance. The Contractor will not be responsible for any damage caused by the Owner's work forces.

3.11 EXTRA IRRIGATION EQUIPMENT

A. The Contractor shall supply the following extra equipment to be installed at the direction of the Landscape Architect during the project. Each item is to include all piping, wiring, fittings, appurtenances, labor and equipment costs for a complete installation at no additional cost to the Owner. Should any items not be installed as part of the project, the remaining items are to be delivered to Owner as part of project completion documentation.

1. Ten (10): Six inch pop up spray sprinklers.
2. Ten (10): Small I-20 six inch pop up rotor sprinklers.
3. Five (5): Large I-25 pop up rotor sprinklers.
4. Five (5): Large I-25 pop up high speed rotor sprinklers.
5. Three (3): 1" electric valve.
6. Three(3): 11/2" electric valve.
7. Three (3): 2" electric valves.
8. Three (3): Quick coupler valves.
9. Two (2): Air relief valve.
10. Ten (10): 1 Station Baseline Decoders.
11. Twenty (20): 3M DBY-6 / 3M DBR-6 splice kits.

B. All work is to be in compliance with all project specifications and construction details at no additional cost to the Owner. Items not installed as part of the project are to be delivered to the Owner as part of project close out procedures (turn over items).

3.12 MAINTENANCE

A. Adjustments: Irrigation system shall be maintained and adjusted as required to provide proper coverage throughout the 120 day maintenance period. Irrigation system maintenance shall commence upon approval of substantial completion following irrigation installation, planting operations, and general site clean up. Maintenance shall be continued until final acceptance.

B. Irrigation controller shall be set during this time with Owner. Training for persons appointed by the Owner is to be completed during this time. Final acceptance of the project will NOT occur until all training of Owner’s personnel is completed.

END OF SECTION

AD3

SECTION 33 12 00 - WATER UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Pipe and fittings for on-site domestic piping.

B. Valves and valve boxes.

C. Accessories.

1.2 RELATED SECTIONS

A. Contract General Conditions and Division 1 Specifications.
B. Section 03 33 00 – Cast-In-Place Concrete.
C. Section 31 11 00 - Site Clearing.
D. Section 31 20 00.01 - Earthwork: Excavation, Filling, and Grading
E. Section 31 22 22.01 - Soil Materials.
F. Section 31 23 33 - Trench Excavation and Backfill.

1.3 REFERENCES

A. ASTM Test Method D1557.

B. ANSI/ASTM D2466 - Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.

C. ANSI/AWWA C110 - Ductile Iron and Grey-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids.

D. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

E. ANSI/AWWA C500 - Gate Valves, 3-inch through 48-inch NPS, for Water and Sewage Systems.

F. ANSI/AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12-inch, for Water.

G. ASTM D1785 - Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and Class 200.

H. ASTM D2855 - Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings.

I. ASTM D3139 - Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.

SECTION 33 12 00 - WATER UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Pipe and fittings for on-site domestic piping.

B. Valves and valve boxes.

C. Accessories.

1.2 RELATED SECTIONS

A. Contract General Conditions and Division 1 Specifications.
B. Section 03 33 00 – Cast-In-Place Concrete.
C. Section 31 11 00 - Site Clearing.
D. Section 31 20 00.01 - Earthwork: Excavation, Filling, and Grading
E. Section 31 22 22.01 - Soil Materials.
F. Section 31 23 33 - Trench Excavation and Backfill.

1.3 REFERENCES

A. ASTM Test Method D1557.

B. ANSI/ASTM D2466 - Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.

C. ANSI/AWWA C110 - Ductile Iron and Grey-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids.

D. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

E. ANSI/AWWA C500 - Gate Valves, 3-inch through 48-inch NPS, for Water and Sewage Systems.

F. ANSI/AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12-inch, for Water.

G. ASTM D1785 - Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and Class 200.

H. ASTM D2855 - Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings.

I. ASTM D3139 - Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section SUBMITTALS and the Contract General Conditions.

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Contract General Conditions and Division 1 Specifications.

B. Accurately record actual locations of piping mains, valves, connections and appurtenances, referenced to permanent surface features.

C. Identify and describe discovery of uncharted utilities or utilities found at locations different than indicated on plans.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with product manufacturer's recommendations and these Contract Documents.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle all products required.

PART 2 - PRODUCTS

2.1 WATER PIPE

A. Ductile Iron Pipe (for iron pipe larger than 3 inches in diameter, above ground): ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, thickness Class 50, with cement - mortar lining and seal coating per ANSI/AWWA C104/A21.4.

1. Fittings: ANSI/AWWA C110/A21.10, ductile iron.
2. Joints: Flanged.

B. PVC Pipe (for pipe 3 inches and smaller, underground): ASTM D1785, Schedule 40; 1120 high impact.

1. Fittings: ANSI/ASTM D2464, Schedule 80 PVC (Schedule 40 PVC for pipes 1-1/2 inches and smaller).
2. Joints: ASTM D2855, solvent weld.

C. PVC Pipe (for pipe 4 inches and larger, underground): ANSI/AWWA C900 Class 305, 1120 high impact.

1. Fittings: ANSI/AWWA C111, ductile iron.
2. Joints: ASTM D3139 compression gasket ring.

D. Locator Tape: Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be six inches wide and be printed “CAUTION - WATER LINE BELOW”.

2.2 VALVES - UP TO 2 INCHES (50 MM)

A. Use full port ball valves for 2 inches and smaller and resilient wedge gate valves for 2-1/2 inches and larger size.

B. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends.

2.3 GATE VALVES - 2-1/2 INCHES (63 MM) AND OVER

A. ANSI/AWWA C509, Iron body, bronze trim, non-rising stem with square nut or control handle wheel, resilient single wedge, threaded or flanged.

2.4 VALVE BOXES

A. Precast Reinforced Concrete. Cast iron lid marked for service. Christy No. G5 or approved equal.

B. Valve boxes shall have a minimum 6 inch wide by 4 inch (6” inches in vehicular areas) thick concrete collar.

2.5 ACCESSORIES

A. Concrete for Thrust Blocks and Valve Box Surface Collars: Concrete type specified in Specification Section CAST-IN-PLACE CONCRETE.

