

PROCUREMENT AND CONTRACTING DOCUMENTS
SPECIFICATIONS



New Elementary School

Proposed Elementary School
Shields and Brawley Avenues
Fresno, California

CENTRAL UNIFIED SCHOOL DISTRICT
FACILITIES MANAGEMENT & PLANNING
4200 North Grantland Avenue
Fresno, California 93723

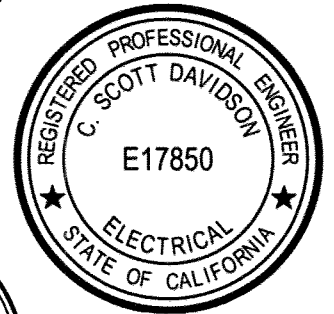
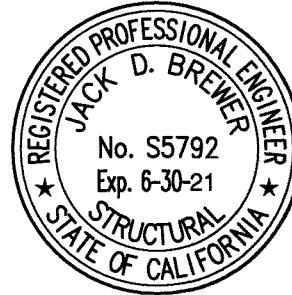
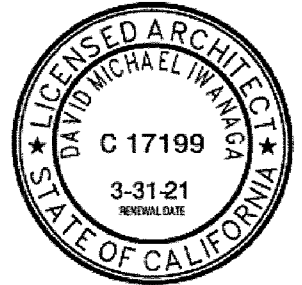
David Iwanaga, Architect

Jack Brewer, Structural Engineer

Scott Davidson, Electrical Engineer

Garen Lencioni, Mechanical Engineer

Yohanes Makmur, Civil Engineer

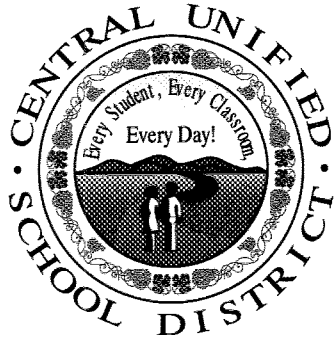


IDENTIFICATION STAMP DIVISION OF THE STATE ARCHITECT OFFICE OF REGULATION SERVICES			
02-116800			
AG	FLS	SS	KG
DATE	12/12/2019		

Architect's Project No: 17-67
File No: 10-22
App. No: 02-116800

SIM-PBK

PROCUREMENT AND CONTRACTING DOCUMENTS
SPECIFICATIONS



New Elementary School

Proposed Elementary School
Shields and Brawley Avenues
Fresno, California

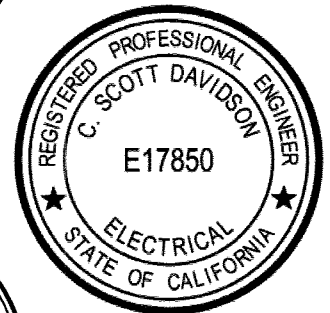
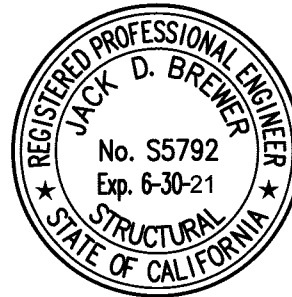
CENTRAL UNIFIED SCHOOL DISTRICT
FACILITIES MANAGEMENT & PLANNING
4200 North Grantland Avenue
Fresno, California 93723

David Iwanaga, Architect

Jack Brewer, Structural Engineer

Scott Davidson, Electrical Engineer

Garen Lencioni, Mechanical Engineer



IDENTIFICATION STAMP DIVISION OF THE STATE ARCHITECT OFFICE OF REGULATION SERVICES		
02-116800		
AC	FLS	SS
		KG
DATE	12/12/2019	

Architect's Project No: 17-67
File No: 10-22
App. No: 02-116800

SIM-PBK

TABLE OF CONTENTS**SHIELDS & BRAWLEY ELEMENTARY SCHOOL****DIVISION 01 GENERAL REQUIREMENTS**

01 10 00	SUMMARY
01 25 00	SUBSTITUTION PROCEDURES
01 29 73	SCHEDULE OF VALUES
01 31 19	PROJECT MEETINGS
01 32 00	CONSTRUCTION PROGRESS DOCUMENTATION
01 33 00	SUBMITTAL PROCEDURES
01 40 00	QUALITY REQUIREMENTS
01 50 00	TEMPORARY FACILITIES AND CONTROLS
01 74 23	CLEANING
01 77 01	GUARANTEE FORM

DIVISION 02 EXISTING CONDITIONS

02 30 00	SUBSURFACE INVESTIGATION
----------	--------------------------

DIVISION 03 CONCRETE

03 11 00	CONCRETE FORMING
03 20 00	CONCRETE REINFORCEMENT
03 30 00	CAST-IN-PLACE CONCRETE
03 33 00	ARCHITECTURAL CONCRETE

DIVISION 04 MASONRY

04 22 00	CONCRETE UNIT MASONARY
----------	------------------------

DIVISION 05 METALS

05 12 00	STRUCTURAL STEEL FRAMING
05 31 00	STEEL DECKING
05 40 00	COLD-FORMED METAL FRAMING
05 50 00	METAL FABRICATIONS
05 52 00	METAL RAILINGS
05 73 00	DECORATIVE METAL RAILINGS

DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

06 10 00	ROUGH CARPENTRY
06 20 00	FINISH CARPENTRY
06 40 00	ARCHITECTURAL WOODWORK
06 41 16	LAMINATED PLASTIC CASEWORK

DIVISION 7 THERMAL AND MOISTURE PROTECTION

07 21 10	THERMAL BATT INSULATION
07 26 00	CONCRETE MOISTURE VAPOR EMISSION CONTROL
07 42 13	METAL WALL PANELS
07 42 13.23	METAL COMPOSITE MATERIAL WALL PANELS
07 52 00	MODIFIED BITUMINOUS SHEET ROOFING
07 54 23	MEMBRANE ROOFING
07 62 00	SHEET METAL FLASHING AND TRIM
07 72 00	ROOF HATCH
07 72 36	SMOKE VENTS
07 84 13	PENETRATION FIRESTOPPING
07 90 00	JOINT PROTECTION

DIVISION 8 DOORS AND WINDOWS

08 11 13	HOLLOW METAL DOORS AND FRAMES
08 14 23.16	PLASTIC LAMINATE FACED WOOD DOORS
08 31 13	ACCESS DOORS AND FRAMES
08 33 20	OVERHEAD COILING COUNTER DOORS
08 51 13	ALUMINUM SERVING WINDOWS
08 71 00	DOOR HARDWARE
08 80 00	GLASS AND GLAZING

DIVISION 9 FINISHES

09 22 36.23	METAL LATH
09 24 00	CEMENT PLASTERING
09 29 00	GYPSUM BOARD
09 30 00	TILING
09 51 13	ACOUSTICAL PANEL CIELINGS
09 64 66	WOOD ATHLETIC FLOORING
09 65 13	RESILIENT BASE AND ACCESSORIES
09 66 10	SAFETY FLOOR COVERING
09 68 18sf	TILE CARPETING
09 72 00	PROTECTIVE WALL PANELS
09 77 20	DECORATIVE FIBERGLASS REINFORCED WALL PANELS
09 91 23	PAINTING
09 96 56	EPOXY FLOOR COATING

DIVISION 10 SPECIALTIES

10 11 16	MARKERBOARDS
10 11 23	TACKBOARDS
10 12 00	TROPHY AND POSTER CASES
10 14 00	SIGNAGE
10 14 16	PLAQUES
10 17 00	TOILET PARTITIONS – SOLID COLOR REINFORCED COMPOSITE
10 21 23	CUBICLE CURTAINS AND TRACK
10 26 13	CORNER GUARDS
10 28 13.13	ELECTRIC HAND DRYERS

10 44 13	FIRE EXTINGUISHERS AND CABINETS
10 51 00	HEAVY DUTY VENTILATED LOCKERS
10 56 13	METAL STORAGE SHELVING
10 75 00	FLAGPOLES
10 80 00	TOILET AND BATH ACCESSORIES

DIVISION 11 EQUIPMENT

11 06 20	STAGE CURTAINS
11 31 00	RESIDENTIAL APPLIANCES
11 40 00	FOOD SERVICE EQUIPMENT
11 41 27	WALK-IN COOLER AND FREEZER
11 50 00	MISCELLANEOUS SPECIALTIES
11 52 13.52	ELECTRIC PROJECTION SCREENS

DIVISION 12 FURNISHINGS

12 21 16	VERTICAL LOUVER BLINDS
----------	------------------------

DIVISION 14 CONVEYING SYSTEM

14 24 00	HYDRAULIC ELEVATOR
14 42 00	WHEELCHAIR LIFTS

DIVISION 21 FIRE SUPPRESSION

21 00 00	GENERAL FIRE PROTECTION PROVISIONS
21 00 01	FIRE PROTECTION SYSTEM

DIVISION 22 PLUMBING

22 00 00	GENERAL PLUMBING PROVISIONS
22 00 01	PLUMBING

DIVISION 23 HEATING, VENTILATING AND AIR CONDITIONING

23 00 00	GENERAL MECHANICAL PROVISIONS
23 00 01	HEATING, VENTILATING AND AIR CONDITIONING

DIVISION 26 ELECTRICAL

26 00 00	ELECTRICAL
26 05 00	COMMON WORK RESULTS FOR ELECTRICAL
26 50 00	LIGHTING

DIVISION 27 COMMUNICATIONS

27 00 00	COMMUNICATIONS
27 10 00	STRUCTURED CABLING
27 51 13	PAGING SYSTEMS

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

28 00 00 ELECTRONIC SAFETY AND SECURITY
 28 16 00 INTRUSION DETECTION
 28 31 00 FIRE DETECTION AND ALARM

DIVISION 31 BORED PILES

31 11 00 SITE CLEARING, STRIPPING AND GRUBBING
 31 23 00 EARTHWORK
 31 23 16 TRENCHING, BACKFILL, AND COMPACTION

DIVISION 32 SITE IMPROVEMENTS

32 11 23 AGGREGATE BASE COURSES
 32 12 16 ASPHALT PAVING, STRIPING, AND MARKINGS
 32 16 13 SIDEWALKS, CURBS, GUTTERS, AND DRIVEWAYS
 32 31 13 CHAIN LINK FENCES AND GATES
 32 31 19 WROUGHT IRON FENCES AND GATES
 32 84 00 PLANTING IRRIGATION
 32 84 00 PLANTING IRRIGATION APPENDIX
 32 93 00 PLANTS

DIVISION 33 UTILITIES

33 01 32 SEWER AND MANHOLE TESTING
 33 05 13 MANHOLES AND STRUCTURES
 33 05 16 UTILITY STRUCTURES
 33 05 17 PRECAST CONCRETE VAULTS
 33 12 13 WATER SERVICE CONNECTIONS
 33 13 00 DISINFECTING WATER DISTRIBUTION SYSTEM
 33 31 13 SANITARY SEWER PIPE
 33 41 13 STORM DRAIN PIPING

END OF SECTION

SECTION 01 10 00**SUMMARY****PART 1 - GENERAL****1.01 SUMMARY****A. Section Includes:**

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work under separate contracts.
5. Access to site.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and drawing conventions.
9. Miscellaneous provisions.

B. Related Requirements:

1. Section 01 50 00 - Temporary Facilities and Controls for limitations and procedures governing temporary use of Owner's facilities.

1.02 PROJECT INFORMATION**A. Project Identification: New Elementary School, Central Unified School District.**

1. Project Location: Fresno, California.

B. Owner: Central Unified School District.

1. Owner's Representative: Joseph Martinez

C. Architect: David Iwanaga, SIM-PBK.

1. Project Manager: Robert Ingalls

D. Project Web Site: A project Web site administered by Architect will be used for purposes of managing communication and documents during the construction stage.**1.03 WORK COVERED BY CONTRACT DOCUMENTS****A. The Work of Project is defined by the Contract Documents and consists of the following:**

1. New Elementary School campus.

B. Type of Contract.

1. Project will be constructed under one General Contractor deemed lowest responsible bidder.

1.04 ACCESS TO SITE

A. 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 Project.

B. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

C. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to as directed by District.
2. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.05 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Owner's written permission before proceeding with disruptive operations.
- D. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.
- E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.06 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 01 60 00 - Product Requirements for requirements for submitting comparable product submittals for products by listed manufacturers.

1.02 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.03 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use facsimile of form provided in Project Manual.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.

- g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.04 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS**2.01 SUBSTITUTIONS**

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution provides sustainable design characteristics that specified product provided.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed unless otherwise indicated.
- C. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Requested substitution provides sustainable design characteristics that specified product provided.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.

- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes the administrative and procedural requirements for the Schedule of Values:
1. Provide a Schedule of Values (Detailed Cost Allocation breakdown) assigned to the various portions of the Work.
 2. Upon request by Architect, support values given with data that will substantiate their correctness.
 3. Use of the Schedule of Values will be the basis for reviewing the Contractors Application for Payment. No payment will be made without the Architect's review of the approved Schedule of Values.
 4. The Schedule of Values shall cover and be cross-referenced to the activities shown on the Construction Schedule.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Drawings and general provisions of the Contract, including General and Special (or Supplementary) Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUBMITTALS

- A. Submit according to Specification Section Submittal Procedures.
1. General Requirements:
 - a. Submit Schedule of Values on form provided by the General Contractor:
 - 1) Within 10 days of Notice to Proceed.
 - 2) Owner will review Schedule.
 - 3) Revise Schedule as required by Owner.
 - 4) No review of an Application for Payment will be undertaken without an approved Schedule of Values.
 2. Form of Hard Copy Schedule:
 - a. General: Use CBS activities as a format outline for listing division of the Work for the Project as provided by the General Contractor.
 - b. Project Site Costs: Detailed Cost Allocation breakdown indicating trade/activity including labor, equipment, and materials for the Project Site that is compatible with the Contractor's Means

and Methods for construction. Provide separate break down for material and labor when appropriate for material delivery. Overhead, profit and bonding costs are to be de-tailed separately and not included with the labor and material costs.

- 1) When the project site is of sufficient size to warrant, break the site costs down into areas compatible with the Contractor's Means and Methods for construction sequences.
- c. Building Costs: Detailed Cost Allocation breakdown indicating trade/activity including labor, equipment, and materials for the Project per Building that is compatible with the Contractor's Means and Methods for its construction sequences. Provide separate break down for material and labor when appropriate for material delivery. Overhead, profit and bonding costs are to be detailed separately and not included with the labor and material costs.
3. Content of Schedule:
- a. Itemize separate line item costs for the Project for each of the following:
 - 1) Division 00 through Division 01 General Cost Items:
 - a) Performance Bond and Labor and Material Bond.
 - b) Field Supervision and Layout.
 - c) Temporary Utilities, Controls and Buildings.
 - 2) 1) Division 02 through Division 16 Cost Items:
 - a) Cost for Work required by each Section (labor, equipment, and materials only).
 - b) Costs for a portion of the Work required by a Section (labor, equipment, and materials only) when required for proper decision of payment or by this specification.
 - c) Specific itemized costs (labor, equipment, and materials only) in the stated unit of measurement shall be included, but not limited to, the following sections:
 - b. Breakdown costs into:
 - 1) Delivered cost of products(s) including tax.
 - 2) Installed cost excluding overhead and profit.
 - 3) Add Contractor's and subcontractor's overhead and profit costs after subtotal and provide a final total.
 - 4) Sum of total costs listed in Schedule shall equal total Contract Sum.

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
1. The General Contractor will schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
- 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.

1.02 QUALITY ASSURANCE:

- A. General:
1. Attendees: The GC will inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. The GC will notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: The GC will prepare the meeting agenda. The GC will distribute the agenda to all invited attendees.
 3. Minutes: The GC will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three [3] days of the meeting.
- B. Pre-construction Conference: The GC will schedule a pre-construction conference before starting construction, at a time convenient to Owner, District's Project Manager, and Architect, but no later than fifteen [15] days after execution of the Agreement. The GC will hold the conference at Project site or another convenient location. The GC will conduct the meeting to review responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; major contractors; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Phasing. (if required)
 - b. Critical work sequencing and long-lead items.

- c. Designation of key personnel and their duties.
- d. Procedures for processing field decisions and Change Orders.
- e. Procedures for RFIs.
- f. Procedures for testing and inspecting.
- g. Procedures for processing Applications for Payment.
- h. Distribution of the Contract Documents.
- i. Submittal procedures.
- j. Preparation of Record Documents.
- k. Use of the premises.
- l. Work restrictions.
- m. Responsibility for temporary facilities and controls.
- n. Construction waste management and recycling.
- o. Parking availability.
- p. Office, work, and storage areas.
- q. Equipment deliveries and priorities.
- r. First aid.
- s. Security.
- t. Progress cleaning.
- u. Working hours.
- v. Lines of Communication
- w. Compliance Items

3. Minutes: The GC will record and distribute meeting minutes.

C. Pre-Installation Conferences: The GC will conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

- 1. Attendees: The contractor must have their estimator, and the foreman that will be running the project. Also, Owner, Architect, Inspector and Consultants that are relative to the scope of work.
- 2. Agenda: The following items shall be reviewed at the Pre-Installation meetings in addition to any other contractor specific items:
 - a. Delete unnecessary items from list below. Add items to suit Project.
 - b. Schedule for the contractor and how they relates to other contractor's schedules
 - c. Contract Drawings relating to that contractor's scope of work
 - d. Contractors related specification sections
 - e. Submittals and shop drawings
 - f. Safety and competent person inspections
 - g. Review subcontractors set to confirm drawings are posted
 - h. Inspection Requests and Testing
 - i. Requirements for Daily Reports
 - j. Jobsite Rules
 - k. Related materials with other contractors
 - l. Requirements for Safety Meetings
 - m. Hours of work at the jobsite
 - n. Subcontractor Meeting dates
 - o. Accident Reporting

- p. RFI Procedures
 - q. Record Drawing requirements
 - r. Contact Information for foreman
 - s. Look Ahead Schedules
 - t. Storage Areas and Techniques.
- 3. The GC will record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: The GC will distribute minutes of the meeting to each party present, and to parties who should have been present.
 - 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. Progress Meetings: The GC will conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.
- 1. Attendees: In addition to representatives of Inspector and District's Project Manager, each major contractor, each 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 conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. 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. GC'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 GC'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) Safety.
 - 2) Sequence of operations.
 - 3) Submittals.
 - 4) Deferred Approval Item.
 - 5) Status of submittals and Deferred Approval Items.
 - 6) Deliveries.
 - 7) Off-site fabrication.
 - 8) Access.
 - 9) Site utilization.

- 10) Temporary facilities and controls.
 - 11) Work hours.
 - 12) Hazards and risks.
 - 13) Progress cleaning.
 - 14) Quality and work standards.
 - 15) Status of correction of deficient items.
 - 16) Field observations.
 - 17) RFIs.
 - 18) Status of proposal requests.
 - 19) Pending changes.
 - 20) Status of Change Orders.
3. Minutes: The GC will record the meeting minutes.
 4. Reporting: The GC will distribute minutes of the meeting to each party present, and to parties who should have been present.
 - a. Schedule Updating: The GC will revise the GC's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. The GC will issue revised schedule concurrently with the report of each meeting.
- E. Coordination Meetings: The GC will conduct Project Coordination Meetings as required. Project Coordination Meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.
1. Attendees: In addition to representatives of Owner, District's Project Manager, and Architect, each major 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 conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 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. GC'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 GC'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: The GC will revise GC'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) Coordination drawing review.
 - 4) Conflict Items.
 - 5) Resolution of conflict items.
 - 6) Access.
 - 7) Site utilization.
3. Reporting: The GC will 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

PART 3 - EXECUTION

END OF SECTION

SECTION 01 32 00**CONSTRUCTION PROGRESS DOCUMENTATION****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Contractor's construction schedule.
 2. Construction schedule updating reports.
 3. Daily construction reports.
 4. Site condition reports.

1.02 DEFINITIONS

- A. 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.
1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 2. Predecessor Activity: An activity that precedes another activity in the network.
 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Float: The measure of leeway in starting and completing an activity.
1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

1.03 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
1. Working electronic copy of schedule file, where indicated.
 2. PDF electronic file.

3. Four paper copies.
- B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
 - C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
 - D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 3. Total Float Report: List of all activities sorted in ascending order of total float.
 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
 - E. Construction Schedule Updating Reports: Submit with Applications for Payment.
 - F. Daily Construction Reports: Submit at weekly intervals.
 - G. Site Condition Reports: Submit at time of discovery of differing conditions.

1.04 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 1. Secure time commitments for performing critical elements of the Work from entities involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.01 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of 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. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 2. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 - Submittal Procedures in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 3. Startup and Testing Time: Include no fewer than 30 days for startup and testing.
 4. 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.
 5. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Uninterruptible services.
 - c. Use of premises restrictions.
 - d. Provisions for future construction.
 - e. Seasonal variations.
 - f. Environmental control.
 5. Work Stages: Indicate important stages of construction for each major portion of the Work.
 6. Other Constraints.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and Contract Time.
- F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.
- G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 15 days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.03 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.
1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing.
 - j. Punch list and final completion.
 - k. Activities occurring following final completion.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.

3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.

2.04 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 7. Accidents.
 8. Meetings and significant decisions.
 9. Unusual events.
 10. Stoppages, delays, shortages, and losses.
 11. Meter readings and similar recordings.
 12. Emergency procedures.
 13. Orders and requests of authorities having jurisdiction.
 14. Change Orders received and implemented.
 15. Construction Change Directives received and implemented.
 16. Services connected and disconnected.
 17. Equipment or system tests and startups.
 18. Partial completions and occupancies.
 19. Substantial Completions authorized.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION**3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE**

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 01 32 00 - Construction Progress Documentation for submitting schedules and reports, including Contractor's construction schedule.
 - 2. Section 01 78 23 - Operation and Maintenance Data for submitting operation and maintenance manuals.
 - 3. Section 01 78 39 - Project Record Documents for submitting record Drawings, record Specifications, and record Product Data.

1.02 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.03 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.04 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 - 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

- a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement, Agreement included in Project Manual.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Name of subcontractor.
 - f. Name of supplier.

- g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 10 00.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.
- a. Transmittal Form for Paper Submittals: Use AIA Document G810.
 - b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).
 - 4) Source (From:).
 - 5) Name and address of Architect.
 - 6) Name of Contractor.
 - 7) Name of firm or entity that prepared submittal.
 - 8) Names of subcontractor, manufacturer, and supplier.
 - 9) Category and type of submittal.
 - 10) Submittal purpose and description.
 - 11) Specification Section number and title.
 - 12) Drawing number and detail references, as appropriate.
 - 13) Indication of full or partial submittal.
 - 14) Signature of transmitter.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations: Identify deviations from the Contract Documents on submittals.

- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.01 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements:
1. Action Submittals: G.C. to review and stamp submittal prior to submitting to Architect for General Conformance to the drawings and specifications. Submit 1 paper copies and 1 electronic copy of each submittal unless otherwise indicated. Architect will 1 electronic copy.
 2. Informational Submittals: Submit 1 paper copies and 1 electronic copy of each submittal unless otherwise indicated. Architect will not return copies.
 3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.

- c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format:
 - a. 1 paper and 1 electronic copies of Product Data unless otherwise indicated. Architect will return 1 electronic copy.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 3. Submit Shop Drawings in the following format:
 - a. 1 opaque (bond) copies of each submittal. Architect will 1 electronic copy.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit 2 full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit 2 sets of Samples. Architect will retain 1 Sample sets; remainder will be returned.
 - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

- E. **Product Schedule:** As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Submit product schedule in the following format:
 - a. One paper copies of product schedule or list unless otherwise indicated. Architect will return 1 electronic copy.
- F. **Contractor's Construction Schedule:** Comply with requirements specified in Section 01 32 00 - Construction Progress Documentation.
- G. **Closeout Submittals and Maintenance Material Submittals:** Comply with requirements specified in Section 01 77 00 - Closeout Procedures.
- H. **Maintenance Data:** Comply with requirements specified in Section 01 78 23 - Operation and Maintenance Data.
- I. **Qualification Data:** Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- J. **Welding Certificates:** Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- K. **Installer Certificates:** Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- L. **Manufacturer Certificates:** Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- M. **Product Certificates:** Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- N. **Material Certificates:** Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- O. **Material Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- P. **Product Test Reports:** Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and

witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

- Q. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- R. Schedule of Tests and Inspections: Comply with requirements specified in Section 01 40 00 - Quality Requirements.
- S. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- T. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- U. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- V. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 - Closeout Procedures.
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 REFERENCE

- A. Requirements in Addenda, Alternates, Conditions and Division 01 collectively apply to this work.
- B. Applicable Sections of Title 21 California Code of Regulations (CCR) also apply to all work.

1.02 DESCRIPTION

- A. Principal Work Items Are:
 - 1. Tests and inspections required per T&I list.
- B. Related Work Specified Elsewhere:
 - 1. Work to be tested or inspected: Respective Sections.

1.03 TESTS AND INSPECTIONS – GENERAL

- A. General:
 - 1. Tests: 21 CCR 35.
 - 2. Inspection: 21 CCR 33.
- B. Contractor: Shall furnish labor, materials, and equipment and perform all operations required to take and prepare test samples, as required for inspection of all work.
- C. Payment of Tests and Inspection Costs:
 - 1. District: The District will pay all costs for required testing and inspection of both on-site and off-site work, except where specifically noted otherwise.
 - 2. Costs to be reimbursed to the District by Contractor:
 - a. Cost of testing materials, which fail to meet requirements of Contract Documents.
 - b. Overtime Costs: Whenever Contractor elects to work during hours other than normal work week and laboratory inspection is required, District will pay normal cost of laboratory inspection and Contractor shall pay that portion of laboratory inspection cost due to overtime.
 - c. Where specifically noted.

1.04 TESTING AGENCY

- A. All tests shall be made by a well-established, independent testing laboratory(ies) selected by the District and approved by DSA.

1.05 RESULTS

A. Test Reports:

- 1. Testing laboratory to report result of all tests in writing.
- 2. Reports shall state that:
 - a. Tests were made under responsible charge of a Testing Engineer, licensed to practice Civil Engineering, State of California.
 - b. Materials(s) were tested per requirements of Contract Documents and Division of State Architect.
 - c. Materials(s) Passed or Failed to Pass requirements.

3. Report(s), Distribution:

Architect.....	2 copies
Structural Engineer.....	1 copy
Inspector.....	1 copy
Contractor.....	1 copy
Construction Manager.....	1 copy
Division of the State Architect	1 copy

B. Certification: Upon completion of the work, Testing Laboratory shall furnish notarized certificate to Division of State Architect stating:

- 1. Tests for the work were made per requirements of Contract Documents and Division of State Architect.
- 2. All such tests and reports made for the work were reported.

1.06 REQUIRED TESTS AND INSPECTIONS

A. General: Tests and inspections are referenced to Specification Divisions and Sections.

B. Division 31 - Earthwork:

- 1. General:
 - a. Conform to Title 24 CCR.
 - b. Tests, inspections, and certifications performed by Registered Soils Engineer, selected by District, for designated site areas requiring Laboratory control.
- 2. Test and determine acceptability of fill material, prior to placement.
- 3. Observe placement of fill.
- 4. Test compacted fill.

- a. Conform to Division of the State Architect requirements.
 - b. Test per ASTM D-1557-78, as follows:
 - 1) Test Cylinder.
 - 2) Hammer: 2" diameter; 10 lbs.
 - 3) Compact earth in cylinder in five layers: 25-18" drop hammer blows per layer.
5. Reports:
- a. Report all tests.
 - b. File Verified Reports with Division of the State Architect.
6. Certification Letter: Upon completion of work, state that compacted fill:
- a. Conforms to requirements of Contract Documents, Division of the State Architect, and Soils Report.
 - b. Is adequate for loads to be carried.
7. Section 32 12 16 - Asphaltic Concrete Paving.
- C. Building Materials:
1. All building materials used in this project must conform to the testing and installation standards of the current C.B.C. as published by I.C.B.O.

1.07 TESTS

- A. The District will select an independent testing laboratory to conduct the tests. Selection of the material required to be tested shall be by the laboratory or the District's representative and not by the Contractor.
- B. The Contractor shall notify the District's representative a sufficient time in advance of the manufacture of material to be supplied by him under the Contract Documents, which must, by terms of the Contract, be tested in order that the District may arrange for the testing of same at the source of supply.
- C. Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required shall not be incorporated in the job.
- D. The District will select and pay testing laboratory costs for all tests and inspections, but may be reimbursed by the Contractor for such costs under the Contract Documents.

1.08 TESTS REPORTS

- A. One copy of all test reports shall be forwarded to the Division of the State Architect by the testing agency. Such reports shall include all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of

special sampling operations as required shall also be reported. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of the California Building Code and any other regulating standards as required by law and with the approved Specifications. Test reports shall show the specified design strength. They shall also state definitely whether or not the material or materials tested comply with requirements.

1.09 VERIFICATION OF TEST REPORTS

- A. Each testing agency shall submit to the Division of the State Architect a verified report in duplicate covering all the tests which are required to be made by that agency during the progress of the project. Such report shall be furnished each time that work on the project is suspended, covering the tests up to that time and at the completion of the project, covering all tests.

1.10 INSPECTION BY THE DISTRICT

- A. The District and his representatives shall at all times have access for the purpose of inspection to all parts of the work and to the shops wherein the work is in preparation, and the Contractor shall at all times maintain proper facilities and provide safe access for each inspection.
- B. The District shall have the right to reject materials and workmanship which are defective, or to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without charge to the District. If the Contractor does not correct such rejected work within a reasonable time, fixed by written notice, the District may correct same and charge the expense to the Contractor.
- C. Should it be considered necessary or advisable by the District at any time before final acceptance of the entire work to make any examination of the work already completed by removing or tearing out the same, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any respect due to the fault of the Contractor or his subcontractor, he shall defray all expenses of such examinations and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the additional cost of labor and material necessarily involved in the examination and replacement shall be allowed the Contractor.

1.11 INSPECTOR – DISTRICT'S

- A. An Inspector employed by the District and approved by DSA in accordance with the requirements of the California Code of Regulations, Title 21 and 22, will be assigned to the work. His duties are as specifically defined in the California Code of Regulations.
- B. The work of construction in all stages of progress shall be subject to the personal continuous observation of the Inspector. He shall have free access to any or all parts of the work at any time. The Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the

character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this Contract.

1.12 INSPECTOR – DISTRICT – FIELD OFFICE

- A. The Contractor shall provide for the use of the District's Inspector a temporary office to be located as directed by the Inspector and to be maintained until removal is authorized by the District. This office shall be of substantial waterproof construction with adequate natural light and ventilation by means of stock design windows. The door shall have a lock. A table satisfactory for the study of plans and two chairs shall be provided by the Contractor. The Contractor shall provide and pay for adequate electric lights, private local telephone service with a long exterior bell, and adequate heat and air conditioning for this field office until the completion of the Contract. In the case of break-in and vandalism to inspector's trailer and loss of I.O.R., privately owned office machines, the Contractor shall reimburse I.O.R. for loss or replace of kind.

END OF SECTION

SECTION 01 50 00**TEMPORARY FACILITIES AND CONTROLS****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 01 10 00 – Summary for work restrictions and limitations on utility interruptions.

1.02 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service is part of this project: Contractor is responsible for temporary water and items specified in Part 2.04 of this specification. Owner will pay permit fees.
- C. Electric Power Service is part of this project: Contractor is responsible for temporary power. Coordinate and apply for temporary power with Daniel Gil of PG&E. Owner will pay permit fees.

1.03 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241, 2013 CFC Chapter 33 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

1.04 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1.05 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.01 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 , with galvanized barbed-wire top strand.

2.02 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, Inspector of Record office and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.03 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures (minimum 2A:10B:C).

2.04 TEMPORARY CONSTRUCTION WATER (CITY OF MADERA)

A. TESTING AND STERILIZATION

22-9.1 General

The specifications constituting this section designate the requirements for the procedure, materials, performance, and payment for testing and sterilization of water mains and appurtenances intended for the conveyance of potable water

under pressure. The Contractor shall furnish all labor, material, tools, and equipment, including all chemicals, necessary to perform all operations required to complete the testing and sterilization as herein specified.

22-9.2 Connections to Water Mains and Use of Construction Water

1. The contractor shall submit a connection sequence and plan including location of a Reduced Pressure Principal Backflow Prevention Device (R.P.) for approval by the City. If the connection location places the temporary R.P. device in the travel way, the City, during plan check will note an alternate location for the R.P. Size of temporary R.P. shall be no less than one-half ($\frac{1}{2}$) the diameter of the pipeline being installed. Smaller R.P.'s may be approved during plan check if two or more points of connection are to be employed. R.P.'s smaller than two 2 inches shall not be allowed in any case.
2. Water sample points shall be installed every 250 feet. New water services intended for private use can be used for collecting water quality samples through a properly installed blow off assembly. It is not recommended that fire hydrants be used for sampling due to potential contamination within the hydrant.
3. All customers affected by shut down of an existing main must be properly notified in advance along with the Public Works Water Division and Fire Department. The contractor shall notify all affected water customers 48 hours prior to commencing installation of a new water main or connecting to an existing City pipeline.
4. Trenches shall be back filled and compacted immediately after pipe installation.
Temporary trench patch shall be installed daily until permanent trench patch is installed.
5. The contractor is solely responsible for traffic control procedures and placing warning signs providing safe travel of vehicles around exposed or open trenches. A traffic control plan shall be submitted to the Engineering Division and designed according to the MUTD.
6. Water required to fill any pipeline for hydrostatic pressure testing, disinfection and flushing shall be supplied downstream of a University of Southern California (U.S.C.) Foundation for Cross Connection Control and Hydraulic Research approved and certified R.P. or Air Gap. Valves are not acceptable for protection during hydrostatic testing and may not be used in place of an R.P. (See Figure 3.)
7. Any fixture connecting to the new pipeline, which has not passed all testing procedures and makes water available to any person, must have a sign posted directly adjacent stating "not safe to drink". Such signs shall be supplied by the contractor and stay in place until all final bacteriological tests are confirmed negative by the City Inspector.
8. Work that involves required inspections, backflow testing work in the right-of-way, chlorination or chlorination testing shall NOT be conducted on holidays, weekends or after hours. If a normal workday extends after hours for justifiable reasons the contractor is responsible for all overtime expenses incurred by the city. The payment of overtime shall be submitted prior to final. Normal bacteriological testing should be

scheduled on Tuesdays. Any change would require a 24-hour notification.

22-9.3 Hot Tap Methodology:

1. Hot taps are required for all connections to existing water mains. All necessary precautions including over excavation and pumping shall be taken to prevent contamination to the existing water main.
2. Contractor shall immediately take corrective action, under the direction of the City Inspector, if any water sample is found to be positive for the presence of Coliform Bacteria at any time during the process of installing a new water main or fire hydrant assembly. The Public Works Water Quality Division will determine Flushing and/or rechlorination procedure. In no case shall completion of corrective action take longer than 24-hours from notification to contractor of a positive sample.
3. Hot tap fittings, gate valve(s), R.P. (s) and other temporary plumbing shall be disinfected by swabbing with a 1% chlorine solution as required by ANSI/AWWA C651-92. (See Table 4; Shown in the City of Madera standard specifications.) The City Inspector must be present during the time of the hot tap procedure.
4. Precautions must be taken to protect the interior of pipes, fittings and valves against all forms of contamination. Pipes left unattended, such as during rest breaks, meal periods, or the end of the workday must be sealed off with watertight plugs to prevent contamination.

22-9.4 Hydrostatic Testing

1. Precautions must be taken to protect the interior of pipes, fittings and valves against all forms of contamination. Pipes left unattended, such as during rest breaks, meal periods, or the end of the workday must be sealed off with watertight plugs to prevent contamination.
2. When a water line is charged for hydrostatic testing a test plate or an R.P. must be in place to protect the City of Madera water systems. Valves or assemblies which are not approved by U.S.C. are unacceptable. Water being used for any hydrostatic test can only come from a source downstream of an air gap or U.S.C. approved R.P. assembly which has been tested and certified. Cases where there is no R.P. on a water pipeline to be hydrostatic tested, installation of a test plate is required so the water pipeline will be isolated and no water from the pipeline can backflow into the City water system. A temporary connection may be installed downstream of the test plate to facilitate hydrostatic testing, chlorine injection, flushing, etc. Temporary connection must be removed and properly plugged under direct observation of City Inspector prior to final inspection. Valves or assemblies which are not approved by U.S.C. are unacceptable. Water sources are a hydrant with an R.P. and construction meter attached, water truck equipped with City of Madera approved air gap or R.P., or any source downstream of a U.S.C. approved backflow prevention assembly.