B. Valve Boxes and Covers: Christy No. G5 traffic box, or approved equal. Cover marking shall read "Water". A one-piece PVC riser extension shall be provided as necessary to allow unobstructed access to valve operating nut.

C. Solvent Cement and Primer for PVC Pipe and Fittings: Per ASTM F656 and ASTM D2564.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions. All plot dimensions are approximate. Before proceeding with any work, carefully check and verify all dimensions and report any variations to the Engineer.

B. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc., which may be required. Carefully investigate the structural and finished conditions affecting all work, and plan work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. Unless dimensions are shown, drawings are generally diagrammatic and indicative of the work to be installed in the most direct and workmanlike manner, so that conflicts between water systems, planting, and architectural features will be minimized.

C. Do not install the facilities as indicated on the drawings when it is obvious in the field that unknown obstructions might not have been considered in the engineering. Such obstructions or differences should be brought to the attention of the Engineer before proceeding.

3.2 PREPARATION

A. Prepare for pipe installation by assembling all needed materials.

B. Cover all PVC pipe during storage.

3.3 BEDDING

A. Excavate trench, pit or hole in accordance with Specification Section TRENCH EXCAVATION AND BACKFILL.

B. Where trench or pit has been overexcavated, place bedding material at bottom of excavations, level soil materials in continuous layers not exceeding 8-inches loose uncompacted depth.

C. Backfill around sides and to a level 12-inches above the top of pipe with bedding sand, tamped in place.

D. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE AND FITTINGS

A. Install pipe at locations and depths indicated on plans.

B. Install pipe, fittings, and associated materials in accordance with manufacturer's recommendations.

C. Route pipe in straight line, whenever possible. All changes in direction of pipes shall be made with fittings, not by bending.

D. Install pipe to allow for expansion and contraction without stressing pipe or joints.

E. Form and place concrete for thrust blocks at each elbow, tee, angle or other significant change of direction in loose-joint pipe, per detail on plans.

F. Establish elevations of buried piping to ensure not less than 30-inches of cover, except at connections to existing lines, which may be shallower or deeper, or where shown otherwise on plans.

G. When two water pipes are to be installed in same trench, maintain a minimum 4-inch horizontal clearance between pipes.

H. Backfill trench or other excavation in accordance with Specification Section TRENCH EXCAVATION AND BACKFILL.

3.5 INSTALLATION - VALVES

A. Set valves on solid bearing.

B. Where valves are installed below finish surface grade, center and plumb valve box and any necessary extensions over valve. Set box cover flush with finished grade.

C. Pour concrete collar around top of valve box per detail on plans.

D. Furnish and install valves and valve boxes in addition to those shown on plans as required for isolation of lines for construction and disinfection, while minimizing disruption of service to buildings, at no additional cost to the Owner.

3.6 INSTALLATION - THREADED CONNECTIONS

A. Assemble all plastic and galvanized steel threaded pipe and fittings using an approved Teflon tape applied to the male threads only. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved Teflon tape will be required.

B. At all plastic (PVC) pipe connections, work the ductile iron connections first. Connections shall always be plastic into steel, never steel into plastic.

C. A non-hardening sealant and lubricant similar to Permatex #51 or LASCO blue pipe sealant may be used in lieu of Teflon tape. Apply sealant to clean male threads brushing into grooves and to the first three threads of the female threads.

3.7 PRESSURE TESTING OF SITE WATER PIPING SYSTEM

A. General: Unless otherwise directed, tests shall be witnessed by Inspector. Work to be concealed shall not be covered until prescribed tests are made. Should any work be covered before such tests, the Contractor shall, at his expense, uncover, test and repair his work and that of other contractors to original conditions. Leaks and defects shown by tests shall be repaired and entire work re-tested. Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the test.

B. Water Piping: Pressure test all onsite water piping systems in accordance with AWWA Standard C605, “Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings”. The pressure testing process shall be performed in cooperation with the authority having jurisdiction and witnessed by the Owner’s Inspector. The constructor shall supply an affidavit of compliance to the Owner as required by AWWA Standard 605. Maintain 150 PSIG water pressure for a duration of four (4) hours. There shall be no drop in pressure during test except that due to ambient temperature changes. Flush all lines prior to pressure test.

C. Backflow Preventer: All backflow preventers shall be tested according to manufacturer’s recommendations and the USC Cross Connection Control and Hydraulic Research Manual latest edition and per City of Fresno requirements. Testing shall be performed by an AWWA Certified Backflow Prevention Assembly Tester. Contractor shall provide written certification to the Architect sowing the date in which the backflow preventers were tested and confirmation that unit passed all test requirements.

3.8 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfect all domestic water piping systems in accordance with AWWA Standard C651, "Disinfecting Water Mains", and in accordance with administrative authority. Disinfection process shall be performed in cooperation with health department having jurisdiction and witnessed by the Owner’s Inspector. During procedure, signs shall be posted at each water outlet stating, "Chlorination - Do Not Drink". After disinfection, water samples shall be collected for bacteriological analysis. Certificate of Bacteriological Purity shall be obtained and delivered to the Owner by the Owner’s Inspector.

3.9 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of the Contract General Conditions and Division 1 Specifications.

B. Compaction testing of bedding and backfill will be performed in accordance with ANSI/ASTM D1557.

C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest. Any retests required due to failure of initial tests shall be paid for by the Contractor.

END OF SECTION

SECTION 33 30 00 - SITE SEWER SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Sanitary Sewer Pipelines and Fittings

B. Site Accessories

1.2 RELATED SECTIONS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division-1 Specifications sections, apply to the work of this section.
B. Section 03 33 00 – Cast-In-Place Concrete.
C. Section 31 11 00 - Site Clearing
D. Section 31 20 00.01 - Earthwork: Excavation, Filling, and Grading
E. Section 31 22 22.01 - Soil Materials
F. Section 31 23 33 - Trench Excavation and Backfill

1.3 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies

1. Safety Regulations: Work shall comply with all Federal, State and Municipal regulations regarding safety, including the requirements of the following:

a. William-Steiger Occupational Safety & Health Act of 1970.
b. State of California, California Administrative Code, Title 8 Industrial Relations, Chapter 4, Subchapter 4, "Construction of Safety Orders" and other State and local agencies having jurisdiction.
c. All trenching work shall conform to Trench Construction Safety Orders of California State Industrial Accident Commission.