3. If water is obtained directly from an R.P. assembly to fill pipeline or feed the booster pump, the only acceptable point of connection is test cock #4 downstream of check valve #2. Water received from test cock #4 must pass through the booster pump and then be injected downstream of the closed #2 shutoff valve.

22-9.5 Disinfection with Temporary RP Backflow Prevention Device:

1. All chlorination disinfection procedures shall be in accordance with the current edition of the ANSI/AWWA C651-92 Standard of Disinfection Water Mains with the exception that the Slug Method shall not be allowed for use in the City. Only Tablet or Continuous Feed Methods are allowed for use in the City. It shall be the responsibility of the contractor to refer only to the current edition of these standards. Some of the most important and often overlooked procedures of these Standards which must be adhered to at all times are as follows: (See Tables 1 – 4). Tablets must be attached to the inside top of each length of pipe with food grade, adhesive. Examples of food-grade adhesives accepted by the U.S. Drug Administration (USDA) are Permatex Form-A-Gasket No. 2 and Permatex Clear RTV Silicone Adhesive Sealant which are manufactured by Loctite Corporation, Kansas City, KS 66115. Other company products, such as Permatex Form-A- Gasket No. 1 are not allowed for use in the City.
2. Contractor shall install a USC approved R.P. between new and existing water mains. All water main extensions shall be connected with a gate valve immediately upstream of the appropriate sized and approved R.P. The temporary R.P. device shall be installed with a minimum of 12 inches above adjacent soil or surface. Testing will be provided by the Water Quality Division
Monday through Friday, except holidays, between 7:00 a.m. and 2:30 p.m.
A 24- hour notice is required to City Inspector requesting R.P. test and certification.
The number 2-shutoff valve must remain fully closed and no water may be allowed to pass through the R.P. until Water Quality Division personnel have certified the device. A \$30.00 fee will be charged to the contractor each time a R.P. is tested or re-tested. The R.P. device is not to be moved, tampered with, adjusted or modified after testing. If the R.P. device is tampered with, it will be removed from the project by City forces halting the project.

22-9.6 Chlorination Procedures:

1. The standards require that new water mains be filled at a “very slow” velocity of less than one foot per second to prevent flushing of the chlorine tablets or granules to the end of the pipeline.
2. Minimum chlorine dose for all water mains and piping shall be a minimum of 25 mg/L and shall not exceed 50 mg/L. See Tables 1,2 and 4 for dosage requirements for various pipe sizes. Water chlorinated at this level shall not be allowed to remain in contact with pipeline and fittings beyond the required 24- hour contact time. (See Tables).

3. The City Inspector shall test for chlorine residual in the new water main 24-hours after the high dosage was introduced to verify a minimum 10 mg/L. The contractor shall then flush the new main until the chlorine residual equals the existing system level and is verified by the City Inspector. See Table 3 and Figures 1 and 2. Chlorination shall not be permitted on Fridays or the day before a City holiday due to the corrosive potential of high concentrations of chlorine after 24-hours.
4. All new water mains shall sit for a minimum of 24-hours once normal City system chlorine residual has been achieved. The Water Quality Division will then collect water samples, which will be tested for Coliform Bacteria. All new water mains must remain isolated with all valves fully closed until all test results are returned from lab and confirmed negative by the City Inspector.
5. Upon approval of bacteriological test results, the contractor may remove the R.P. and complete connection to existing water mains. The City Inspector must be notified 24-hours in advance and shall be present during the connection procedure. All pipes and fittings used for final connection to an existing water main must be disinfected in accordance with the most current edition of ANSI/AWWA C651-92.
6. Contractor shall prevent water flowing from a disconnected pipe, R.P. assembly, test plate, coupling or other fixtures from coming in contact with new water main. This situation shall be controlled by over excavation of the trench where connection is being made. Water shall be pumped out of excavated area to prevent contaminated water from coming in contact with or infiltrating into water mains. If the water in the trench comes in contact with the new water main at any time or the trench fails and the water main is covered with soil, the main is contaminated and will require complete high dose disinfection and testing.
7. Throughout the testing and disinfection process if a sample returns positive for fecal coliform or 1.1 coliform or greater, the contractor shall stop all other work and commence another disinfection of the water main immediately. This second disinfection process shall be conducted as stated previously. This work shall be conducted regardless of weekends and holidays.
8. Contractor shall flush new water main through fire hydrants and or blow off assembly immediately after all connections have been made to existing water mains. See Table 3. This is to remove chlorine-swabbing residue. The City Inspector will then verify that chlorine residual is equal to the existing system level. The Water Quality Division will then sample for final bacteriological analysis after 24-hours. The contractor shall then close all valves, in the presence of the City Inspector, to achieve isolation of newly installed water system. All valves shall remain closed until approved by the City Inspector.
9. Contractor shall reimburse City for all costs incurred for all laboratory analysis prior to final project approval.
10. Upon completion of attachment "A" (Check List for Connection and Disinfection of New Water Main and/or Fire Hydrant Pipe Lines), contractor shall fully open all new mainline and fire hydrant valves in the presence of the City Inspector. The City Inspector must verify and approve this procedure prior to final project approval.

22-11 CONSTRUCTION WATER

All water trucks being filled from fire hydrants or from any other connection to the City water system must have an air gap between the receiving vessel and delivery pipe. Air gap must be at least two times the diameter of the delivery pipe. All delivery pipes must be externally mounted on the truck to facilitate visual inspection. Presence of an R.P. on the hydrant will not exempt trucks from the air gap requirement. No construction water may be taken from the water system through a hose unless it is downstream of the R.P. and meter.

22-12 PENALTY FOR VIOLATION OF THIS STANDARD

The purpose of this Standard is to maintain the integrity of the water system. This will help protect the public from all potential sources of cross-connection contamination.

The contractor under the direction of the City Inspector shall immediately correct violations of this policy. When necessary, applicable penalties shall be assessed as specified in the following:

1. City of Madera Code of Ordinances, Chapter 6: Water Cross-Connection Control, Section 5-6.07 Water Termination.
2. City of Madera Council Resolution No. 4369 Adopting the State of California Department of Health Services Manual of Cross-Connection Program in the City of Madera. Chapter IX Enforcement, Section A: Conditions Leading to Termination of Water Service.

22-13 Tables

Table 1 – Ounces of calcium hypochlorite granules to be placed at beginning of main and at each 500 foot interval

Pipe Diameter		Calcium Hypochlorite Granuels	
In.	m	Oz.	G
4	1	0.5	14
6	1	1	28
8	2	2	57
12	2	4	113
16 or larger	400 or larger	8	227

Table 2 – Number of 5-g calcium hypochlorite tablets required for dose of mg/L*
Length of Pipe Section, ft (m)

Pipe Diameter		13 (4.0) or less	18 (5.5)	20 (6.1)	30 (9.1)	40 (12.2)
In	mm.	Number of 5-g Calcium Hypochlorite Tablets				
4	100	1	1	1	1	1
6	150	1	1	1	2	2
8	200	1	2	2	3	4
10	250	2	3	3	4	5
12	300	3	4	4	6	7
16	400	4	6	7	10	13

- * Based on 3.25g available chlorine per tablet; any portion of tablet to next higher integer.

Table 3 – Required flow openings to flush pipelines (40 psi [276-kPa] residual pressure in water main*

Pipe Diameter		Flow Required to produce 2.5 ft/s (aprox.) Velocity in Main		Size of Tap, in (mm)			Number of 2 ½ (64-mm) Hydrant Outlets
In	(mm)	Gpm	(L/s)	1 (25)	1 ½ (38)	2 (51)	
4	(100)	100	(6.3)	1	-	-	1
6	(150)	200	(12.6)	-	1	-	1
8	(200)	400	(25.2)	-	2	1	1
10	(250)	600	(37.9)	-	3	2	1
12	(300)	900	(56.8)	-	-	2	2
16	(400)	1600	(100.9)	-	-	4	2

* With a 40-psi (276-kPa) pressure in the main and the hydrant flowing to atmosphere, a 2 ½ inch (64-mm) hydrant outlet will discharge approximately 100 gpm (63.1 L/s) and a 4 ½ inch (114-mm) hydrant outlet will discharge approximately 2500 gpm (160 L/s)

†Number of taps on pipe based on discharge through 5 feet (1.5 m) of galvanized iron (GI) pipe with on 90° elbow.

Table 4 – Chlorine required to produce 25-mg/L concentration in 100 ft (30.5m) of pipe by diameter.

Pipe Diameter		100 percent Chlorine		1% Chlorine Solution	
In	(mm)	Lb	G	Gal	(L)
4	100	0.013	5.9	0.16	0.6
6	150	0.03	13.6	0.36	1.4
8	200	0.054	24.5	0.65	2.5
10	250	0.085	38.6	1.02	3.9
12	300	1.12	54.4	1.44	5.4

16 400 0.217 98.4 2.6 9.8

PART 3 - EXECUTION

3.01 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 01 10 00 – 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.

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel.
- F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing 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.
- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing 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.

- H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead unless otherwise indicated.
 - 2. Coordinate with PG&E to establish service, contact David Gil at (559) 675-2258.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
 - 1. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- K. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access project electronic documents and maintain electronic communications. Provide:
 - 1. Computer for use.
 - 2. Network Connectivity: 10/100BaseT Ethernet.
 - 3. Productivity Software
 - 4. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
 - 5. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 384 Kbps upload and 1 Mbps download speeds at each computer.
 - 6. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.

3.03 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion.

Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
 - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations and Fire Department access.
 - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 31 22 00 - Earthwork.
 - 3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 - 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 32 12 16 - Asphalt Concrete Paving.
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: Provide temporary parking areas for construction personnel.
- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

- a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touchup signs so they are legible at all times.
- H. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 - Construction Waste Management and Disposal.
 - I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 74 23 - Cleaning.
 - J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
 - K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
 - L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: 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. Temporary Erosion and Sedimentation Control: Comply with requirements specified in Section 31 10 00 - Site Clearing and Grubbing.
- D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.
- E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains. See Section 01 57 23 SWPPP for further information.

- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241A and 2013 CFC Chapter 33; manage fire prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only

and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.05 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Discard or replace water-damaged and wet material.
 - 4. Discard, replace, or clean stored or installed material that begins to grow mold.
 - 5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.06 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 - Closeout Procedures.

END OF SECTION

SECTION 01 74 23**CLEANING****PART 1 - GENERAL****1.01 DESCRIPTION**

- A. Perform cleaning and disposal work as specified, complete. This Section forms a part of all other Sections of the specifications and shall be coordinated with such additional cleaning and disposal requirements as may be specified in other Sections.
- B. Related Requirements:
 - 1. Section 00 72 00 - General Conditions of the Contract for Construction; Article 47, Cleaning Up.
 - 2. Section 01 74 19 - Construction Waste Management.
 - 3. Pertinent Specification Sections: Specific requirements for cleaning.

1.02 CLEANING IN GENERAL

- A. Contractor shall at all times keep premises free from accumulations of waste material or rubbish caused by Contractor's employees or work, or employees or work of subcontractors, and shall remove rubbish from and about areas of Work and Contractor's and subcontractors' tools, scaffolding and surplus materials and shall leave the Work "broom clean", or its equivalent, except as hereinafter specified. In case of dispute between Contractor and other contractors employed on or about the work areas, as to responsibility for removal of rubbish, etc., or in case debris is not promptly removed as herein required, the State may remove rubbish, etc., and backcharge the Contractor.
- B. At all times, Project working area and site shall be kept clean and orderly. Dirt, debris, waste, rubbish and disused implements and equipment shall be removed frequently and not allowed to accumulate more than 24 hours. Flammable and toxic materials shall not be stored in structures>.

1.03 FINAL CLEANING

- A. Within Contract limits, clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
 - 1. Clean equipment and fixtures to sanitary condition, clean or replace filters of mechanical equipment.
 - 2. Clean roofs, gutters, downspouts and drainage systems.
 - 3. Glass: Clean all glass, interior and exterior, affected by Work of this Project; including removal of foreign material from glass.
- B. Clean site: Sweep paved areas, rake clean other surfaces.

- C. Remove waste and surplus materials, rubbish and construction facilities from Project and from site.
- D. Dust, dirt, stains, hand marks, paint spots, and like defects shall be completely removed from surfaces. Metal surfaces shall be cleaned, using only non-corrosive and non-abrasive materials.
- E. Final Inspection: Deficient cleaning operations, as determined by the State, shall be immediately corrected as directed.

1.04 DISPOSAL

- A. Under no circumstances shall rubbish or waste material be disposed of in site fills or backfills. Debris, rubbish, and waste or surplus material shall be removed from the State property daily and legally disposed of.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 77 01

GUARANTEE FORM

GUARANTEE FOR _____

DISTRICT: _____

PROJECT: _____

ADDRESS: _____

DATE OF PROJECT ACCEPTANCE: _____

We hereby guarantee the _____,
which we have installed in the above project, for a period of _____ year(s), in accordance with the
requirements of the specifications. We agree to repair or replace any or all such work, together
with any other work which may be displaced or marred in so doing, that may prove defective in
workmanship or materials within the above-mentioned period (from date of acceptance) without
expense whatsoever to the District, ordinary wear and tear and unusual abuse or neglect excepted.

Signature of General Contractor

Signature of Subcontractor

Address

Address

Phone

Phone

Date

Date

END OF SECTION

SECTION 02 30 00**SUBSURFACE INVESTIGATION****PART 1 - GENERAL**

1.01 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. The City of Dinuba Specifications shall prevail for all work performed within the City of Dinuba Right-Of-Way.

1.02 SUMMARY

- A. Section Includes information for the Geotechnical Investigation Report prepared for this Project.
- B. Related Sections:
 - 1. Division 31 Sections as applicable to site clearing, earthwork, excavations, fill, trenching, and paving.

1.03 GEOTECHNICAL REPORT

- A. A Geotechnical report for this project has been prepared by:

Salem Engineering Group
4729 W. Jacquelyn Ave
Fresno, CA 93722
Phone Number: (559) 271-9700
Project No. 1-216-1084 (Includes Geologic Evaluation)
Date: October 10, 2016, Revised October 30, 2018
- B. A copy of the Geotechnical Investigation Report is contained in the Appendix of this Project Manual.
- C. The Geotechnical Investigation Report shall be considered to be a part of the Contract Documents. The Contractor shall become familiar and comply with the requirements and recommendations in the Report.
- D. The Geotechnical Investigation Report identifies subsurface soil and ground water conditions and offers recommendations for earthwork and preparation of subsurface conditions for the Work of this Project.
- E. The Geotechnical Investigation Report is not a warranty of subsurface conditions. Should subsurface conditions be found to vary substantially from the Report, changes in design and construction of foundations may be made by the

Architect, with resulting credits or expenditures to the Contract sum accruing to the Owner.

1.04 QUALITY ASSURANCE

- A. A soil engineer will be retained by the Owner to observe performance of work in connection with excavating, trenching, filling, backfilling, and grading, and to perform compaction tests.
 - 1. Requirements for Field Quality Control are included in individual Sections as applicable to excavating, trenching, filling, backfilling, and grading.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

CONCRETE FORMING**SECTION 03 11 00****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

1.02 RELATED REQUIREMENTS

- A. Section 03 20 00 - Concrete Reinforcing.
- B. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. 2016 California Building Code (CBC).
- B. 2016 California Building Code (CBC), Volume 2, Title 24 CCR.
- C. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.
- D. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2016.
- E. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2014.
- F. ACI 347 - Guide to Formwork for Concrete; American Concrete Institute International; 2014.
- G. ASME A17.1 - Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers; 2016.
- H. PS 1-109- Structural Plywood; 2010.

1.04 SUBMITTALS

- A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on void form materials and installation requirements.
- C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and

arrangement of joints and ties.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in California.
- B. Maintain one copy of each installation standard on site throughout the duration of concrete work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver void forms and installation instructions in manufacturer's packaging.
- B. Store void forms off ground in ventilated and protected manner to prevent deterioration from moisture.

PART 2 - PRODUCTS

2.01 FORMWORK - GENERAL

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.
- C. Comply with applicable State and local codes with respect to design, fabrication, erection, and removal of formwork.
- D. Comply with relevant portions of ACI 347, ACI 301, and ACI 318.

2.02 WOOD FORM MATERIALS

- A. Form Materials: At the discretion of the Contractor, with Architect's approval.

2.03 PREFABRICATED FORMS

- A. Tubular Column Type: Round, spirally wound laminated fiber material, surface treated with release agent, non-reusable, of sizes indicated.

2.04 FORMWORK ACCESSORIES

- A. Form Ties: Removable type, galvanized metal, fixed length, cone type, with waterproofing washer, 1/2 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.
- B. Form Release Agent: Colorless mineral oil that will not stain concrete.
- C. Corners: Filleted, rigid plastic type; 3/4 x 3/4 inch size; maximum possible

lengths.

- D. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- E. Flashing Reglets: Galvanized steel, 22 gage thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- G. Waterstops: Rubber, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, 3 inch wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.03 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members that are not indicated on drawings.
- F. Provide fillet strips on external corners of beams, joists, and columns.
- G. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
- H. Coordinate this section with other sections of work that require attachment of

components to formwork.

- I. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

3.04 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.

1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 117.
- B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.
- C. Camber slabs and beams 1/4 inch per 10 feet.

3.08 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 29.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.
- C. Do not patch formwork.

3.09 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged form.

END OF SECTION

CONCRETE REINFORCEMENT**SECTION 03 20 00****PART 1 - GENERAL****1.01 SUMMARY**

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

1.02 RELATED SECTIONS:

- A. All Division 00 Specification Sections
- B. All Division 01 Specification Sections
- C. All Division 32 Specification Sections

1.03 REFERENCES:

- A. ACI American Concrete Institute
- B. ASTM American Society for Testing and Materials
- C. AWS American Welding Society
- D. CRSI Concrete Reinforcing Steel Institute

1.04 SUBMITTALS:

- A. Submit in accordance with Section 013300 and the Contract General Conditions.
 - 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.
 - 2. Manufacturer's specification and installation instructions for splice devices.
 - a. Bar supports
 - 3. Drawings and placing diagrams for each grade slab including dowels and corner bars.
 - a. 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.
- b. Coordinate placing diagrams with the concrete placing schedule.

1.05 PRODUCT DELIVERY:

- A. Deliver reinforcement to project site in bundles marked with tags indicating bar size and length.
- B. Store on wooden supports above ground surface.

PART 2 - PRODUCTS

2.01 BARS

- A. Bars shall be deformed billet steel conforming to ASTM A 615, Grade 40 for #3 bars and smaller, Grade 60 for #4 bars and larger. Mixing of steel grades will not be allowed.
- B. Bars that get welded shall conform to ASTM A706. Welding shall be done using low hydrogen electrodes and shall comply with ANSI/AWS D1.4.

2.02 BAR SUPPORTS

- A. Bar support shall be concrete or metal chairs, spacers or hangers. Reinforcing bars shall not be supported by forms.
- B. Bar supports shall be provided for reinforcing at slabs on grade also. No lifting of bars into place as the concrete is being poured.

2.03 TIE WIRE

- A. Tie wire shall be annealed steel wire of not less than 16-gauge.

PART 3 - EXECUTION

3.01 PLACEMENT

- A. Position reinforcement 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 (1/4") 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 cost to the Owner.
- 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.

3.02 SPLICES

- A. Splice bars only at locations shown on the drawings. Where splices are not detailed, lap bars using a Class B lap as defined in ACI 318 and stagger adjacent splices 48 bar diameters minimum unless otherwise noted.

3.03 CLEANING

- A. Remove dirt, form oil, excessive rust, cement coating from previous pours, and foreign matter that will reduce bond with concrete.

3.04 PROTECTION DURING CONCRETING

- A. Keep reinforcing steel in proper position during concrete placement.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings and foundation walls.
2. Interior Slabs-on-grade.
3. Exterior slabs-on-grade.

- B. Related Sections:

1. Section 07 11 13 - Dampproofing and Waterproofing.
2. Section 07 26 00 - Concrete Moisture Vapor Emission Control.

- C. Special Coordination Requirements: Coordinate with the work of the following sections to identify the finish flooring manufacturer's concrete slab requirements. Such requirements may be over and above the requirements of the Contract Documents and may require additional materials, means, or methods, which shall be included as part of the Work.

1. Section 09 68 16 - Sheet Carpeting.

1.03 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Samples: For vapor retarder.
- E. Certificates: Weighmaster's Certificates.

1.05 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
 1. Cementitious materials.
 2. Admixtures.
 3. Waterstops.
 4. Curing compounds.
 5. Floor and slab treatments.
 6. Bonding agents.
 7. Adhesives.
 8. Vapor retarders.
 9. Semirigid joint filler.
 10. Joint-filler strips.
 11. Repair materials.
- B. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- C. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

1.06 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:
 1. California Building Code, 2016 Edition.
 2. CCR Title 24, Part 2
 3. ACI 314-14 Building Code Requirements for Structural Concrete.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Source Quality Control: Furnish Weighmaster's Certificates for all concrete.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specifications for Structural Concrete,"
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials,"
 3. ACI 305R, "Hot Weather Concreting".
 4. ACI 306R, "Cold Weather Concreting".
 5. ACI 308R, "Standard Practice for Curing Concrete".
- F. Concrete Testing Service: Engage a qualified independent testing agency approved by DSA to perform material evaluation tests and to design concrete mixtures.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.02 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 40 for #3 bars and smaller, Grade 60 for #4 bars and larger, using deformed bars for #3 and larger.
- B. Welded Reinforcing Bars: Low-Alloy-Steel Reinforcing Bars, ASTM A 706/A 706M, deformed.
- C. Do not use reinforcement having any of the following defects:
 - 1. Bar lengths, depths, or bends exceeding the specified fabricating tolerances.
 - 2. Bends or kinks not indicated on the Drawings or required for this Work.
 - 3. Bars with cross-section reduced due to excessive rust or other causes.

2.03 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.04 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F.

- B. Normal-Weight Aggregates: ASTM C 33.
 - 1. Coarse-Aggregate Size: $\frac{3}{4}$ " nominal aggregate size at second floor slab, 1 inch nominal aggregate size all other concrete.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94 and potable.

2.05 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.06 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Products: Subject to compliance with requirements, acceptable products:
 - a. Carlisle Coatings & Waterproofing, Inc.; Blackline 400.
 - b. Fortifiber Building Systems Group; Moistop Ultra 15.
 - c. Grace Construction Products, W. R. Grace & Co.; Florprufe 120.
 - d. Insulation Solutions, Inc.; Viper VaporCheck 16.
 - e. Meadows, W. R., Inc.; Perminator 15 mil.
 - f. Raven Industries Inc.; Vapor Block 15.
 - g. Reef Industries, Inc.; Griffolyn 15 mil Green
 - h. Stego Industries, LLC; Stego Wrap 15 mil Class A.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.07 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd. when dry.

- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309.
 - 1. Shall not discolor concrete or other materials, shall not leave an oily residue upon evaporation of solvent.
 - 2. Shall afford moisture loss not greater than 0.055 grams/cm² at minimum average of 300 square feet.
 - 3. Meet State of California Air Regulation Board Solvent Emission Standards.

2.08 RELATED MATERIALS

- A. Non-shrink Grout:
 - 1. Factory premixed grout; ASTM C1107.
 - 2. Compressive strength: 5,000 psi at 28 days.
- B. Exterior Concrete Walks: Provide a capillary break consisting of 2" of clean dry sand, ASTM C33, evenly spread on top of the compacted subgrade.

2.09 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
 - 2. All concrete mix designs shall be prepared and stamped by a California registered Civil Engineer.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 15 to 20 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

- D. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings and Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days unless otherwise noted.
2. Maximum Water-Cementitious Materials Ratio: 0.55.
3. Minimum Cementitious Materials Content: 5.5 sacks of cement per cubic yard.
4. Slump Limit: 4 inches, plus or minus 1 inch.

- B. Interior Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Minimum Cementitious Materials Content: 5.5 sacks of cement per cubic yard.
4. Slump Limit: 4 inches, plus or minus 1 inch.

- C. Exterior Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.55.
3. Minimum Cementitious Materials Content: 5.5 sacks of cement per cubic yard.
4. Slump Limit: 4 inches, plus or minus 1 inch.

- D. Concrete on Metal Deck: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.55.
3. Minimum Cementitious Materials Content: 5.5 sacks of cement per cubic yard.
4. Slump Limit: 4 inches, plus or minus 1 inch.

2.11 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Construct forms tight enough to prevent loss of concrete mortar.
- D. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- E. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded. In no case shall any bolt or anchor be stabbed in place while or after the concrete is poured.
 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.03 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved **at least 70 percent of its 28-day design compressive strength**.
 2. Do not strip vertical concrete in less than 7 days.
 3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

- B. 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 agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.04 SHORES AND RESHORES

- A. Comply with ACI 318-14 and ACI 301-10 for design, installation, and removal of shoring and reshoring.
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.05 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.
 - 2. Seal all penetrations (including pipes) per manufacturer's tape.
 - 3. No penetration of the vapor barrier is allowed except for reinforcing and permanent utilities.
 - 4. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with tape.
 - 5. Do not saturate the sand cushion.
 - 6. If sand is saturated prior to placement of concrete, remove the sand and replace.
 - 7. Protect all installed moisture barrier construction from precipitation and water penetration by covering and providing positive drainage away from the moisture barrier.
 - 8. Cover slab openings and block-outs around columns to prevent water penetration of moisture barrier.

3.06 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
 - 2. Clean reinforcement and remove loose dust and mill scale, earth, oil, and other materials which reduce bond or destroy bond with concrete.

3. Position, support, and secure reinforcement against displacement by forms, construction, and the concrete placement operations. Provide metal chairs, dobies, or other aids manufactured for this purpose.
4. Place reinforcement to obtain the required concrete coverages for concrete protection.

3.07 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-inch as follows:
 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groove tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Saw cut slab as soon as surface has hardened to where it can support the equipment and operator, normally within 2 hours after finishing. Use saw which is specially designed for cutting fresh concrete, such as "Soff-Cut" or equal.
- D. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate one-half of dowel length to prevent concrete bonding to one side of joint.

3.08 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.

2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- F. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.09 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part Portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Except as may be shown otherwise on the drawings, provide the following finishes at the indicated locations.

- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
1. Apply scratch finish to surfaces that are to receive concrete floor toppings or mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.
 3. The contractor shall anticipate that grinding will be required as a result of curling or other slab defects. Grinding required to bring the slab surface into acceptable tolerances for finished flooring installation shall be included as part of the Work.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
- G. Finish at Pool Pit Area: Finish slabs below pools per pool manufacture requirements.
1. Comply with flatness and levelness tolerances as required by pool manufacture.

3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.13 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 - 6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 7. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

- b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
 8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION

SECTION 03 33 00
ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes cast-in-place architectural concrete including form facings, reinforcement accessories, concrete materials, concrete mixture design, placement procedures, and finishes pertaining to planters, seat walls, stepped seating, monument signs; stairs, etc..

1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.
- C. Formwork shop drawings.
- D. Placement schedule.
- E. Samples: For each of the following materials:
 - 1. Form-facing panel.
 - 2. Form ties.
 - 3. Form liners.
 - 4. Coarse- and fine-aggregate gradations.
 - 5. Chamfers and rustications.

1.04 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.

1.05 QUALITY ASSURANCE

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5 and Section 6, "Architectural Concrete."
 - 2. ACI 303.1, "Specification for Cast-in-Place Architectural Concrete."

- B. Field Sample Panels: After approval of verification sample and before casting architectural concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, cast vertically, approximately 48 by 48 by 6 inches minimum, to demonstrate the expected range of finish, color, and texture variations.
- C. Mockups: Before casting architectural concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

- A. General: Comply with Section 03 30 00 - Cast-in-Place Concrete for formwork and other form-facing material requirements.
- B. Form-Facing Panels for As-Cast Finishes: Steel, glass-fiber-reinforced plastic, or other approved nonabsorptive panel materials that will provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- C. Form Liners: Units of face design, texture, arrangement, and configuration indicated. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent surface treatments of concrete.
- D. Rustication Strips: Metal, rigid plastic, or dressed wood with sides beveled and back kerfed; nonstaining; in longest practicable lengths.
- E. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch, minimum; nonstaining; in longest practicable lengths.
- F. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch thick.
- G. Form Ties: Factory-fabricated, removable ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

2.02 STEEL REINFORCEMENT AND ACCESSORIES

- A. General: Comply with Section 03 30 00 - Cast-in-Place Concrete for steel reinforcement and other requirements for reinforcement accessories.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place; manufacture according to CRSI's "Manual of Standard Practice."

1. Where legs of wire bar supports contact forms, use CRSI Class 1, gray, plastic-protected bar supports.

2.03 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 1. Portland Cement: ASTM C 150, Type I.
 - a. Fly Ash: ASTM C 618, Class C.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or Grade 120.
 - c. Silica Fume: ASTM C 1240, amorphous silica.
 2. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag Type IP, portland-pozzolan Type IPM), pozzolan-modified portland Type ISM), slag-modified portland cement.
- B. Normal-Weight Aggregates: ASTM C 33, Class 5S Class 5M Class 1N coarse aggregate or better, graded. Provide aggregates from single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 1. Maximum Coarse-Aggregate Size: 1/2 inch.
 2. Gradation: Uniformly graded.
- C. Normal-Weight Fine Aggregate: ASTM C 33 or ASTM C 144, manufactured or natural sand, from same source for entire Project.
- D. Water: Potable, complying with ASTM C 94/C 94M except free of wash water from mixer washout operations.

2.04 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

- C. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.

2.05 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
 - 1. For integrally colored concrete, curing compound shall be pigmented type approved by color pigment manufacturer.
 - 2. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

2.06 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed design mixtures based on laboratory trial mixtures.
- B. Proportion concrete mixtures as follows:
 - 1. Compressive Strength(28 Days): 4000 psi.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.46.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: 5-1/2 Insert number percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
 - 5. Air Content: 6 Insert number percent, plus or minus 1.5 percent at point of delivery for 1-inch 3/4-inch nominal maximum aggregate size.
- C. Cementitious Materials: For cast-in-place architectural concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
- D. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.07 CONCRETE MIXING

- A. Ready-Mixed Architectural Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
 - 1. Clean equipment used to mix and deliver cast-in-place architectural concrete to prevent contamination from other concrete.
 - 2. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMWORK

- A. General: Comply with Section 03 30 00 - Cast-in-Place Concrete for formwork, embedded items, and shoring and reshoring.
- B. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.
- C. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place architectural concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch.
- D. Fabricate forms to result in cast-in-place architectural concrete that complies with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- E. Chamfer exterior corners and edges of cast-in-place architectural concrete.
- F. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- G. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- H. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting. Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and form liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

3.02 REINFORCEMENT AND INSERTS

- A. General: Comply with Section 03 30 00 - Cast-in-Place Concrete for fabricating and installing steel reinforcement. Securely fasten steel reinforcement and wire ties against shifting during concrete placement.
- B. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.03 REMOVING AND REUSING FORMS

- A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Cut off and grind glass-fiber-reinforced plastic form ties flush with surface of concrete.
- B. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of 28-day design compressive strength. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place architectural concrete surfaces.

3.04 JOINTS

- A. Construction Joints: Install construction joints true to line with faces perpendicular to surface plane of cast-in-place architectural concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
- B. Contraction Joints: Form weakened-plane contraction joints true to line with faces perpendicular to surface plane of cast-in-place architectural concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

3.05 CONCRETE PLACEMENT

- A. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- B. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.
- C. Cold-Weather Placement: Comply with ACI 306.1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- D. Hot-Weather Placement: Comply with ACI 301.

3.06 FINISHES

- A. Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.
 - 1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.
- C. Maintain uniformity of special finishes over construction joints unless otherwise indicated.
- D. Form-Liner Finish: Produce a textured surface free of pockets, streaks, and honeycombs, and of uniform appearance, color, and texture.
- E. Scrubbed Finish: After concrete has achieved a compressive strength of from 1000 to 1500 psi, apply scrubbed finish. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed. Rinse scrubbed surfaces with clean water. Maintain continuity of finish on each surface or area of Work. Remove only enough concrete mortar from surfaces to match design reference sample or mockup.
- F. High-Pressure Water-Jet Finish: Perform high-pressure water jetting on concrete that has achieved a minimum compressive strength of 4500 psi. Coordinate with formwork removal to ensure that surfaces to be high-pressure water-jet finished are treated at same age for uniform results.
- G. Abrasive-Blast Finish: 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.
 - 1. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match design reference sample or mockup, as follows:
 - a. Brush: Remove cement matrix to dull surface sheen and expose face of fine aggregate; with no significant reveal.
 - b. Light: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color; with maximum reveal of 1/16 inch.
 - c. Medium: Generally expose coarse aggregate; with slight reveal, a maximum of 1/4 inch.
 - d. Heavy: Expose and reveal coarse aggregate to a maximum projection of one-third its diameter; with reveal range of 1/4 to 1/2 inch.
- H. Bushhammer Finish: Allow concrete to cure at least 14 days before starting bushhammer surface finish operations.

1. Surface Continuity: Perform bushhammer finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances of cut as shown on Drawings or to match design reference sample or mockup.
2. Surface Cut: Maintain required depth of cut and general aggregate exposure.

3.07 CONCRETE CURING

- A. Begin curing cast-in-place architectural concrete immediately after removing forms from concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:
 1. Moisture curing.
 2. Moisture-retaining-cover curing.
 3. Curing compound.

3.08 FIELD QUALITY CONTROL

- A. General: Comply with field quality-control requirements in Section 03 30 00 - Cast-in-Place Concrete.

3.09 REPAIRS, PROTECTION, AND CLEANING

- A. Repair and cure damaged finished surfaces of cast-in-place architectural concrete when approved by Architect. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
 1. Remove and replace cast-in-place architectural concrete that cannot be repaired and cured to Architect's approval.
- B. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.
- C. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.

END OF SECTION

SECTION 04 22 00
CONCRETE MASONRY UNIT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Concrete masonry units (CMU's).
 2. Decorative concrete masonry units.
 3. Pre-faced concrete masonry units.
 4. Steel reinforcing bars.
 5. Masonry-cell insulation.
- B. Scope within project:
1. Free-standing CMU site fences.

1.02 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.
 2. Mortar Test (Property Specification): For each mix required, according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 3. Mortar Test (Property Specification): For each mix required, according to ASTM C 780 for compressive strength.
 4. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
- C. Samples: For each type and color of exposed masonry unit and colored mortar.

1.04 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product indicated. For masonry units include material test reports substantiating compliance with requirements.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.05 QUALITY ASSURANCE

- A. Comply with CBC 2010 Edition, CCR Title 24 Part 2, DSA IR 21-2 for High Lift Grouting Method, and DSA IR 21-4 for Concrete Masonry Unit Standards.
- B. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- C. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 01 40 00 - Quality Requirements for mockups.
 - 1. Build sample panels for typical exterior and interior walls in sizes approximately 48 inches long by 48 inches high by full thickness.

1.06 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.01 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing

according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.02 CONCRETE MASONRY UNITS

- A. Regional Materials: CMUs shall be manufactured within 500 miles of Project site from aggregates that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- B. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- C. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength 1900 psi.
 - 2. Density Classification: Lightweight unless otherwise indicated.

2.03 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Aggregate for mortar and grout shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- E. Masonry Cement: ASTM C 91.
- F. Mortar Cement: ASTM C 1329.
- G. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
- H. Aggregate for Mortar: ASTM C 144.
 - 1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 2. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- I. Aggregate for Grout: ASTM C 404.