1.4 REFERENCES

A. American Water Works Association (AWWA).

B. American Society for Testing and Materials (ASTM):

1. Designation D3034 - Polyvinyl Chloride (PVC) pipe.

C. California Plumbing Code, 2019 Edition (CPC).

D. Local County Health Department Standards.

1.5 SUBMITTALS

A. Submit under provisions of Specification Section - SUBMITTAL PROCEDURES. Certificates of compliance for material

B. Product Data: Provide data indicating pipe, accessories, and associated equipment to be furnished.

C. Submit manufacturer's data and/or fabrication drawings for Sanitary Sewer Pipelines, Sanitary Sewer Manholes and Sanitary Sewer Fittings, installed under this Section. No items shall be incorporated into the work until submittals are approved by the Engineer.

1.6 COORDINATION

A. Verify location of existing utilities have been indicated at by local utility authorities.

1.7 EXISTING UTILITIES

A. The Engineer has made a diligent attempt to indicate on the plans the location of all main and trunkline utility facilities which may affect the Work. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

B. Service laterals and appurtenances have also been shown where information was available as to their location. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. At new work location, expose by hand methods all existing utilities along the route of the new work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand methods to locate all existing facilities as indicated on the plans, and as indicated at the work site by local utility authorities.

D. Maintain all existing utility mains and service lines in constant service during construction of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sanitary sewer pipelines for pipes larger than 4 inches shall be polyvinyl chloride (PVC) pipe conforming to ASTM Designation 3034, SDR-35, unless otherwise indicated on plans.

B. Sanitary sewer pipelines for pipe less than 4 inches shall be Schedule 40 PVC pipe, ASTM D1785, 1120 high impact, unless otherwise indicated on plans.

C. All sanitary sewer fittings shall be watertight connections using PVC sewer fittings as approved by the California Plumbing Code, or approved equal to be determined by the Civil Engineer.

D. Surface cleanouts to be furnished and installed per plans and Plumbing Codes.

E. Locator Tape: Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be six inches wide and be printed "CAUTION - SEWER LINE BELOW".

PART 3 - EXECUTION

3.1 CLEARING OF WORK SITE FOR SITE IMPROVEMENTS

A. Clear site for improvements per construction drawing demolition plan and in accordance with Specification Section SITE CLEARING.

3.2 TRENCH EXCAVATION

A. Trench excavation and backfilling shall be in accordance with Specification Section TRENCH EXCAVATION AND BACKFILL and construction drawing detail.

3.3 SOIL MATERIALS

A. Excavated materials and imported materials shall meet engineering recommendations in accordance with Specification Section SOIL MATERIALS.

3.4 PIPE INSTALLATION

A. Pipe Laying: Alignment and elevation stakes shall be set at intervals with offsets and cut to the invert of the pipe.

1. Proper facilities shall be provided for stringing and lowering sections of pipe into the trench. The pipe shall be laid carefully to lines and grades given.
2. The grade line shown on the plans indicates the flow line or invert of the pipe and all cuts, unless otherwise indicated, refer to this line.
3. After the trench for pipe has been brought to the proper line and grade, the pipe shall be laid in the following manner.

a. Pipe laying shall proceed upgrade with the bell ends of bell and spigot pipe placed upstream. Each section of pipe shall be laid to line and grade as herein specified and in such a manner as to form a watertight, concentric joint with the adjoining pipe. The interior of the pipe shall be cleared of all dirt and debris and excess joint sealing material as the work progresses. Pipe shall not be laid when the condition of the trench or weather is unsuitable. All open ends of pipe and fittings shall be adequately and securely closed whenever the work is discontinued for more than one-half hour. If pipe with elliptical or quadrant reinforcement is used, care shall be taken to properly orient the axis.

4. All joint surfaces shall be cleaned before joints are made.
5. The Contractor shall furnish and use, for grade and alignment control, a laser beam system which complies with OSHA requirements. The laser system shall have good visibility when used with suitable target material. The laser system must be of the self-leveling type so that the laser beam is automatically compensated for minute grade disturbances.
6. The laser system must also have an early warning system that instantly warns the pipe layer when the laser is off grade. The laser system is to be provided by the Contractor and shall have a minimum accuracy of ±0.01 foot per one hundred feet (100') on line; and a minimum visible range of one thousand feet (1000'). When conditions are such that this method is impractical, such as on short pipe runs, the Contractor shall have an Engineer on the ground to set grade of each joint of pipe by means of an Engineer's level.

B. Sewer Systems Plugs: Temporary plugs of brick or mortar shall be installed on all sewer projects at points of connection to existing facilities. These plugs shall remain in place until completion of the balling and flushing operation. The plugs, intended to prevent water from the balling and flushing operation, drainage, or any other condition from entering the existing system, shall be installed or removed in the presence of and under the direct supervision of the Engineer. Until the system has been pumped clear of accumulated water, the plugs shall not be removed. This water must not be allowed to enter adjacent sewer or drainage systems.

C. Internal Inspection: Upon completion of construction and prior to final inspection, the Contractor shall clean the entire new pipeline of all dirt and debris. Any dirt or debris in previously existing pipes or ditches in the area, which in the opinion of the Engineer resulted from the new installation, shall also be removed by the Contractor. Sewer pipes shall be cleaned by the controlled balling method. Temporary plugs shall be installed and maintained during cleaning operations at points of connection to existing facilities to prevent water, dirt, and debris from entering the existing facility. Temporary plugs for sewer systems shall also conform to Subsection B, above. Water from the drainage system operations shall be routed through a suitable trap to collect any dirt and debris prior to discharging into any downstream facility. The Contractor shall notify the Architect immediately after completion of the pipe cleaning operations. Cleaning of drainage pipes by the controlled balling method will not be required.

D. As soon as possible after the completion of the pipe cleaning, and prior to final acceptance, the Architect or Engineer may make a visual internal inspection of the new pipeline either manually or with television equipment.

3.5 COORDINATION

A. Coordinate with the campus for the shutdown of the existing sewer system to make new sewer connection. Install sewer pipelines before making tie-in to the existing sewer pipeline. Tie-in work may proceed during the campus non-use of the existing sewer system such as on weekends.

3.6 TESTING OF SANITARY SEWERS

A. After cleaning per Section 3.4-C, each section of sewer constructed shall be tested in accordance with acceptable "Low Pressure Air Test for Sanitary Sewers" methods such as presented in the Journal of Sanitary Engineering, Division ASCE, April 1964, to test the point of effluent disposal. All lines and components shall be leak proof.

3.7 INSPECTION OF SANITARY SEWERS

A. System components shall be properly identified as to the manufacturer.

3.8 CLEAN-UP

A. Remove from the site all rubbish, debris, etc. in a lawful manner, resulting from work in this Section. The clean-up shall include the replacement and repair of any damaged or disturbed property.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 33 40 00 - STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. This section includes the following:

1. Provide all materials, labor, equipment and services necessary to furnish and install Storm Drainage System, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. RELATED SECTIONS:

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Divisions 00 and 01 sections, apply to this work.
2. Section 03 33 00 – Cast-In-Place Concrete.
3. Section 31 22 22 – Soil Materials
4. Section 31 23 33 – Trench Excavation and Backfilling.
5. Section 32 13 13 – Site Concrete Improvements.

1.3 REFERENCES

A. ANSI/ASTM C76 - Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.

B. ANSI/ASTM C443 Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

C. ANSI/ASTM C478 Precast Reinforced Concrete Manhole Sections.

D. ASTM D1557

1.4 DEFINITIONS

A. Bedding: Fill placed under, around, beside and directly over pipe, prior to subsequent backfill operations.

B. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.5 SUBMITTALS

A. Submit under provisions of Division 01.

B. Certificates of compliance for material.

C. Product Data: Provide data indicating pipe, accessories, and associated equipment to be furnished.

D. Submit manufacturer's data and/or fabrication drawings for all pipes, and appurtenances installed under this Section. No items shall be incorporated into the work until submittals are approved by the Architect/Engineer

1.6 COORDINATION

A. Coordinate work with Owner’s personnel.

B. Verify that the location of existing utilities have been indicated at work site by utility authorities and Owner’s personnel.

C. Coordinate work with other project work.

1.7 EXISTING UTILITIES

A. The Engineer has made a diligent attempt to indicate on the plans the location of all main and trunkline utility facilities which may affect the Work. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

B. Service laterals and appurtenances have also been shown where information was available as to their location. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. At new work location, expose by hand methods all existing utilities along the route of the new work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand methods to locate all existing facilities as indicated on the plans, and as indicated at the work site by Owner’s personnel.

D. Maintain all existing utility mains and service lines in constant service during construction of the Work

1.8 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 01.

B. Accurately record actual locations of utilities encountered.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforced Concrete Pipe for pipe larger than fifteen (15) inches: ANSI/ASTM C76, Class 3, with rubber gasket joints per ANSI/ASTM C443.

B. Storm drainage sewer pipeline shall be polyvinyl chloride (PVC) pipe for storm sewer conforming to ASTM designation 3034, SDR 35 for pipe fifteen (15) inches or less.

C. Storm drainage pipeline shall be polyvinyl chloride (PVC) pipe for storm sewer conforming to ANSI/AWWA Schedule 40 for pipe three (3) inches or less.

D. Poured in Place Concrete: Specification Section CAST-IN-PLACE CONCRETE.

E. Mortar: Composed of one part, by weight, portland cement (Type II low alkali per ASTM C150), 2 parts, by weight, sand, and water.

F. Manhole Frames, Covers and Grates: Cast Iron per ASTM A48, Class 25.

G. Soil Fill for Concrete Pipe Bedding Envelope: Specification Section TRENCH EXCAVATION AND BACKFILL.

H. Catch basins and drain inlets shall be constructed as per detail drawing.

I. Concrete collar shall be constructed as per detail drawing.

J. Cleanout shall be constructed as per detail drawing.

K. All metallic pipe, fittings and appurtenances in contact with soil shall be coated or wrapped with an approved material, as required to protect it from corrosive soil.

L. Locator Tape: Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be six inches wide and be printed “CAUTION – STORM SEWER LINE BELOW”.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

3.2 PREPARATION

A. Identify location of proposed storm drainage facilities to be constructed. Expose connection points to existing system.

B. Locate, identify, and protect existing above and below grade utilities from damage.

C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

D. Protect existing structures and other improvements to remain from damage from excavation equipment and vehicular traffic.

E. Employ equipment and methods appropriate to the work site.

F. Protect excavated areas from drainage inflow, and provide drainage to all excavated areas. Dewater existing drainage basins and existing drainage pipeline systems as necessary to accomplish the work.

G. Comply with safety requirements as they pertain to excavations, per Specification Section EARTHWORK.

H. Remove all interfering surface and subsurface improvements authorized for removal.

3.3 EXCAVATION

A. Excavate soil required to locate existing utilities and install the work.

B. Excavate trenches and pits per Specification Section EARTHWORK.

C. Excavate trenches and pits to allow installation and construction of the storm drainage facilities to the alignment, grades, depths and cross-sections as indicated on the construction plans.

D. Excavate trench to depth which is 6 inches below the outside bottom of the pipe barrel to be placed therein.

E. Cut trenches just wide enough to allow the installation of the pipe and pipe bedding as indicated on the plans. Minimize trench width above the pipe.

F. Provide protection to public per Division 01.

3.4 INSTALLATION AND BEDDING OF STORM DRAIN PIPE

A. Install the pipe and fittings to the lines and grades shown on the construction plans.

B. Install pipe and fittings in accordance with the manufacturer's recommendations, and these specifications.

C. Unless otherwise approved by the Engineer, lay all pipe upgrade from structure to structure, with bell or socket ends of pipe upgrade.

D. Excavate suitable bell (or socket) holes in the bedding material, so that the bells do not bear on the subgrade or bedding. Provide uniform bearing of pipe barrel on bedding material.

E. Ensure that all joints are properly "homed" and are watertight.

F. Bed concrete pipe in backfill or sandfill soil envelope, and compact to a minimum of 90% relative compaction. Place and compact the bedding material under, around and over the pipe, filling the trench cavity and extending from the bottom of the trench (6 inches below the outside bottom of the pipe barrel) to a level 12 inches above the outside top of the pipe barrel.

3.5 INSTALLATION OF STORM DRAINAGE STRUCTURES AND APPURTANCANCES

A. Install storm drainage structures as indicated on the construction plans, in accordance with the manufacturer's recommendations, and as specified herein.