- J. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
1. Products: Subject to compliance with requirements, [available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Euclid Chemical Company (The); Accelguard 80.
 - b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
 - c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.
- K. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs, containing integral water repellent by same manufacturer.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ACM Chemistries, Inc.; RainBloc for Mortar.
 - b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
 - c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
- L. Water: Potable.

2.04 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

2.05 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Anchor Bolts: Headed steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.06 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent.

- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.07 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use Portland cement-lime mortar unless otherwise indicated.
 - 3. For exterior masonry, use Portland cement-lime mortar.
 - 4. For reinforced masonry, use Portland cement-lime mortar.
 - 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
 - 6. Use admixture of the type that reduces early water loss to the masonry units and produces an expansive action I the plastic grout sufficient to offset initial shrinkage and promote bonding of the grout to all interior surfaces of the masonry units. (Sika grout aid or approved equal).
- B. Grout Strength: Grout shall attain a minimum compressive strength of 2,000 psi at 28 days, and test specimens shall be prepared according to ASTM C 1019.
- C. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- D. Mortar for Unit Masonry: Comply with ASTM C 270, [Proportion] [Property] Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For masonry below grade or in contact with earth, use Type S.
 - 2. For reinforced masonry, use Type S.

PART 3 - EXECUTION

3.01 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.

2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.02 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- G. Fill all cores in hollow CMUs with grout.

3.03 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- E. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

3.04 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
- B. Inspections: Special Inspections and tests of masonry construction shall be performed in accordance with the quality assurance program requirements of TMS 402-13/ACI 530-13/ASCE 5-13, as set forth in Table 3.1.3 Level C requirements and TMS 602-13/ACI 530.1-13/ASCE 6-13.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.05 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 2. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.06 MASONRY WASTE DISPOSAL

- A. Masonry Waste: Remove masonry waste and legally dispose of off Owner's property.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:

1. Structural steel.
2. Field-installed shear connectors.
3. Grout.

- B. Related Sections:

1. Section 05 12 13 - Architecturally Exposed Structural Steel Framing for additional requirements for architecturally exposed structural steel.
2. Section 05 31 00 - Steel Decking for field installation of shear connectors through deck.
3. Section 01 40 00 - Quality Requirements for independent testing agency procedures and administrative requirements.
4. Section 05 31 00 - Steel Decking
5. Section 05 50 00 - Metal Fabrications for other metal items not defined as structural steel.
6. Section 09 91 23 - Painting

1.03 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303-10, "Code of Standard Practice for Steel Buildings and Bridges."

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. 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.

4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.

1.05 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- C. Mill test reports for structural steel, including chemical and physical properties.
- D. Product Test Reports: For the following:
 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength bolt-nut-washer assemblies.
 4. Shop primers.
 5. Nonshrink grout.

1.06 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- B. Comply with applicable provisions of the following specifications and documents:
 1. AISC 303-10.
 2. AISC 341-10 and AISC 341s1-11.
 3. AISC 360-10.
 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 5. California Building Code, 2016 Edition
 6. CCR Title 24 Part 2

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.08 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M unless otherwise noted on details.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Grade B.
 1. Weight Class: As indicated on the Drawings.
- F. Welding Electrodes: Comply with AWS requirements.

2.02 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

- B. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating.
 - 2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.
- C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Plain
- D. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- E. Unheaded Anchor Rods: ASTM F 1554, Grade 36 unless otherwise noted, straight.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 4. Finish: Plain
- F. Headed Anchor Rods: ASTM F 1554, Grade 36 unless otherwise noted, straight.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 4. Finish: Plain
- G. Threaded Rods: ASTM A 36 unless otherwise noted.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 3. Finish: Plain
- H. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

2.03 PRIMER

- A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Primer: Zinc Chromate. Primer selected shall be compatible with finish coats of paint. Coordinate selection of metal primer to be compatible with actual finish

paint. Comply with California Air Resources Boards and Environmental Protection Agency Rules.

- C. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20, ASTM A 780.

2.04 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.05 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
1. Camber structural-steel members where indicated.
 2. Fabricate beams with rolling camber up.
 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 4. Mark and match-mark materials for field assembly.
 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.06 EXPOSED STRUCTURAL STEEL

- A. Exposed Structural Steel: All structural steel exposed to view shall meet the following requirements:
1. All structural members exposed to view shall be straight and free of dents or other blemishes. The fabricator shall use special care to avoid bending, twisting, or otherwise distorting members during delivery.
 2. Members shall be plumb, level, and aligned to tolerances permitted for structural steel per AISC standards.
 3. Curved sections shall be bent to form smooth curves and shall be free of wrinkles, buckling, or other deformations. Fabricator shall increase member thickness as required to assure proper appearance.
 4. Member ends shall be notched and fitted as required for proper fit-up and welding.
 5. Provide $\frac{1}{4}$ " flush fitting end caps at exposed ends of hollow members. Weld all around with partial pen butt weld and grind smooth.
 6. All welds shall be smooth and uniform. Grinding is not required except where clearances or fit of other components may necessitate, or when specifically shown on drawings or specified in these notes.
 7. The fabricator has the option to select which welds need to be field welds for erection purposes unless specifically shown on Drawings. All field welds shall be clearly shown on the shop drawings and will require the approval of the Structural Engineer.
 8. Remove all temporary erection bolts. Fill holes with weld metal and grind smooth.
 9. Fill holes in over-sized slots with weld metal and grind smooth.
 10. Grind all corners and edges of connection plates to provide straight smooth edges with eased corners.

2.07 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.08 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field welded.

3. Surfaces to be high-strength bolted with slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.09 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
1. Liquid Penetrant Inspection: ASTM E 165.
 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 3. Ultrasonic Inspection: ASTM E 164.
 4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION**3.01 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 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.

3.03 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of base plate where indicated.
 - 3. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect and Structural Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.04 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified on the Drawings.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.06 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 09 91 23 - Painting.

END OF SECTION

SECTION 05 31 00**STEEL DECKING****PART 1 - GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SUMMARY**A. Section Includes:**

1. Roof deck.
2. Acoustical roof deck.
3. Cellular roof deck.
4. Acoustical cellular roof deck.
5. Composite floor deck.
6. Electrified cellular floor deck.
7. Noncomposite form deck.
8. Noncomposite vented form deck.

B. Related Requirements:

1. Section 03 30 00 - Cast-in-Place Concrete for normal-weight and lightweight structural concrete fill over steel deck.
2. Section 05 12 00 - Structural Steel Framing for shop- and field-welded shear connectors.
3. Section 05 50 00 - Metal Fabrications for framing deck openings with miscellaneous steel shapes.
4. Section 09 91 23 - Painting for repair painting of primed deck and finish painting of deck.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.04 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

- B. Product Certificates: For each type of steel deck.

- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - 1. Power-actuated mechanical fasteners.
 - 2. Acoustical roof deck.
- D. Evaluation Reports: For steel deck.
- E. Field quality-control reports.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL's "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.
- D. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
 - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

- C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than **25** percent.
- D. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.02 ROOF DECK

- A. Manufacturers: The basis for design is Verco Manufacturing Co. Any substitution shall be subject to the approval of SEOR and DSA. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Verco Manufacturing Co.
- B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 80 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard color or as specified by Architect.
 - 2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 50, G60 zinc coating.
 - 3. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 50, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard color or as specified by Architect.
 - 4. Aluminum-Zinc-Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Structural Steel (SS), Grade 50 minimum, AZ50 aluminum-zinc-alloy coating.
 - 5. Deck Profile: As indicated on drawings.
 - 6. Cellular Deck Profile: As indicated on drawings.
 - 7. Profile Depth: As indicated on drawings
 - 8. Design Uncoated-Steel Thickness: As indicated on drawings
 - 9. Span Condition: As indicated on drawings
 - 10. Side Laps: As indicated on drawings

2.03 COMPOSITE FLOOR DECK

- A. Manufacturers: The basis for design is Verco Manufacturing Co. Any substitution shall be subject to the approval of SEOR and DSA. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. Verco Manufacturing Co.
- B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 50, G50 zinc coating.
 2. Profile Depth: As indicated on structural drawings.
 3. Design Uncoated-Steel Thickness: As indicated on structural drawings.
 4. Span Condition: As indicated on structural drawings.

2.04 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile as shown on structural details.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- J. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch- wide flanges and level recessed pans of 2-inch minimum depth. For drains, cut holes in the field.

- L. Galvanizing Repair Paint: ASTM A 780.
- M. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
 - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.03 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
 - 1. Weld Diameter: 1 inch nominal (1/2" min effective).
 - 2. Weld Spacing: Weld edge and interior ribs of deck units as indicated on structural drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated on structural drawings.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches, with end joints as follows:
 - 1. End Joints: As indicated on structural drawings.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.
- G. Sound-Absorbing Insulation: Installation into topside ribs of deck per manufacturer's specifications.

3.04 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 - 1. Weld Diameter: 1 inch, nominal (1/2" min effective).
 - 2. Weld Spacing: Weld edge ribs of panels at each support as indicated on structural drawings. .
 - 3. Weld Spacing: Space and locate welds as indicated on structural drawings.
- B. Side-Lap and Perimeter Edge Fastening: Space and locate welds as indicated on structural drawings.

- C. Retain acceptable fastening method(s) from subparagraphs below. Welding may be mandatory for diaphragm deck. Revise fastening requirements as required.
- D. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches with end joints as follows:
 - 1. End Joints: As shown on structural drawings.
 - 2. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency acceptable to DSA to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to the Owner, Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.06 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on top surface of prime-painted deck immediately after installation, and apply repair paint.
 - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
- C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 09 91 23 - Painting.
- D. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 40 00
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Interior non-load-bearing wall framing.
 2. Exterior non-load-bearing wall framing.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. Shop Drawings:
1. Not required. Comply with details and sizes shown on structural drawings.

1.03 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product test reports.
- D. Research reports.

1.04 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- C. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

PART 2 - PRODUCTS**2.01 MANUFACTURERS**

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AllSteel & Gypsum Products, Inc.
2. California Expanded Metal Products Company.
3. ClarkWestern Building Systems, Inc.
4. Consolidated Fabricators Corp.; Building Products Division.
5. Craco Mfg., Inc.
6. Custom Stud Inc.
7. Design Shapes in Steel.
8. Dietrich Metal Framing; a Worthington Industries company.
9. Formetal Co. Inc. (The).
10. MarinoWARE.
11. MBA Building Supplies, Inc.
12. Nuconsteel; a Nucor Company.
13. Olmar Supply, Inc.
14. Quail Run Building Materials, Inc.
15. SCAFCO Corporation.
16. Southeastern Stud & Components, Inc.
17. State Building Products, Inc.
18. Steel Construction Systems.
19. Steel Network, Inc. (The).
20. Steel Structural Systems.
21. Steeler, Inc.
22. Super Stud Building Products, Inc.
23. Telling Industries, LLC.
24. United Metal Products, Inc.
25. United Steel Manufacturing.

2.02 PERFORMANCE REQUIREMENTS

- A. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.03 COLD-FORMED STEEL FRAMING, GENERAL

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
1. Grade: As shown on structural drawings.

2. Coating: G60 or equivalent.
- B. Steel Sheet for [Vertical Deflection] [Drift] Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
1. Grade: As required by structural performance.
 2. Coating: G60

2.04 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As indicated on structural drawings.
 2. Flange Width: As indicated on structural drawings.
 3. Section Properties: As indicated on structural drawings.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs and with minimum 1-1/2" flanges unless otherwise noted.
- C. Vertical Deflection Clips: Manufacturer's standard clips as specified on structural drawings, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AllSteel & Gypsum Products, Inc.
 - b. ClarkWestern Building Systems, Inc.
 - c. Dietrich Metal Framing; a Worthington Industries company.
 - d. MarinoWARE.
 - e. SCAFCO Corporation.
 - f. Steel Network, Inc. (The).
 - g. Steeler, Inc.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.
- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of

primary structure through positive mechanical attachment to stud web and structure.

2.05 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration.

2.06 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.07 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.

- D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.02 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
- D. Install framing members in one-piece lengths.
- E. 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.
- F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- G. Install insulation, specified in Section 07 21 10 - Thermal Batt 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.
- H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

- I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 1. 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.

3.03 NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 1. Install single deep-leg deflection tracks and anchor to building structure.
 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 3. Connect vertical deflection clips to studs and anchor to building structure.
 4. Connect drift clips to cold-formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows as indicated on structural drawings but not more than 48 inches apart when flanges are not laterally braced by finishes. Fasten at each stud intersection.
 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - a. Install solid blocking at spacing indicated on structural drawings.
 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.04 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.05 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Prefabricated building column covers.
3. Shelf angles.
4. Metal ladders.
5. Ladder safety cages.
6. Metal floor plate and supports.
7. Elevator pit sump covers.
8. Metal bollards.
9. Abrasive metal nosings thresholds.
10. Loose bearing and leveling plates.
11. Site fencing and gates (u.o.n.)

B. Products furnished, but not installed, under this Section include the following:

1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.02 ACTION SUBMITTALS

A. Product Data per the General Conditions - Submittal Procedures: For the following:

1. Prefabricated building columns.
2. Metal nosings and treads.
3. Paint products.
4. Grout.
5. Metal ladders
6. Ladder safety cages
7. Metal bollards
8. Site fencing and gates

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

C. Samples for Verification: For each type and finish of extruded stair nosing.

PART 2 - PRODUCTS

2.01 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- F. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- G. Steel Pipe: ASTM A 53/A 53M, Standard Weight Schedule 40) unless otherwise indicated.
- H. Zinc-Coated Steel Wire Rope: ASTM A 741.
 - 1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- I. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- J. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- K. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- L. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- M. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500(extruded architectural bronze).
- N. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (lead red brass) or No. C84400(lead semi-red brass).
- O. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600(20 percent lead nickel bronze).

2.02 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633

or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
 2. Provide stainless-steel fasteners for fastening stainless steel.
 3. Provide stainless-steel fasteners for fastening nickel silver.
 4. Provide bronze fasteners for fastening bronze.
- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- D. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.03 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. Weld corners and seams continuously to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

- F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches from ends and corners of units and 24 inches o.c.

2.04 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.05 PREFABRICATED BUILDING COLUMN COVERS

- A. Manufacturers: Basis of Design: Products specified are those as manufactured by COMPOSITEcore, a Div. Doralco Architectural Metals; 5919 W. 118th Street, Alsip, IL 60803; Phone: 888-443-6725; Fax: 708-388-9392; Web Site: www.doralco.com. Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other manufacturers are acceptable. The Architect will be the sole judge of the basis of what is equivalent.
 - 1. Acceptable manufacturers are Fry Integral. Substitutions: If the Contractor desires to make substitutions of materials, comply with requirements specified in Section 01 25 00 – Substitution Procedures.
- B. Aluminum: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required.
 - 1. Aluminum Extrusions: ASTM B 221/B 221M, Alloy 6063-T5, 0.125 inch) minimum thickness.
 - 2. Aluminum Sheet: ASTM B 209/B 209M, Alloy 5005.
- C. Form column covers from sheet metal of type and thickness indicated. Incorporate reveals, trim, concealed anchors, etc., for attachment to columns or adjacent construction as indicated. Provide units of size and configuration shown. Column covers shall be formed in shape shown on the Drawings, with reveals, joints, etc., as shown on the Drawings. Include structural supports and anchorages as required. Factory assembles units complete, ready for field installation.
 - 1. Aluminum Column Cover System:
 - 2. System: "Series 3000," 1/2 inch wet joint.
 - 3. System: "Series 3500," 3/4 inch wet joint.
 - 4. System: "Series 4000," 1/2 inch) metal filler channel joint flush or recessed).
 - 5. System: "Series 4500," 3/4 inch) metal filler channel joint flush or recessed).
 - 6. System: "Series 5000," key slot hairline joint.

7. Material: Aluminum sheet, Alloy 3003, 0.125 inch) thick.
8. Material: Aluminum sheet, Alloy 5005, 0.125 inch) thick.
9. Aluminum Finish, Alloy 3003: Factory baked-on PVDF finish, applied per AAMA standards, free of scratches and blemishes.
 - a. Provide color to match the Architect's sample, or, if no sample, as selected by the Architect from manufacturer's standard choices for color and gloss.
 - b. Aluminum Finish, Alloy 5005: Anodized finish, applied per AAMA standards, free of scratches and blemishes.
 - c. Provide color to match the Architect's sample, or, if no sample, as selected by the Architect from manufacturer's standard choices for color and gloss.
 - d. Fabrication: Column covers shall be fabricated on press breaks and roll-forming equipment as shapes require. Maximum column cover piece length shall be 10 feet. Column covers shall be available in a 15 inch minimum diameter. Provide solid aluminum materials to allow for forming techniques on curves, 3D profiles, and difficult transitions without unsightly splices or joints.
- D. Each course shall be fabricated in two or more vertical sections typically halves with joints as indicated on the Drawings but not greater than 3/4 inch. Fold back ends of sheet metal to form a 1 inch wide return leg on the concealed side.
- E. Bump forming of column cover will not be permitted unless prior written acceptance of the Architect.
- F. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise damaging the work.
- G. Provide straps, plates, and brackets as required for support and anchorage of fabricated items.
- H. Form column cover work to required shapes and sizes, with true curves, lines, and angles. Provide components in sizes and profiles indicated.
- I. Coordinate dimensions and attachment methods of formed metal fabrications with those of adjoining products and construction to produce integrated assemblies with closely fitting joints, and edges and surfaces aligned with one another in relationship indicated.

2.06 METAL LADDERS

- A. General:
 1. Comply with ANSI A14.3, except for elevator pit ladders.
 2. For elevator pit ladders, comply with ASME A17.1/CSA B44.
- B. Steel Ladders:
 1. Space siderails 18 inches apart unless otherwise indicated.

2. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 1-inch- diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung.
6. Galvanize exterior ladders, including brackets.
7. Prime interior ladders, including brackets and fasteners, with primer specified in Section 09 91 23 - Painting.

2.07 LADDER SAFETY CAGES

- A. Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or with stainless-steel fasteners.
- B. Provide primary hoops at tops and bottoms of cages and spaced not more than 20 feet o.c. Provide secondary intermediate hoops spaced not more than 48 inches o.c. between primary hoops.
- C. Galvanize exterior steel ladder safety cages, including brackets and fasteners.
- D. Prime interior steel ladder safety cages, including brackets and fasteners, with primer specified in Section 09 91 23 - Painting.