B. Construct poured-in-place concrete per Specification Section CAST-IN-PLACE CONCRETE.

C. Key top of poured-in-place concrete bases for structures to receive the tongue of precast riser sections.

D. Construct cleanout, outfall structure per detail drawing.

3.6 BACKFILLING TO FINISHED GRADE AND FINISHED GRADING

A. Place and compact backfill per Specification Section TRENCH EXCAVATION AND BACKFILL.

B. Conform finished surface to the lines, grades and cross-sections shown on the plans, or as otherwise directed by the Inspector.

C. In areas to receive paving or a significant thickness of sealing material, temporarily set manhole frame and cover below finish grade, then return after final surfacing and/or pavement sealing and bring manhole frame and cover to final grade, as shown on the plans.

D. Fine grade all finished soil surfaces disturbed to the lines, grades and cross-sections shown on the plans.

E. Rake and smooth all finished dirt surfaces.

3.7 TOLERANCES

A. Pipe laying tolerances:
   1. Above grade: Not to exceed 1/4-inch above planned grade.
   2. Below grade: Not to exceed 1/2-inch below planned grade.
   3. Alignment: Not to exceed 2 inches from planned alignment, if gradual and regular over a distance of 20 feet.

B. Structure finish grade tolerance: Within 1/4 inch of planned grade, but must match adjacent improvements.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 01.

B. Compaction testing of bedding and backfill will be performed in accordance with ASTM D 1557.

C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest at no additional cost to Owner.

END OF SECTION

APPENDIX B

INTENTIONALLY LEFT BLANK

Project: ***Sanger Educational Complex - Phase III*** ***Darden Project #2171***
Client: ***Sanger Unified School District*** ***8/15/2023***
Location: Fresno, CA

AD5

APPENDIX "B": INTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION
SHADES			
Shade Band, Light Filtering	Mechoshade	1350, 1369	Ecoveil Screens - Silver Birch
Shade Band, Blackout	Mechoshade	0700, 0702	Classic Blackout - Light Grey
Fascia	Mechoshade	-	Clear Annodized
POLISHED CONCRETE FINISHING			
Concrete Dye			
Color 1	-	-	Natural (No Dye)
MCM PANELS			
MCM Panel	3A Composites		To Match Pantone CMS 661C, "Royal Blue"
MODULAR CASEWORK			
Plastic Laminate			
PL-1	Wilsonart	7992-38	Pinnacle Walnut
Cabinets to be PL-1, Unless Noted Otherwise.			
PL-2	Formica	3505-SP	Storm Solidz
Plastic Laminate Countertops to be PL-2, Unless Noted Otherwise.			
PL-3	Wilsonart	D427-60	Linen
Plastic Laminate @ Building Q Casework b211.			
Fabrications, Solid Surfacing			
Color 1 (Gray)	Formica	775	Luna Storm
Unless otherwise noted			
Color 2 (White)	Corian	-	Modern White
Refer to casework schedule and details. Placement of all modular casework materials to be verified upon submittal.			
Solid Surface Color 2 to occur adjacent to TILE, CT-2 backsplash, uno.			
Solid surface sills to be Color 2 (White), UNO.			
Solid surface sills to be Color 1 (Gray) at Paint Color 3.er			
WOOD DOORS	Lynden Door	#50 `	Espresso
FIRE RATED ALUMINUM FRAMED STOREFRONT			
Exterior/Interior Storefront			Clear Anodized Aluminum
STOREFRONT			
Exterior/Interior Storefront,	Kawneer	17	Clear
Curtain Wall, Entrance Doors	Kawneer	18	Clear
SERVICE WINDOWS			
SW-1			Satin Anodized
SW-2			Painted to match Kelly Moore KMA84 Starlit Eve
TILE			
Ceramic Interior Floor Tile			
CT-1	Daltile	D208	Suede Gray Speckle
Grout to be Custom Building Products #19 Pewter.			

APPENDIX "B": INTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION
Ceramic Interior Base Tile			
CTB-1	Daltile	D208	Suede Gray Speckle
Grout to be Custom Building Products #19 Pewter.			
CTB-2	Daltile	0190	Arctic White
Grout to match adjacent wall tile, unless otherwise noted.			
Ceramic Interior Wall Tile			
CT-2/CT-2a, Color 1	Daltile	0190	Arctic White
Unless Otherwise Noted, Grout to be Custom Building Products #38 Avalanche.			
CT-2, Color 2	Daltile	0182	Suede Gray
Grout to be Custom Building Products #19 Pewter for CT-2, Color 2 only.			
CT-3	Daltile	1174	Sea Breeze
CT-3a, Color 1	Daltile	1174	Sea Breeze
CT-3a, Color 2	Daltile	1194	Electric Blue
CT-3a, Color 3	Daltile	0169	Waterfall
CT-4	Daltile	1174	Sea Breeze (Hex Mosaics)
CT-5	Daltile	MU16	Hexagon, Origami White
Grout to be Custom Building Products #38 Avalanche, unless otherwise noted.			
CT-6 (See Food Service Drawings)	Daltile	RV17	Kaleidoscope, Gray
Grout to be Custom Building Products #38 Avalanche, unless otherwise noted.			
CT-7	Daltile	VL72	Intensity Pebble
Grout to match.			
Trim			
Finishing and Edge Protection Trim	Schluter	Q60AE	Satin Anodized
ACOUSTICAL CEILINGS			
Woodworks	Armstrong	NWN	Natural Variations Walnut
Metalworks	Armstrong	-	Silver Grey
ACT-II	Armstrong	-	Tech Back
ACT-II to be Tech Black and Grid and Panels (Tiles) at L203.			
RESILIENT WOOD FLOOR			
Gymnasium Floor			
Stain Color 1	-	-	Natural
Stain Color 2	-	Stain to match Wilsonart Pinnacle Walnut 7992-38	
Paint	-	To Match Pantone CMS 661C, "Royal Blue"	
RESILIENT BASE AND ACCESSORIES			
Rubber Wall Base 4", 6"	Mannington	660	Rocky
Unless otherwise noted			
Rubber Wall Base 4" / Transitions	Mannington	701	Black
To occur at carpet location only			