2.08 ELEVATOR PIT SUMP COVERS

- A. Fabricate from 1/8-inch-rolled-steel floor plate with four 1-inch- diameter holes for water drainage and for lifting.

2.09 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 80 steel pipe 1/4-inch wall-thickness steel shapes, as indicated.
 1. Cap bollards with 1/4-inch- thick steel plate.
- B. Fabricate sleeves for bollard anchorage from steel pipe or tubing with 1/4-inch-thick steel plate welded to bottom of sleeve.
- C. Prime bollards with zinc-rich primer.

2.10 ABRASIVE METAL NOSINGS

- A. Extruded Units: Aluminum, with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ACL Industries, Inc.
 - b. American Safety Tread Co., Inc.
 - c. Amstep Products.

- d. Armstrong Products, Inc.
 - e. Balco, Inc.
 - f. Granite State Casting Co.
 - g. Wooster Products Inc.
2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.
- B. Drill for mechanical anchors and countersink. Locate holes not more than 4 inches from ends and not more than 12 inches o.c.
 - C. Apply bituminous paint to concealed surfaces of cast-metal units.
 - D. Apply clear lacquer to concealed surfaces of extruded units.

2.11 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.02 INSTALLING METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
- B. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink grout.
- C. Anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- D. Fill bollards solidly with concrete, mounding top surface to shed water.

3.03 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION

SECTION 05 52 00**METAL RAILINGS****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Wall mounted handrails.
- B. Stair railings and guardrails.
- C. Free-standing railings at steps.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00: Cast-In-Place Concrete: Placement of anchors in concrete.
- B. Section 06 10 00: Rough Carpentry: Wood handrail.
- C. Section 09 21 16: Gypsum Board Assemblies: Placement of backing plates in stud wall construction.
- D. Section 09 91 00: Painting: Paint finish.
- E. Section 07 90 00: Joint Protection

1.03 REFERENCE STANDARDS

- A. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.
- B. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2003a.
- C. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2001 (Reapproved 2005).
- D. ASTM E 935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- E. ASTM E 985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); The Society for Protective Coatings; 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures.

- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- C. Samples: Submit two, 6 inch long samples of handrail. Submit two samples of elbow, wall bracket, and end stop.

PART 2 - PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E 985 and applicable local code.
- B. Design railing assembly, wall rails, and attachments to resist lateral force of 75 lbs at any point without damage or permanent set. Test in accordance with ASTM E 935.
- C. Allow for expansion and contraction of members and building movement without damage to connections or members.
- D. Dimensions: See drawings for configurations and heights.
 - 1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
 - 2. Intermediate Rails: 3/8 inches thick by 2 inches wide.
 - 3. Posts: 1-1/2 inches diameter, round.
 - 4. Wire Fabric Cloth: 3/16 inch diameter wire at 3 inches on center both ways.
- E. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
 - 2. For anchorage to stud walls, provide backing plates, for bolting anchors.
 - 3. Posts: Provide adjustable flanged brackets.
- F. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.
- G. Steel Tube: ASTM A 500, Grade B cold-formed structural tubing.
- H. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- I. Galvanizing: In accordance with requirements of ASTM A 123/A 123M. All exterior rails shall be galvanized.
 - 1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I -

Inorganic.

- J. Stainless Steel: All interior rails shall be brushed stainless steel tubing, ASTM A , Type 304.

2.02 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
 - 1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion. Use these holes for dipping. Do not drill additional holes that will be visible once installed.
 - 2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
 - 3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Anchor railings securely to structure.

- D. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.
- E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

3.05 SCHEDULE

- A. See drawings.

END OF SECTION

SECTION 05 73 00
DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes Pre-engineered Circum™ stainless steel Railing System. All drawings, General Conditions including Division 01 specifications apply to this section.

1.02 PRODUCT REFERENCES AND DESIGN REQUIREMENTS

- A. Principle items specified in this section are:
1. Stainless steel perforated, woven or welded infill panels.
- B. Design requirements are based on IBC/IRC and ADA standards:
1. Guardrails and handrails shall meet or exceed all applicable building codes.
 2. Railings shall have high strength stainless steel to comply with structural requirements with an appropriate safety margin.
 3. All internal members shall be stainless steel, aluminum or nylon to eliminate the possibility of rust.
 4. Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- C. Work Included
1. Provide all materials, labor and equipment necessary to fabricate and completely install handrails, guardrails, infill panels, and other railing options as shows on drawings or specific herein.
- D. Definitions
1. Terms and definitions from ASTM E985 and ISO/TC 59 for railing related items apply to this section.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

- A. Railings shall meet or exceed the requirements of all applicable building codes.
- B. Railings shall have high strength stainless steel in order to comply with 1.41 with adequate safety margin.
- C. All internal members shall be stainless steel, nylon or wood to eliminate the possibility of rust.

- D. Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.04 SUBMITTALS

- A. Shop Drawings for architectural approval, showing fabrication and installation of handrails and railings including plans, elevations, sections, details of components and attachments to other units of work per Spec Section 01 33 00 - Submittal Procedures.
- B. Product data for stainless steel/wood products to be supplied by the manufacturer.
- C. Structural computations or test data/evaluations, material properties, PE (professional engineering) calculations signed/sealed in the State of the project, and other information needed to ensure satisfactory structural compliance to applicable building codes to be supplied by the manufacture, based on final fabrication drawings and documents.
- D. Maintenance instructions: Provide manufacturer's maintenance and cleaning instructions.
- E. Warranty: Provide manufacturer's warranty effective from completion of work.
- F. Initial selection
 - 1. Provide 6" long handrail samples complete with supports and rosette covers to demonstrate stainless steel grade and finish. Nylon components to be includes if specified, color as indicated.
- G. Final verification
 - 1. Qualification data for authorized installers specified in Quality Assurance is to demonstrate their capabilities and experience. Include list of completed projects with project and architect names.
- H. Quality Assurance
 - 1. Single Source Responsibility: Materials shall be supplied and installed by one manufacturer.
 - a. Execution tolerance plus/minus 5/64".
- I. Storage
 - 1. Store handrails and railing systems in clean, dry location, away from uncured concrete and masonry, protected against damage of any kind.
 - 2. Materials must be kept in original packing until installation.
 - 3. Materials to be stored at not lower than -40°C (-104°F) or higher than 100°C (212°F).

1.05 PROJECT CONDITIONS

1. All measurements for handrails and railings should be taken from construction site elements to which railings are to fasten. This information to be recorded on final shop drawings.
2. Coordinate fabrication schedule with construction progress to avoid delay of work

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Specification is based on HDI Railing Systems, 3905 Continental Drive, Columbia PA 17512 (Tel: 717-285-4088 Fax 717-285-5083). Regionally based employee installers. Regional Sales Manager contact: Linda Savoie Mobile 310.968.4551 LSavoie@Hdirailings.com Other acceptable manufacturers are Livers Bronze or equal. All substitutions shall be per Spec Section 01 25 00 - Substitution Procedures.
- B. Materials for Guardrails and Handrail System
- C. All rails and other tubular components shall be constructed using the following:
 1. Stainless steel grade UNS 1.4305, type 304; surface to be 240 grain/grit finish; tubes 1-1/2" (38mm) outside diameter by 5/64" (2 mm) wall thickness.
- D. All posts and other components shall be constructed using the following:
 1. Stainless steel grade UNS 1.4305, type 304, surface to be 240 grain/grit finish; tubes 1.9" diameter by 0.14" wall thickness.
 2. Stainless steel grade UNS 1.4305, type 304, surface to be 240 grain/grit finish for: end caps at top of posts. Hardware for handrail attachment to match finish of posts.
- E. Stainless steel grade UNS 1.4305, type 304, surface to be 240 grain/grit (#6) finish for post fastening base plate
- F. Fastening bolts to be stainless steel or other high strength material as determined by engineering requirements.
- G. Exterior and aggressive environments require stainless steel grade 316 or 316L to minimize maintenance requirement; surface to be 240 grain/grit (#6) finish.

2.02 STAINLESS PERFORATED METAL INFILL PANELS

- A. Stainless steel perforated metal infill panels with continuous frame by HDI Railing Systems. Installed post centers are required complete with sketch, to allow panel fabrication.

- B. Standard pattern to be 3/8" square holes on 1/2" centers surrounded by a continuous 3/8" x 1.5" 304 SS rectangular tube frame with hairline joints. Grain is 240 grit and polished longitudinally to the mitre cuts.

2.03 FASTENERS

- A. Anchors shall be fabricated from stainless steel or other materials as determined by engineering requirements with capability to sustain, without failure, load imposed within a safety factor of 4, as determined by testing per ASTM E488.

2.04 2.5 FABRICATION

- A. Fabricate railing system for compliance with structural requirements of applicable code.
- B. Pre-assemble railings prior to shipping to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
- C. Clearly mark units for re-assembly and for coordination with shop drawings.
- D. Stainless steel tubing cuts shall be square, without burrs and where exposed, rounded to produce smooth rigid and hairline joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that reinforcement and anchoring devices are the correct type, have been located correctly, and have been installed properly.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Provide information on fastening point locations for posts where necessary to relevant parties.

3.03 INSTALLATION

- A. Installation shall be by HDI Railing Systems or a qualified, authorized representative of the manufacturer
 1. Installation must be in accordance with standard or non-standard, yet applicable details (instructions) included on installation/shop drawings provided by HDI Railing Systems.
 2. Install components plumb and in-line, accurately fitted, free from distortion or defects and securely anchored to structure.

3. Provide anchors, plates, angles, etc., necessary for connecting railings to structure.
4. Any and all field welding shall be by a certified welder.
5. Access for anchors that require through bolting either vertically or horizontally to be made available through General Contractor.
6. Erection tolerances
 - a. Maximum variation from plumb shall be 1/4".
7. Maximum offset from true alignment for every 50-foot of railing shall be 1/4", non-accumulative.

3.04 CLEANING AND PROTECTION

- A. Remove manufacturer's protective coverings from exposed surfaces after installation.
- B. Railings shall be cleaned, including infill panels, by contractor to the satisfaction of the owner.
- C. Wipe with moistened cloth only. Do not use cleaning agents with abrasive or acid/alkaline content.
- D. General contractor to provide protective covering on handrails and guardrails if construction is not yet finished in the area where the railings are installed.
- E. Railings shall be cleaned, including infill panels, by contractor to the satisfaction of the owner.
- F. Wipe with moistened cloth only. Do not use cleaning agents with abrasive or acid/alkaline content.

3.05 COREECTION OF DEFICIENCIES

- A. All deficiencies in work and/or items not meeting specified requirements shall be corrected in order to meet specification requirements at no additional cost to owner.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Included: Provide all rough carpentry including all wood, nails, bolts, screws, framing, anchors and other rough hardware, and all other items needed for rough and finish carpentry in this work, but not specifically described in other sections of these specifications.
- B. Scope Within Project:
 - 1. Stage
 - 2. Equipment platforms
- C. Related Requirements:
 - 1. 03 30 00 - Cast In Place Concrete
 - 2. 06 20 00 - Finish Carpentry
 - 3. 06 40 00 - Architectural Woodwork

1.02 QUALITY ASSURANCE

- A. Codes and Standards: Comply with all pertinent provisions of the following codes and standards:
 - 1. Federal Specifications (Fed. Spec.)
 - a. FF-B-561C Bolts, (Screw), Lag
 - b. FF-B-588C(1) Bolt, Toggle: and Expansion Sleeve, Screw
 - c. FF-N-105B(3) Nails, Brads, Staples, Spikes, Wire, Cut and Wrought
 - d. FF-P-395B Pin, Drive, Guided; and Pin, Drive Powder Actuated
 - e. QQ-Z-32C Zinc Coated, Electro Deposited,
- B. Requirements for:
 - 1. U.S. Department of Commerce Product Standards:
 - a. PS 1-95 Construction and Industrial Plywood
 - b. PS 20-95 American Softwood Lumber Standard
 - 2. American Society for Testing and Materials (ASTM) Publications:
 - a. A307-91 Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
 - 3. American Wood Preservers' Association (AWPA) Publication:

- a. C2-77 Standard for the Preservative Treatment of Lumber, Timber, Bridge Ties, and Mine Ties by Pressure Treatment
 - b. Standard for the Preservative Treatment of Plywood by Pressure Treatment
 - c. M4-77 Standard for the Care of Preservative Treated Wood Products
4. American Forest & Paper Association (AFPA) Publications:
- a. 2015 Edition National Design Specification for Wood Construction and Supplement, Design Values for Wood Construction (as adopted by 2016 CBC).
5. Redwood Inspection Service (RIS) Publication: Standard Specifications for Grades of California Redwood Lumber, April 1989 Edition.
6. International Conference of Building Officials (ICBO) Publication & State of California:
- a. California Building Code, 2016 Edition
7. West Coast Lumber Inspection Bureau (WCLIB) Publication: Standard Grading Rules for West Coast Lumber, No. 17, 2004 September 1, 1991 Edition (Rev. 1993)
8. Western Wood Products Association (WWPA) Publication: Standard Grading Rules for Western Lumber, 2011.
9. Title 24, Part 2, California Code of Regulations.
- C. Conflicting Requirements: In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards or these specifications, the provisions of the more stringent shall govern.
- D. Qualifications of Personnel
1. Throughout progress of the work of this section, provide at least one person thoroughly familiar with the specification requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and shall direct all work performed under this section.
 2. In actual installation of the work of this section, use adequate numbers of skilled workmen to ensure installation in accordance with the approved design and approved recommendations of the manufacturer of the material which is being installed or applied.

1.03 ACTION SUBMITTALS

- A. Retain only the most common and essential submittals and delete the rest.
- B. General: Make submittals in accordance with requirements of the General Conditions.
- C. Pneumatically-Driven Fasteners: Submit manufacturer's literature and installation instructions and one sample for review by the Architect.

- D. Framing Devices: Submit manufacturer's literature describing dimensions, materials and load carrying capacities for review by the Architect.
- E. Powder Actuated Fasteners: Submit manufacturer's literature describing installation instructions and load carrying capacity for review by the Architect.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation, and to protect the work and materials of all other trades.
- B. Replacement: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 GRADING AND MARKING

- A. Framing Lumber: Grade and grade-mark lumber in accordance with the following standards:
 - 1. Douglas Fir-Larch: WCLIB or WWP
 - 2. Redwood: RSI
 - 3. Exposed Structural Members: (Glu-Lam excepted) Manual of Millwork, Woodwork Institute of California, 2003.
 - 4. Exceptions: The provisions of WCLIB paragraph 2b and WWP Section 5.6 which permits five percent (5%) of the material to fall below grade shall not apply to structural framing members. Structural framing members which have permissible grade characteristics or defects in such combination as to affect the serviceability of the member shall be rejected.
- B. Plywood: Legibly identified with appropriate grade trademark of American Plywood Association. Plywood shall conform to requirements of Product Standard PS1-95. The outer plies of sanded or finished plywood shall be not less than 95 percent of the thickness required at the time of lay-up prior to sanding. Do not incorporate improperly or illegibly identified plywood into the work.
- C. Preservative Treated Lumber and Plywood: Each piece of preservative treated lumber or plywood shall be labeled with a permanent mark indicating conformance with the applicable AWP standard. The label shall be an approved AWP quality mark or that of an ALSC (American Lumber Standards Committee) approved independent inspection agency that maintains continuing control, testing, and inspection over the quality of the product.

2.02 MATERIALS

A. Lumber: Surfaced four sides, except when otherwise required. Sizes of surfacing of lumber shall conform to PS 20 for dressed sizes of yard and structural lumber. Sizes of framing lumber and board lumber indicated on the drawings and specified hereinafter are given by nominal sizes, unless otherwise specified or indicated. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced. To facilitate approximate equilibrium with average local atmospheric moisture conditions, lumber shall have been air seasoned for not less than 30 days, however, moisture content shall not exceed 19% when incorporated into the work. Material shall be kiln-dried when specifically noted or when customary practice requires such procedure. The following designation of materials, i.e. 'JOISTS AND PLANKS', 'POSTS AND TIMBERS', etc., is not intended to limit the use to such elements of the structure. Except as otherwise noted on the drawings, dimension lumber and boards shall be graded as specified in the following subparagraphs. Boxed heart material will not be permitted.

1. Light Framing: General Use: Douglas Fir-Larch (2" to 4" thick, 2" to 6" wide), "No. 1" - LIGHT FRAMING, Paragraph 122b WCLIB or Section 40.11 WWPA.
2. Joists and Planks: General Use: Douglas Fir-Larch (2" to 4" thick, 5" and wider), "NO. 1" STRUCTURAL JOISTS AND PLANKS, Paragraph 123b, WCLIB or Section 62.11 WWPA, except that 2X12's shall be No. 1 or better Douglas Fir-Larch.
3. Beams and Stringers: General Use: Douglas Fir-Larch (5" and thicker), "NO.1" BEAMS AND STRINGERS, Paragraph 130b, WCLIB or Section 70.11 WWPA.
4. Posts and Timbers: General Use: Douglas Fir-Larch (4"x 4" and larger), NO.1" POSTS AND TIMBERS, Paragraph 131b, WCLIB or Section 80.00 WWPA.
5. Boards: (Nominal sizes up to 1-1/2" thick, 2" and wider), "CONSTRUCTION" - BOARDS, 188b, WCLIB.
6. Sill Plates: Bearing on concrete: Douglas Fir: minimum no. 2, pressure treated,. Use No. 1 Grade if 2"x 5" or larger.

B. Plywood

1. Provide plywood in accordance with following listed uses, unless otherwise designated on drawings.
2. Each panel shall bear the appropriate symbol marking as hereinafter specified, however panel thickness, identification index or specie group shall be as required on the drawings.

2.03 TYPICAL APPLICATIONS

- A. Roof Sheathing not exposed to weather
- B. Signs, mounting panels and similar uses.
- C. Rough Hardware

1. Fasteners: Nails, spikes, screws, lag screws, nuts, bolts and similar fastenings of the types and sizes required by the drawings or as otherwise indicated, sufficient to properly draw and secure members in place. Fastenings exposed to weather, to preservative treated or fire-retardant treated lumber, and at other conditions which subject the fastenings to corrosion, shall be copper, stainless steel, hot-dip galvanized or other non-corrosive metal as indicated on the drawings or required by the specifications. In the absence of specific requirements elsewhere, the fastenings shall be hot-dip galvanized at such locations. Fastenings, not indicated or specified, shall conform to the requirements of "National Design Specification for Stress Grade Lumber and its Fastenings", of the American Forest & Paper Association
 - a. Common Nails and Spikes: Flat head, diamond point, smooth, bright, Fed. Spec. FF-N-105B.
 - b. Mechanically deformed (Annular): Threaded or ring shank, Stronghold, Independent Nail and Packing Co.
 - c. Concrete Nails: Flat countersunk head, diamond point, quench hardened steel.
 - d. Finishing Nails: Brad head, diamond point, smooth or mechanically deformed, Fed. Spec. FF-N-105B.
 - e. Wood Screws: Fed. Spec. FF-S-111D.
 - f. Bolts and Nuts: Steel machine bolts and nuts, ASTM A-307.
 - g. Lag Screws: Fed. Spec. FF-B-561C.
 - h. Toggle Bolts: Fed. Spec. FF-B-588.
2. Pneumatically Driven Fasteners: Pneumatically driven staples, nails, or allied fasteners shall be used only when reviewed by the Architect. Submit samples and manufacturer's installation instructions.
3. Plywood Joint Clips: H-shaped fastening device, extruded aluminum alloy, 1-3/16" long, 3/4" wide, to accommodate thickness of plywood required by structural drawings, Plyclip, Plywood Research Foundation, Tacoma, Washington or approved equal.
4. Framing Devices: Framing anchors, joist hangers and similar devices, Simpson Company, San Leandro, California or equivalent. All framing connectors in contact with preservative treated or fire-retardant treated lumber shall be hot dipped galvanized or coated with ZMAX (G-180) or equal.
5. Powder Actuated Fasteners: The fasteners shall have a dome shaped head, a .145 inch minimum diameter smooth shank and shall have sufficient length to penetrate the concrete 1-1/8 inches. Fasteners shall be installed with a 7/8 inch minimum diameter, 14 gage steel disc under the fastener head. Fasteners shall be manufactured from AISI 1062 or 1065 steel tempered to a minimum core hardness of 50 to 57 Rockwell hardness and shall possess the following minimum properties:
 - a. Tensile Strength = 270,000 psi
 - b. Shear Strength = 162,000 psi

6. The fasteners shall be zinc plated with a minimum thickness of .003 inches then zinc chromate passivated. Fasteners shall meet requirements of Fed. Spec. FF-P-395B and QQ-Z-325C, Type II, Class 3.
- D. Adhesive: Contact adhesive, Fed. Spec. MMM-A-130B.
- E. Mortar Bedding of Sill Plates
1. Dry-Pack Mortar: One part Portland cement to 2 parts fine sand.
 2. Non-Shrink Mortar: Ready to use metallic aggregate product requiring only the addition of water at the job site. Product shall have the following characteristics.
 - a. Be capable of producing mortar bed material having no drying shrinkage or settlement at any age.
 - b. Compressive strength of mortar (2" cubes) shall be not less than 5,000 psi at age seven days and 7,500 psi at age 28 days.
- F. Bridging: Use one of the following:
1. Two crossed wood pieces, 2" x 3" minimum size.
 2. Full depth 2" thick solid blocking.
 3. Approved metal cross bridging.
- G. Other Materials: All other materials not specifically described, but required for complete and proper performance of the work as indicated on the drawings shall be new, suitable for intended use, and subject to review of the Architect.

2.04 RE-USE OF MATERIALS

- A. Wood products previously used on this project for forming or other temporary uses may be incorporated into the work as concealed blocking, backing, or similar miscellaneous uses when the material has been cleaned, is equivalent in all respects to new material and has been reviewed by the Architect.

2.05 PRESERVATIVE TREATMENT

- A. Pressure Treatment: Wood framing and plywood shall be pressure treated with a preservative when used under the following conditions:
1. Foundation plates or sills and sleepers on a concrete slab which is in direct contact with earth.
 2. Sills which rest on concrete or masonry foundations.
 3. Wood in direct contact with earth.
 4. Posts or columns placed directly on concrete or masonry.
 5. Wood nailers embedded in concrete or masonry.
- B. Preservatives
1. Treatment shall conform to AWPB C-2 for lumber and AWPA C-9 for plywood.

C. Field Handling

1. Handle treated lumber and treat penetration damage in accordance with AWWA M-4.
2. When treating lumber or plywood with a water borne salt, dry to a moisture content of 19% or less after treatment.

2.06 FIRE RETARDANT TREATMENT

- A. Fire Retardant Treatment: Wood framing and plywood (as indicated in drawings) shall be treated with Pyro-Guard as manufactured by Hoover Treated Wood Products or approved equal.
- B. Requirements:
1. Treated wood shall have a flame spread rating of 25 or less (Class A) and a smoke developed index of 450 or less when tested in accordance with ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Burning Materials"
 2. Structural performance of fire retardant wood shall meet requirements of ASTM D5664 for lumber. ASTM D 5516 and ASTM D 6305 for plywood.
 3. Treated wood used in structural applications shall be installed in accordance with ESR-1791.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 WORKMANSHIP

- A. General: Carpentry work shall produce joints true, plumb, level, tight and well nailed, or fastened as indicated, with all members assembled in accordance with the drawings and with all pertinent codes and regulations.

3.03 FRAMING

- A. General
1. In addition to all framing operations customary to fabrication and erection indicated on the drawings, install all backing required for work of other trades.
 2. Do not shim sills, joists, short studs, trimmers, headers, lintels, or other framing components.
 3. Set all horizontal or sloped members with crown up.
 4. Do not splice individual framing members between supports.

B. Bearings

1. Make all bearing full unless otherwise indicated on the Drawings.
2. Finish all bearing surfaces on which structural members are to rest so as to provide positive and even support. Where framing members slope, cut or notch as required to provide uniform bearing surface.
3. Provide solid blocking for joists and rafters at all bearings.

C. Notching and Boring

1. Do not notch, bore, or cut members for pipes, ducts, conduits for other reasons except as shown on the Drawings or as specifically reviewed in advance by the Architect.

D. Blocking

1. Install all blocking required to support all items of finish and to cut-off all concealed draft openings, both vertical and horizontal.
2. Fire-blocking, when of wood, shall be two inches (nominal) in thickness by the full width of the opening being blocked.
3. Fire-block in the following specific locations:
 - a. In all stud walls at ceiling and floor levels.
 - b. In all stud walls, including stud spaces, so that the maximum dimension of each concealed space is not more than eight feet.
 - c. All other location where openings could afford passage for rodents or flames.

E. Bridging

1. Required Locations
 - a. In roof rafter and ceiling joist spans where the depth of the member is more than 8" deep and the spacing is 32" or less.
 - b. In floor joist spans where the member is more than 4" deep.
2. Spacing: The spacing between adjacent bridging members and between the bearing and a bridging member shall not exceed the following:

MEMBER	MAXIMUM SPACING
Roof Rafters	8'-0"
Ceiling Joists	8'-0"
3. Place bridging at midspan where only one set of bridging is required.
4. Installation: The lower ends of the cross bridging shall be driven up and nailed after the roof has been nailed.

- F. Sill Plates: Sill plates bearing on concrete or masonry shall be accurately aligned and leveled to the required elevation shall be completely bedded in 1/2 inch Portland cement mortar, except for non-bearing walls on true and level floors, so as to obtain a. Plates shall be secured with anchor bolts in accordance with the

structural details. Washers shall be placed between the plate and the nut. Nuts shall be tightened immediately prior to becoming inaccessible.

G. Stud Walls and Partitions

1. Studs: Make all studs single length, unspliced.
2. Corners and Intersections: Unless otherwise indicated on the Drawings, frame all corners and intersections with three or more studs and all required bearing for wall finish.
3. Spacing: Unless otherwise noted, studs shall be spaced 16" o.c.

3.04 INSTALLATION OF WOOD PANEL SHEATHING

A. General

1. Protect all sheathing from moisture by use of waterproof coverings until the plywood has in turn been covered so as to be protected.
2. Install in accordance with the requirements of the drawings and notations thereon.
3. Allow 1/16 inch spacing at panel ends and 1/8 inch spacing at panel edges.
4. Install sheathing joints to be centered on its supporting members.

B. Roof Sheathing

1. Install with face grain perpendicular to supports and continuous over two or more spans with end joints staggered.
2. No panel less than 24 inches wide shall be used.

C. Wall Sheathing

1. Wall sheathing may be installed either horizontally or vertically. Stagger end joints.
2. Wood blocking shall be provided at horizontal joints not otherwise supported.
3. No panel less than 12 inches wide shall be used.

3.05 FASTENING

A. Nailing

1. Use only common wire nails or spikes of the size required.
2. The use of machine nailing for plywood is subject to a satisfactory jobsite demonstration review by the Architect. Approval is subject to continued satisfactory performance. If requirements for nailhead penetration and nail edge distance requirements are not met, machine nailing shall be discontinued and the Architect and Structural Engineer notified of the non-conforming work.
3. Nails in sheathing shall not be overdriven to the extent that nailheads penetrate the face ply more than the thickness of the nail head.

4. The spacing center to center of nails shall not be less than the required penetration. Edge or end distances shall not be less than one-half the required penetration. The required penetration is 10 nail diameters for Douglas-Fir lumber.
 5. Do all nailing without splitting the wood. Prebore to a diameter smaller than the nail when required to avoid splitting. Replace all split members.
 6. Prebored holes will be required for all nails 20d and larger; or where nailing tends to split the wood.
- B. Bolting: Drill holes 1/16 inches larger in diameter than the bolts being used. Drill straight and true from one side only. Bolts shall be provided with plate washers or malleable iron washers. All nuts shall be turned up and made tight at the time of installation and again immediately before being enclosed with other fixed materials or at the completion of the job. Edges of square washers used at exposed locations shall be installed level and plumb.
- C. Lag-Screws
1. The threaded portion of the lag screw shall be inserted into its lead hole by turning with a wrench.
 2. Soap or other lubricant shall be used on the screw or in the lead hole to facilitate insertion and prevent damage to the screw.
 3. The lead hole for the shank shall have the same diameter as the shank, and the same depth as the unthreaded shank.
 4. The lead hole for the threaded portion shall have a diameter equal to 60 to 75 percent (use larger figure for larger bolts) of the shank diameter and a length equal to at least the length of the threaded portion.
 5. Washers shall be provided under the heads of lag screws that bear on wood.
- D. Wood Screws:
1. The screw shall be inserted in the lead hole by turning with a screwdriver or other tool, not by driving with a hammer.
 2. The lead hole shall have a diameter of about 70 percent of the root diameter of the screw.
- E. Powder-Actuated Fasteners: When used for the attachment of non-bearing, non-shear wall plates to concrete, the fasteners shall not be installed closer than 3 inches from the edge of the concrete nor shall they be spaced closer than 4 inches. Do not use to install plates to the top of concrete curbs nor where a cold joint is made between the slab and foundation below. Install in accordance with low velocity powder actuated tools in accordance with manufacturer's recommendation

3.06 INSTALLATION OF BUILDING PAPER

- A. Install the specified building paper over all exterior framing members where plywood siding, masonry, or stucco is indicated to be installed, lapping all joints to prevent penetration of water into the stud spaces, and securely fastening the paper in place in accordance with the manufacturer's published

recommendations, but in no case less than two inch horizontal laps and six inch vertical laps.

3.07 INSTALLATION OF WOOD DOORS

- A. Prior to installation of each door, carefully inspect the door and verify:
1. That the door furnished is the proper door for the opening, as scheduled and/or specified.
 2. That the door is in sound condition, unblemished, without warp, twist, bow or similar conditions.
- B. Trim doors as necessary to provide a uniform clearance between 1/8 inch at jambs and head, and a uniform clearance at the threshold or floor to properly clear the scheduled floor finish.
- C. For each door, verify the hardware type as described in the Door Schedule and verify that the hardware actually supplied is the hardware specified. Using only the specified hinges or butts, and proper equipment for the purpose, install the door into the opening with the following hinge and butt locations throughout the work:
1. Top hinge or butt: The center of the hinge or butt not more than 11" below the top of the door;
 2. Bottom hinge or butt: The center of the hinge or butt not more than 13" above the finish floor;
 3. Intermediate hinge: Equal distant between the top and butt or pivot: bottom hinge, butt, or pivot.
 4. With fine sandpaper, working only in the direction of the grain of the wood, remove all rough edges resulting from door trimming and leave the installed door in a condition to receive finish.

3.08 INSTALLATION OF OTHER FINISH HARDWARE

- A. Locations: Using only the specified hardware, and the proper equipment for the purpose, install all other finish hardware in the following locations throughout the work.
1. Armor plates: On the push side of single-acting doors & on both sides of double-acting doors;
 2. Combination push: Centered 40-5/16" above the finish floor.
 3. Door pulls on plates: Centered 40-5/16" above the finish floor.
 4. Door pulls, sectional: Centered 40-5/16" above the finish floor.
 5. Door-closing devices: Install and adjust in strict accordance with the templates and printed instructions supplied by the manufacturer of the devices. Insofar as practicable, doors opening to or from halls or corridors shall have the closer mounted on the room side of the door.
 6. Extension lever flush: In the edge of the door. Center to bolts: bolt fronts 12" from the bottom and 12" from top edge of the door.
 7. Flush cup pulls: Centered 40-5/16" above the finish floor;
 8. Key cabinet: Install where directed

9. Kick plates: On single-acting doors: with kick plate on push side. On double- acting doors: with kick plate on both sides.
 10. Mortise Deadlock: Center 60" above the finish floor strike.
 11. Knob lock and knob: Center 40-5/16" above the finish latch strikes floor.
 12. Panic bolt cross bars: Align in horizontal position with top and bottom bolts and rods aligned vertically. Install the centerline of strike 40-5/16" above the finish floor.
 13. Push bars: Centered 42" above the finish floor.
 14. Push plates: Centered 48" above the finish floor.
 15. Other hardware items: Installed as directed.
- B. Anchoring: Anchor all components firmly into position for long life under hard use. Use only the anchoring devices furnished with the hardware item, unless otherwise specifically directed.
- C. Adjustment: Adjust all operating hardware to operate properly in accordance with manufacturer's published recommendations.

3.09 WOOD TRIM

- A. Install wood trim plumb, level and true. Scribe members accurately in place, maintaining full widths of members whenever possible.
- B. Apply trim in full lengths except when single lengths would be impracticable or impossible.
- C. Bevel abutting joints. Miter exterior angles; cope interior angles.
- D. Set all nails for putty.

3.10 CASEWORK

- A. Assemble cabinets and casework in correct locations and position. Securely join each section with concealed fastenings into a continuous unit.
- B. Assemble tops in one length with joints permitted only as shown on drawings. Attach securely to casework.
- C. Scribe casework and tops to abutting surfaces.

3.11 PANELING

- A. Select paneling for uniformity of grain with similar grains adjacent to each other. Install panels symmetrically on and in full widths where conditions permit; otherwise as directed by Architect.
 1. Prefinished Panels: Secure to backing with specified contact adhesive in accordance with procedures recommended by manufacturer.
 2. Job Finished Panels: Secure to supports with finish nails spaced 4 inches on center along the joint, 3/8 inches from edge, and 8 inches on center at

intermediate bearings. Countersink nails for putty; sand resulting burr smooth. Bear panels edge on at least 1/3 the width of the support.

3.12 SPECIALTY ITEMS

- A. Install specialty items where the specified item does not include installation within the section in which the item is specified.
- B. Install in accordance with architectural details except when such details are modified by approved shop drawings or installation details. In the absence of such details, install in accordance with manufacturer's recommendations as submitted to and approved by the Architect.

3.13 CLEANING UP

- A. Keep the premises in a neat, safe and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut-ends, and debris.
- B. Do not allow any wood debris in fill or backfill at any area within the site limits.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Hardware and attachment accessories.

1.02 Related Requirements:

- A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 06 40 00 - Architectural Woodwork.
- C. Section 09 91 23 - Painting

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2006, 8th Ed., Version 2.0.
- C. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2003 (ANSI/BHMA A156.9).
- D. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2004.
- E. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.
- F. WDMA I.S.4 - Water-Repellent Preservative Non-Pressure Treatment for Millwork; Window and Door Manufacturers Association; 2007a.
- G. WI (MAN) - Manual of Millwork; Woodwork Institute; 2017.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See General Conditions - Submittal Procedures.
- B. Product Data:
 - 1. Provide instructions for attachment hardware and finish hardware.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, to a minimum scale of 1-1/2 inch to 1 ft.

1.06 QUALITY ASSURANCE

- A. Grade materials in accordance with the following:
 - 1. Lumber Grading Agency: Certified by ALSC.
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum three years of documented experience.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Protect work from moisture damage.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Unless otherwise indicated provide products of quality specified by AWI Architectural Woodwork Quality Standards Illustrated for Premium grade.
- B. Unless otherwise indicated provide products of quality specified by Woodwork Institute Manual of Millwork for Premium grade.
- C. Provide materials having fire and smoke properties as required by applicable code.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.
- B. Provide sustainably harvested wood, certified or labeled as specified in Section 01 60 00 - Product Requirements.

2.03 LUMBER MATERIALS

- A. Softwood Lumber: WIC "Custom" Grade Douglas Fir species, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

- B. Hardwood Lumber: WIC "Custom" Grade Birch species, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

2.04 SHEET MATERIALS

- A. Softwood Plywood Not Exposed to View: Any face species, veneer core; PS 1 Grade A-B; glue type as recommended for application.
- B. Softwood Plywood Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A-B; glue type as recommended for application.
- C. Particleboard: ANSI A208.1; composed of wood chips, sawdust, or flakes of medium density, made with waterproof resin binders; of grade to suit application; sanded faces.