APPENDIX "B": INTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION
Rubber Stair Tread, Riser and Stringer, and Transitions	Mannington	660	Rocky
RESILIENT SHEET			
Vinyl Sheet (RS-1)	Armstrong	H5307	Rock Dust Light
Weld Rod to be WP307, Rock Dust Light .			
RESILIENT TILE			
Luxury Vinyl Tile (RT-1)			
Color 1	J+J Flooring	V5006, 1054	Fusion, Melting
Unless Otherwise Noted			
Luxury Vinyl Tile (RT-2)			
Color 1	J+J Flooring	V5012, 1067	Make Your Mark, Cobalt
Color 2	J+J Flooring	V5012, 1065	Make Your Mark, Charcoal
Refer to Interior Design - Floor Pattern Sheets.			
Luxury Vinyl Tile (RT-4)			
Color 1	Armstrong	ST881	Oxidize Tin
Rubber Tile (RT-3)	Mannington	660	Rocky
To occur at landings in Stairs			
RESILIENT ATHLETIC FLOORING			
Rubber	Mondo	L06	Dark Gray
Vinyl			
Color 1	Gerflor	6062	Canadian Maple
Unless otherwise noted.			
Color 2	Gerflor	6430	Blue
Color 3	Gerflor	6758	Silver Gray
Refer to M/A803 and M/A804 for pattern/location.			
RESINOUS FLOORING			
Resinous Flooring (RF-1)	Sherwin Williams	-	Onyx
Unless otherwise noted.			
Resinous Flooring (RF-2)	Sherwin Williams	-	Onyx
Refer to Interior Design - Floor Pattern Sheets.			
CARPET			
Modular			
MT-1	Tarkett	04849, 33201	Maelstrom, Blue Spirit
MT-2	Shaw	5T315, 05486	Source Tiles, Skies
MT-3	Shaw	5T160, 59505	Contact Hexagon, Electric Form
MT-4	Shaw	5T161, 59429	Color Shift Hexagon, Electric Form
Refer to Interior Design sheets			

APPENDIX "B": INTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION
Walk-Off			
WO-1	Tarkett	02578, 191001	Abrasive Action II, Midnight Blue
Refer to Interior Design sheets			
WALLCOVERINGS			
FRP	Crane	85	White
Vinyl Covered Tackboard			
Color 1	Koroseal	LN21-81	Lino, Hang Dry
Acoustical Panels, Fabric			
Fabric, Color 1	Guilford of Maine	2762, 2690	Framework , Elephant
To occur at Paint Color 3, UNO.			
Fabric, Color 2	Guilford of Maine	2334, 2842	Open House, Pool
Fabric, Color 3	Guilford of Maine	2334, 2094	Open House, Lapis
To occur at Paint Color 5, UNO.			
Fabric, Color 4	Guilford of Maine	3035, 7020	Intermix, Swan
To occur at Paint Color 1, UNO.			
Fabric, Color 5	Guilford of Maine	2334-2025	Open House, Midnight
To occur at Paint Color 10, UNO.			
Refer to Interior Elevations and Drawings.			
Glass Marker Wall System			
Color 1	Claridge		To match Pantone CMS 661C, "Royal Blue"
To occur as noted in Drawings.			
Color 2	Claridge		White
Unless otherwise noted.			
PAINT			
Gypsum Board			
Color 1	PPG	PPG1001-1	Delicate White
Unless otherwise noted.			
Color 2			PPG to match Dunn Edwards DE6367, Covered In Platinum
Color 2 to occur at Classroom teaching wall typical.			
Color 3			PPG to match Sherwin Williams SW7075 Web Gray
Color 4	PPG	PPG1010-7	Zombie
Color 4 to occur adjacent to and behind METAL PANELS, Interior Acoustical Wall Panels and WALL COVERINGS, Ultra High Impact Panels, Typical.			
Color 4 to occur behind louver wall system and ACT Type XII Wall Mounted in Flat Finish (DW-1).			
Color 5			PPG to Match Pantone CMS 661C, "Royal Blue"
Color 6			PPG to match Kelly Moore, KM5015 Tech Wave
Color 7	PPG	PPG1159-4	Walden Pond
Color 8			PPG to Match Sherwin Willaims, SW7074, Software.
Color 9			NOT USED.
Color 10			PPG to match Kelly Moore KMA84 Starlit Eve
Gypsum Board at Buidling L, Black Box Theater and Drama Room to be Color 10.			
Gypsum Board at Building L to be Color 10 at rooms: L115, L124, L201, L211, L202, L204, L210, L207, UNO.			
Refer to interior design sheets for accent paint locations.			

APPENDIX "B": INTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION
Rough Carpentry Plywood			
Plywood Panels			PPG to match Dunn Edwards DE6367, Covered In Platinum
Millwork, Wood			
Bench			Stain to match Wilsonart Pinnacle Walnut 7992-38
Wall Casing/Concrete Bench Cap			Stain to match B+N Industries TE2039 English Walnut G
Wood Doors (Paint Grade)			
Opaque Finish	PPG		Match to adjacent wall color
Railing System			
Wood Handrail			Stain to match B+N Industries TE2039 English Walnut G
Metal Doors/Frames			
Metal Doors			Match to adjacent wall color
Metal Frames @ Metal Doors			Match to adjacent wall color
Unless Otherwise Noted			
Metal Frames @ Wood Doors	PPG		Match to adjacent wall color
Metal Doors and Frames at WALL COVERINGS, Ultra High Impact Panels, Typical.			
Steel and Fabrications			
Color 1	PPG	PPG1001-1	Delicate White
Unless Otherwise Noted			
Color 3			PPG to match Sherwin Williams SW7075 Web Gray
Steel and Fab., Handrails and Guardrails at Building M Room M161 Bleachers to be Color 3			
Steel and Fab. at Interior Stairs, including, but not limited to, Stairs, Stringer, Sheet Metal @ Stringer to be color 3.			
Color 5			PPG to Match Pantone CMS 661C, "Royal Blue"
Color 7	PPG	PPG1159-4	Walden Pond
Guardrails, UNO			PPG to match Sherwin Williams SW7075 Web Gray
Steel Angle and Structural @ Curtain Wall			PPG to match Dunn Edwards DE6366, Silver Spoon
Refer to Detail A11-X/A442			
Color 10			PPG to match Kelly Moore KMA84 Starlit Eve
Steel and Fab at Building L to be Color 10 at rooms: L115, L124, L201, L211, L202, L204, L210, L207, UNO.			
Metal Deck			
Color 1	PPG	PPG1001-1	Delicate White
Unless Otherwise Noted			
Color 4	PPG	PPG1010-7	Zombie
Metal Deck at Interior Stairs to be Color 4.			
Color 5			PPG to Match Pantone CMS 661C, "Royal Blue"
Color 7	PPG	PPG1159-4	Walden Pond
Color 10			PPG to match Kelly Moore KMA84 Starlit Eve
Metal Deck at Building L to be Color 10 at rooms: L115, L124, L201, L211, L202, L204, L210, L207.			
Metal Panels			
Interior Acoustical Wall Panel			PPG to match Sherwin Williams SW7075 Web Gray

APPENDIX "B": INTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION
MISCELLANEOUS SPECIALTIES			
Dimensional Letters			
Cast Letters	Gemini	-	Brushed Stainless Steel Finish
Cut and Fabricated	Gemini	-	Brushed Stainless Steel Finish
Flat Cut Letters	Gemini		To match Pantone CMS 661C, "Royal Blue"
("Resin Letters" or "Dimensional Graphic")			
Metal Louver Wall System	B & N Industries	TE-2039	English Walnut G
Retail Wall Unit			
Laminate	Opto	WC115	Aimtoo Savatre
Powder Coat	Opto	-	Sky White
Molded Reflectors, Field Painted, Flat Sheen			
Color 1			Painted to match PPG, PPG1001-1 Delicate White
Unless Otherwise Noted			
Color 2			Painted to Match Pantone CMS 661C, "Royal Blue"
@ Building L Room L129			
Color 3			Painted to match Kelly Moore KMA84 Starlit Eve
@ Building L Room L115			
VISUAL DISPLAY BOARDS			
Liquid Markerboard	Egan	-	White
Tack Board Fabric	Guilford of Maine	2762, 2690	Framework , Elephant
Tack Board Frame	Egan		White
Recessed Display Case			
Frame	Claridge		Powder coat to match PPG1001-1 Delicate White
Cork	Claridge	1136	Graphite
IDENTIFYING DEVICES			
Plastic Signs			
Field/Rails	Best		PPG to match Sherwin Williams SW7075 Web Gray
Characters	Best	951	White
Frames	Best	-	Anodized Aluminum
TOILET PARTITIONS			
Solid Plastic Partition	Scranton Products	-	Grey
WALL AND CORNER GUARDS			
Wall Protection and Accessories	Inpro	0238	Feather
Corner Guards			
@ Paint Color 1	Inpro	0238	Feather
@ Paint Color 2	Inpro	927	Folkstonge
@ Paint Color 3, Color 4 and Color 8	Inpro	162	Charcoal
@ Paint Color 6	Inpro	223	Danube

APPENDIX "B": INTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION
METAL LOCKERS			
Metal Lockers			
Color 1	List Industries	738	Charcoal
Metal Lockers @ Building M Rooms M113 and M120.			
Color 2	List Industries	717	Grand Slam
Metal Lockers @ Building M, Typical Unless Noted Otherwise.			
Color 3	List Industries	711	Light Gray
Metal Lockers @ Building L, Typical Unless Noted Otherwise.			
PLASTIC LAMINATE LOCKERS			
Plastic Laminate Lockers			
Laminate	Wilsonart	7992-38	Pinnacle Walnut
Vinyl	RFS Sports	TRA-6631	Tradewinds, Abyss
TELESCOPING BLEACHERS			
Molded Plastic			
Color 1	Hussey	050	Gray
Color 2	Hussey	301	Blue
Refer to M/A110 for color locations/pattern.			
MOBILE STORAGE UNITS			
Laminate	Wilsonart	7992-38	Pinnacle Walnut
FOOD SERVICE EQUIPMENT			
Service Counter			
Quartz	Wilsonart	Q1012	Lorraine
Tile	Daltile	RV17	Kaleidoscope, Gray
Finishing and Edge Protection Trim	-	-	Satin Anodized
ATHLETIC EQUIPMENT			
Wall Padding			
Type 1, Color 1	Porter		Royal Blue
Type 1, Color 2	Porter		Gray
Type 1, Color 1, with Custom Graphic	Porter		Royal Blue
Type 1, Color 2, with Custom Graphic	Porter		Gray
Refer to Interior Elevatio for location and Interior Drawings for Graphics.			
MUSIC EQUIPMENT			
Instrument Storage Cabinets			
Laminate	Wilsonart	7992-38	Pinnacle Walnut
Edge Banding	Wenger	-	Black
Hardware, Painted Grille and Fasteners	Wenger	-	Black
PLUMBING			
Concrete Sink	Trueform	-	Graphite
THEATER			
Tension Grid System			Painted to match Kelly Moore KMA84 Starlit Eve

APPENDIX "B": INTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION

NOTES:

1. The intent of this schedule is to clarify and detail the color and patterns of finishes. All information regarding construction conditions, casework, framing and ceiling details, etc. shall be per Architectural plans, unless otherwise noted.
2. Interior Color Schedule to be used in conjunction with Architectural plans and Specifications.
3. Paint colors listed on Interior Color Schedule are for color reference only. Refer to Architectural Specifications and Finish Schedules for information regarding paint systems.
4. Change of paint color to occur on an inside corner, unless otherwise noted.
5. All Gypsum Board surfaces to be painted Color 1, unless otherwise noted.
6. All vision light frames in wood doors to match PAINT, Color 4. All vision light frames in hollow metal doors to match door color.
7. All interior Wall Louver Assemblies receiving a field finish to be painted to match color of adjacent surface.
8. All access doors and frames to be painted to match color of adjacent surface.
9. All miscellaneous exposed to view metal and mechanical equipment receiving a field finish to be painted to match color of adjacent surface. If adjacent material is vinyl covered tackboard, paint to be Color 2.
10. All interior ladders and ladder assemblies receiving a field finish to be painted to match color of adjacent surface.
11. All accent paint, changes in paint color and extent of paint and accent paint to be verified by Darden Architects at job site prior to commencement of work.
12. All finishes to extend inside accessible base cabinets.
13. All mechanical closet doors and frames in classrooms to be painted to match adjacent wall. Doors and frames at custodian, electrical, IDF, MDF, and mechanical rooms to be painted to match adjacent wall.
14. All Steel and Fabriactions to be painted Color 1, unless otherwise noted.
15. All modular casework edgebanding to match adjacent plastic laminate.
16. All Steel and Fabrications @ Handrails to be Color 4, unless otherwise noted.
17. All Janitorial rooms to receive Sheet Vinyl with Integral Cove Base and matching, patterned weld rod.
18. Modular Casework Apron, when directly adjacent to Base Cabinet, Plastic Laminate color shall match Base Cabinet.
19. All paints and stains are to be submitted in the form of brushouts to Darden Architects for approval prior to commencement of work.

INTENTIONALLY LEFT BLANK

APPENDIX C

INTENTIONALLY LEFT BLANK

Project: ***Sanger Educational Complex - Phase III*** ***Darden Project #2171***
Client: ***Sanger Unified School District*** ***12.20.2022***
Location: ***Fresno, CA***

APPENDIX "C": EXTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION
CONCRETE MASONRY			
Concrete Masonry Units			
BC-1	Basalite	Nat-Grey (T)	Precision, Light Gray
BC-2	Basalite	A-705 (R')	Precision, Dark Gray
Refer to SD-A306 for Exterior Elevations Patterns.			
MCM PANELS			
Metal Composite Panels (MCM)			
MCM-1	Reynobond	-	Bone White
MCM-2	3A Composites		To Match Pantone CMS 661C, "Royal Blue"
Refer to Exterior Elevations for Location.			
FIBER-CEMENT PANELS			
Fiber-Cement Panels			
FC-1	Taktl	-	White, Smooth, Media Blast, Microseal
FC-2	Taktl	-	Graphite, Smooth, Cast, Color Seal
Unless otherwise noted.			
Refer to Exterior Elevations for Pattern.			
FIRE RATED ALUMINUM FRAMED STOREFRONT			
Storefront			Clear Anodized Aluminum
STOREFRONT			
Storefront	Kawneer	17	Clear
Curtain Wall	Kawneer	17	Clear
Doors	Kawneer	17	Clear
CEMENT PLASTER			
Cement Plaster			
PC-1			PPG to match Dunn Edwards DE6366 Silver Spoon
Unless otherwise noted.			
PC-2			PPG to match Dunn Edwards DE6367 Covered in Platinum
PC-3			PPG to match Sherwin Willians SW7075 Web Gray

APPENDIX "C": EXTERIOR COLOR SCHEDULE

PAINT

Sheet Metal

MC-1	PPG to match Dunn Edwards DE6366 Silver Spoon
MC-2	PPG to match Dunn Edwards DE6367 Covered in Platinum
MC-3	PPG to match Sherwin Willians SW7075 Web Gray
MC-4	PPG to match Reynobond Bone White
MC-5	PPG to Match Pantone CMS 661C, "Royal Blue"
Extended Trim	Clear Anodized Aluminum

Metal Doors and Frames

Metal Doors	Paint to match adjacent wall color
Metal Frames	Paint to match adjacent wall color

Metal Deck

MC-1	PPG to match Dunn Edwards DE6366 Silver Spoon

Steel and Fabrications

MC-1	PPG to match Dunn Edwards DE6366 Silver Spoon
MC-2	PPG to match Dunn Edwards DE6367 Covered in Platinum
MC-3	PPG to match Sherwin Willians SW7075 Web Gray
MC-4	PPG to match Reynobond Bone White
MC-5	PPG to Match Pantone CMS 661C, "Royal Blue"

Stairs

Pan	PPG to Match Pantone CMS 661C, "Royal Blue"
Stringer	PPG to Match Pantone CMS 661C, "Royal Blue"

Ornamental Metal PPG to match Sherwin Williams, SW7075, Web Gray

MISCELLANEOUS SPECIALITIES

Dimensional Letters Gemini - Clear Anodized

Unless otherwise noted.

School Name Signage

Face	Gemini	To match Reynobond Bone White
Edges	Gemini	To match Pantone CMS 661C, "Royal Blue"

To occur @ Dimensional letters building H west only, see H/A404

IDENTIFYING DEVICES

Metal Signs

Field/Rails	King	To match Sherwin Williams, SW7075, Web Gray
Characters	King	PPG to match Reynobond Bone White

APPENDIX "C": EXTERIOR COLOR SCHEDULE

NOTES:

1. The intent of this schedule is to clarify and detail the color and patterns of finishes. All information regarding construction conditions, detailing, etc. shall be per Architectural plans, unless otherwise noted.
2. Paint colors listed on Exterior Color Schedule are for color reference only. Refer to Architectural Specifications and Finish Schedules for type.
3. Change of color to occur at control joints or an inside corner, unless otherwise noted.
4. Exterior Color Schedule to be used in conjunction with architectural plans and specifications.
5. Cement plaster accessories shall match primary color of adjacent material, unless otherwise noted. Cement plaster vents to remain unfinished.
6. Mechanical grille/louvers with factory baked enamel finish shall match primary color of adjacent hollow metal door frame. Louvers located in doors shall match door color.
7. All louvers/frames to match color of adjacent material.
8. All miscellaneous visual architectural sheet metal and steel fabrications including, but not limited to, mechanical/plumbing/electrical equipment shall match color of adjacent material, unless otherwise noted.
9. Soffits shall match color of outer face wall, unless otherwise noted.
10. All parapet caps to match color of adjacent material, unless otherwise noted.
11. All Parapet caps at CMU to match adjacent CMU Color.
12. All Hollow Metal Doors and Frames Color are to Match Adjacent Wall Color, unless otherwise noted.
13. All CMU to be BC-1, unlesss otherwise noted.
14. Cement plaster wall perpendicular to elevation, not shown elsewhere, shall be the same color as face plane, UNO.
15. All downspouts to match majority color of adjacent surface.
16. All sunscreens, steel and fab at sunscreens and sunscreen assembly to be MC-4.
17. All canopies and canopy fabrication to be MC-1.
18. All exterior ladders to match color of adjacent material.
19. All steel and fab at door stop bollards to be MC-3.
20. All access doors and frames to match color of adjacent material, unless otherwise noted.
21. All site development steel and fab to be MC-3.

INTENTIONALLY LEFT BLANK