2.05 PLASTIC LAMINATE MATERIALS

- A. Plastic Laminate: NEMA LD 3, HGS; standard color; textured, low gloss finish; manufactured by Formica, Wilsonart, Nevamar, or Pionite.
- B. Low Pressure Laminate: Melamine; white color, and low gloss surface texture.
- C. Solid Surfacing: color, pattern, and gloss surface texture to be selected by architect.
- D. Laminate Backing Sheet: NEMA LD 3, BKL; undecorated plastic laminate.

2.06 ADHESIVE

- A. Adhesive: Type recommended by laminate manufacturer to suit application.

2.07 FASTENERS

- A. Fasteners: Of size and type to suit application; stainless steel finish in concealed locations and stainless steel finish in exposed locations.
- B. Concealed Joint Fasteners: Threaded steel.

2.08 ACCESSORIES

- A. Lumber for Shimming, Blocking, and Bucks: Softwood lumber of Douglas Fir species.
- B. Plastic Edge Trim: Extruded convex shaped; smooth finish; self locking serrated tongue; of width to match component thickness; color to match adjacent surface.
- C. Aluminum Edge Trim: Extruded convex shape; smooth surface finish; self locking serrated tongue; of width to match component thickness; natural mill finish.
- D. Primer: Alkyd primer sealer.

- E. Wood Filler: Solvent base, tinted to match surface finish color.
- F. Attachment Accessories.
- G. Boxes and Trim for Recessed Components.

2.09 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.
- C. Cap exposed plastic laminate finish edges with aluminum trim.
- D. Shop prepare and identify components for book match grain matching during site erection.
- E. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- F. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
- G. Apply laminate backing sheet to reverse face of plastic laminate finished surfaces.

2.10 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- D. Finish work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Section 1500:
 - 1. Transparent: Nitrocellulose lacquer (formerly TR-1).
 - 2. Opaque: Nitrocellulose lacquer (formerly OP-1).
- E. Back prime woodwork items to be field finished, prior to installation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.
- C. See Section 06 10 00 - Rough Carpentry for installation of recessed wood blocking.

3.02 INSTALLATION

- A. Set and secure materials and components in place, plumb and level.
- B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- C. Install components with nails at spacing suitable for application.
- D. Install prefinished paneling with full bed contact adhesive applied to substrate.
- E. Install hardware supplied by Section 06 40 00 – Architectural Woodwork in accordance with manufacturer's instructions.

3.03 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply one coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

3.04 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 91 23 - Painting.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.05 ERECTION TOLERANCES

- A. Maximum Variation from True Position.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

3.06 SCHEDULE

- A. Exterior:
 - 1. Enclosing Structural Members: Softwood lumber; "PT" preservative treat.

2. Enclosing Soffit Spaces: As detailed.

B. Interior:

1. Window Sills: White birch; prepare for paint finish.
2. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.
3. Chair Rails: Clear white pine, prepare for transparent finish
4. Loose Shelving: Birch plywood; prepare for paint finish.

END OF SECTION

SECTION 06 40 00
ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. Work Included: Provide all architectural woodwork shown and/or noted on the drawings, included in the specifications or reasonably there from. Refer to Manual of Millwork, Section 2.
- B. Related Work Described Elsewhere:
 - 1. Section 06 10 00 - Rough Carpentry

1.02 ACTION SUBMITTALS

- A. Product Data: Within 30 days after award of Contract, submit:
 - 1. Sufficient data to demonstrate compliance with specified requirements.
 - 2. Shop Drawings showing each of the items to be provided under this Section, completely detailing joinery and other construction, including anchorage, and with respect to casework, displaying the "Certificate of Compliance" of the Wood Work Institute for the grade specified.
 - 3. Samples of the proposed woods to be used.

1.03 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.
- B. Qualifications of Installers: use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Certification: In addition to complying with all pertinent codes and regulations, comply with the "Manual of Millwork" of the Woodwork Institute of California, 1978 for the grades specified. Provide certification on Shop Drawings and on each item of casework signifying such compliance.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Refer to Manual of Millwork, Woodwork Institute of California for requirements in addition to those included below.

2.02 LAMINATED PLASTIC CASEWORK

- A. Fabricate in accordance with Section 15 of the Manual of Millwork, except as modified herein:

1. WIC Grade:	Custom and/or Premium at casework with visible interiors.
2. Type:	Type 1.
3. Construction:	Style A-Frameless.
4. Joinery:	Doweled or rabbited.
5. Cabinet Backs:	Required for all casework. (Dadoed Detail 2C and 7C, "Millwork Manual").
6. Cabinet Door Type:	Type "A". Type "B" for glass.
7. Shelves:	Per WIC Section 25A; 3/4-inch minimum; 1 inch thickness for spans 30" or greater. Facings shall be in addition to these thicknesses. (Shelf spans in excess of 4 foot not permitted).
8. Plastic Laminate:	
a. Exposed surfaces (including shelves and interior of open front cabinets):	.028-inch high-pressure plastic laminate, color and pattern selected by District. A maximum of 5 colors and patterns to be selected.
b. Semi-exposed surfaces (behind doors and inside drawers):	Low-pressure decorative polyester or melamine laminates ALA-85.
9. Shelf edge bands:	1mm PVC or PL on front edge. Color to match shelf. Metal edge bands at Music Room and Instrument Storage Rooms
10. Door and Drawer Edge Bands:	3mm PVC radiused 1/8" at edge. Solid color as selected by District.
11. Security Dust Panels:	Plywood, 3/4" thick at all lockable drawers.
12. Base:	4" high with 3" toe kick. At ADA cabinets, use PF Toe Kick by Sunbelt Plastic
a. Finish	Plastic Laminate or Burke Top set per District specifications.

- B. Plastic Laminates approved for use:

1. Nevamar®
2. Wilsonart®

3. Laminart®

C. Chemical resistant laminate:

1. At all cabinets in contact w/ epoxy resin counters only (u.o.n.)
2. Color: See Plans
3. Products approved for use: WA(Chemsurf) or Formica(ChemTop)

2.03 CASEWORK FINISH HARDWARE

- A. All casework shall be totally finished in the fabricators shop including the provision and installation of all required hardware. Hardware shall be as scheduled herein, or equal, with exposed surfaces to match the door hardware finishes in the room or area where casework is installed. The following schedule lists a standard of quality for all typical hardware items, some of which may not be required for this project. Shop drawings shall include hardware schedules. All casework hardware to comply with reach ranges (11B-308) and operable parts (11B-309).

1. Cabinet Hinge: Blum Nickel finish # 71T5550 Clip Top 120° Hinge Straight-Arm, Self Closing, Screw on with the Blum # B175H7100 Mounting Plate.
2. Cabinet Door Lock: CompX National C8 Series.
3. Cabinet Drawer Lock: CompX National C8 Series.
4. The above locks to be master keyed as directed by the owner.
5. Cabinet Door Latch System:
 - a. Magnetic Catch: KV-916 (KV-918 on wardrobe doors).
 - b. Friction Catch: 2120 FlexaCatch by Bainbridge.
 - c. Slide Bolt: Surface Bolt by Quality Hardware.
6. Drawer Suspension:
 - a. Blum White #230M5500 Standard 230M Drawer Runners, Complete, for 22" drawers..
7. Door Pulls – Amerock 24017-SN
8. Drawer Pulls – Amerock 24018-SN
9. Shelf Standards:
 - a. KV255 flush mount with KV256R supports.
 - b. Provide earthquake pins in back row.
10. Glass Door Lock:
 - a. KV 965 (opening size under 16 square ft.).
 - b. National C-8140 Pin Tumbler (opening size 16 square ft. or larger).
11. Sliding Glass Door Track:

- a. KV 1092 (opening size under 16 square ft.).
 - b. KVP-992 roll easy (opening size 16 square ft. or larger).
12. Support (Glass Shelves): KV #256-R or LD-KV348.
 13. Sliding Glass Door Pull: KV #831 or Mepla 70.1.
 14. Counter Top Hinge--Soss #204.
 15. Articulating keyboard shelf slides in and out, raises and lowers 5-3/4" and tilts ± 15 degrees. Keyboard shelf swivels 360 degrees and slides under the desk on a 18" track. Includes fabric covered padded wrist rest.
 - a. Slide-out mouse tray attached to keyboard shelf and slides out to the left or right.

2.04 LAMINATED PLASTIC COUNTER TOPS

A. Fabricate in accordance with Section 16 of the Manual of Millwork:

1. WIC Grade:	Premium.
2. Core Material:	.75-inch minimum. Industrial Grade Particle Board.
3. Plastic Laminate:	.050 inch Formica Color Core, matte finish or equivalent.
4. Adhesives:	Use manufacturer's recommended adhesives. Use clear types where glue lines will be exposed.
5. Backing Sheet:	Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
6. Fastenings:	Fasten countertops with concealed clips, screws, glue blocks or similar hidden fastenings in accordance with the "Architectural Woodwork Institute's Quality Standards for Premium Grade".
7. Standard Cabinet:	
a. Edge Covering:	3mm PVC.
b. Backsplash:	Square Butt (glued and screwed to tops).
c. Top of Backsplash:	Square self-edge.
8. Sink Cabinets:	
a. Core Material:	.075 min. Industrial Grade Particle Board.
b. Backsplash:	Coved.
c. Top of Backsplash:	Square self-edge or 1mm PVC.
d. Edge Covering:	No drip
e. Joints:	No joints permitted through

	sink openings or other locations where water is used.
f. Sink Opening Sealer:	At sink openings, seal cut edges with a penetrating sealer similar to WoodLife.
9. Plastic Colors and Pattern:	As selected from the manufacture's standard color range, 2 colors minimum, 12 colors maximum.

2.05 SPECIALTY COUNTERTOPS

A. Epoxy Resin Countertops at Five (5) Science Labs with adjacent Prep Rooms

1. Manufacturer: Durcon (or approved equal)
2. Core thickness: 1 inch
3. Edge: Radius $\frac{1}{4}$ inch with drip groove
4. Backsplash: Coved splash joint
5. Color: See Plans
6. Provide Chemical resistant laminate at all cabinets in contact w/ epoxy resin counters. Plastic laminate cabinets elsewhere.
7. Epoxy sinks:
 - a. Description: Integrally molded from modified thermosetting epoxy resin, and oven cured. Nominal wall thickness of $\frac{1}{2}$ inch (12mm) with all interior corners coved to 1- $\frac{1}{2}$ inch (36mm) radius and bottoms pitched to the outlet opening.
 - b. Drop-in Sinks; Provide as indicated below:
 - 1) Sinks shall be installed such that the top edge of the sink is positioned $\frac{1}{8}$ " below the work surface with a 45 degree slope from the top of the work surface to the top of the sink lip. The sink joint shall not exceed $\frac{1}{8}$ " plus or minus $\frac{1}{16}$ ".
 - 2) Sealant: Join work surface and sinks with a 2 part epoxy grout having similar chemical resistance and strength properties as the work surface itself.
 - 3) Sink drains will be positioned per manufacturer's drawings.
 - 4) Sink installed by Division 15.
 - 5) Sink color: to match countertop
 - 6) Sink outlets shall accommodate a plastic disc strainer. Provide outlet with 1.93" outlet opening and open-end overflow standpipe. Outlet flange to be sloped and radiused to the opening for proper outlet drainage. Overflow to be at least 2" shorter than depth of sink. Installation and traps by division 15.
 - c. Epoxy Sink schedule:

ERS-1: Tiered Sink (ADA Compliant)
Model: # A26

- ERS-2: Size: 18"x15"x5"/11"
Sink (ADA Compliant)
Model: # A25
Size: 18"x15"x5"
- ERS-3: Double Sink
Models: # D15
Sizes: 16"x12"x8" (Rotate 90 degrees)
Provide 1" work surface strip between sinks
- ERS-4: Double Sink (ADA Compliant)
Models: # A07
Sizes: 14"x14"x5"
Provide 1" work surface strip between sinks
- ERS-5: Tub Sink w/ Dual Drainboards
Model: # D59
Size: 28"x15"x11.8"
Drain Top: #456
Drain Tops to have backsplash to match adjacent counter

B. Chemical Resistant Laminate Countertops at Art Lab & Tech Lab with adjacent Prep Rooms.

1. Grade 25, pcstforming
2. Backsplash: 5/16" cove
3. Edge: no drip
4. Color: See Plans
5. Products approved for use: WA(Chemsurf) or Formica(ChemTop)
6. Casework to be plastic laminate.

C. Stainless Steel Countertops, refer to section 11 40 00 – Foodservice Equipment.

2.06 FABRICATION - CASEWORK:

A. WIC Casework Grade:

1. Laminated plastic covered modular casework, Deluxe Grade, flush overlay.
2. Laminated plastic tops. Custom Grade.

B. Types of Casework Units: Various types of units required are typically identified by a WIC model number. Furnish unit with all standard features, plus any modifications shown. Where not identified by model number, furnish unit as detailed and/or constructed similar to standard unit it most closely resembles. Furnish numbers of units shown (see drawings); typically, combinations of equal dimension modules.

C. Closures: Fabricate cabinets to close tight to abutting construction and other Cabinets, including closing the voids where cabinets on adjacent walls meet in corners.

- D. Locks: Provide where indicated. Mount in specified pulls.
- E. Doors and Hinges: Cabinet construction and door hinges shall permit doors to swing 270° whenever possible.
- F. Holes and Cutouts for Related Work of Other Sections: Verify exact sizes and locations, prior to fabrication.
- G. Coordinate with owner/ architect for grommets locations required for counters and desks. Plan for approximately every 36" for bid purposes.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine building surfaces, mechanical and electrical rough-ins, and other related work for proper dimension and alignment.
- B. Do not start work until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Layout locations accurately. Install any stripping or furring required for casework attachment.
- B. Field cut openings as required to accept and/or match related work of other Sections.
- C. Install Chemistry Lab accessories at Chemistry Lab Instructors desk described in Specification Section 11 62 00 - Miscellaneous Lab Specialties, 2.00 D Support Rod Assemblies.

3.03 INSTALLATION

A. Casework

1. Install by factory trained representatives. Conform to WIC Standards typically, except where shown or specified otherwise.
2. General:
 - a. Install plumb and level, without racking or distortion.
 - b. Install continuous cabinet base and anchor to floor.
 - c. Set cabinets on base.
 - d. Shim as necessary with concealed shims.
 - e. Securely anchor in place to base and abutting construction to withstand strain of usage, to conform to OSA requirements, and as indicated.
 - f. Prebore typically for attaching screws and nails, countersink flush typically.
 - g. Scribe fit casework and filler strips to irregularities of walls, ceilings, windows and other abutting work; no scribe moldings.

ARCHITECTURAL WOODWORK

06 40 00 - 7

SECTION 06 41 16**LAMINATED PLASTIC CASEWORK****PART 1 – GENERAL****1.01 REFERENCE:**

- A. Requirements in Addenda, Alternates, Conditions, and Division 1 collectively apply to this work.

1.02 DESCRIPTION:**A. Principal Work Items Are:**

- 1. All Educational Casework.
 - a. Fixed base and upper cabinets.
 - b. Tall cabinets.
 - c. Open shelving units.
 - d. Movable casework on casters.
 - e. Countertops: Plastic laminate.
 - f. Applied items: Tackboard and mirrors.
 - g. Lavatory counter(s), including supports.
 - h. Wall shelving, standards, and brackets.
- 2. Definition Educational Casework: Factory-finished modular casework, plastic laminate surfaces typical, indicated on drawings.

B. Related Work Specified Elsewhere:

- 1. Wall Construction: Respective Sections.
- 2. Mill-Built Casework and certain wall shelving: Section 06410, Custom Casework.
- 3. Resilient base at fixed casework: Section 09660, Resilient Flooring.
- 4. Plumbing: Division 15.
- 5. Electrical: Division 16.

1.03 SUBSTITUTIONS:

- A. Only written approval of the District will permit substitutions for material specified. Refer to Section 00700, Article 30, Substitutions, for procedure.

1.04 QUALITY ASSURANCE:

- A. Standards: Work shall conform to following standards as applicable, and as modified herein: Woodwork Institute of California (WIC) "Manual of Millwork", latest edition, with addenda.

- B. Grade Stamp: WIC Conformance grade stamp is required on each casework piece and countertop.
- C. The Contractor shall employ an independent Inspector approved by the Woodwork Institute of California (NIC) to certify construction and installation of all casework for conformance to drawings, Specifications and WIC Standards.

1.05 SUBMITTALS:

- A. Samples, Materials: Submit in duplicate.
 - 1. Plastic laminates.
 - 2. Finishes.
 - 3. Vinyl wall covering for tackboard.
- B. Shop Drawings:
 - 1. Submit for all work.
 - 2. Shop drawings to show WIC grade for each piece, and construction details of approved cabinets.
 - 3. Shop drawings to show holes and cutouts for plumbing, electrical, and related work of other Sections.
 - 4. Where groups of cabinets occur, provide a continuous drawing and developed elevation showing each unit in group.
- C. Certificate: WIC Conformance certificate is required. Deliver with casework.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Delivery: Do not deliver until buildings are closed-in from weather; concrete and plaster are dry.
- B. Storage: Immediately upon delivery, store in clean, dry, well-ventilated building areas, out of direct sunlight. Set cabinetwork on level floors.
- C. Handling: Protect and handle members in a manner to keep them clean, unmarked, undamaged, and prevent discoloration by sun or weather. Use extra care with exposed wood surfaces having natural or stained finishes.

1.07 JOB CONDITIONS:

- A. Sequencing, Scheduling:
 - 1. Verify dimensions in field.
 - 2. Obtain and work from templates whenever possible.
 - 3. Coordinate with related work of other Sections. Verify exact size and location of holes in casework for plumbing fixtures, electrical outlets, intercom, signal systems, telephones and other penetrations with respective trade.

1.08 GUARANTEE:

- A. Reference: Refer to Section 01 77 00, Closeout Procedures.
- B. The Contractor shall guarantee all work for a two-year period.

PART 2 - PRODUCTS

2.01 LAMINATED PLASTIC CASEWORK:

- A. Fabricate in accordance with Section 15 of the Manual of Millwork, except as modified herein:

1. WIC Grade:	Custom and/or Premium at casework with visible interiors.
2. Type:	Type 1.
3. Construction:	Style A-Frameless.
4. Joinery:	Doweled or rabbited.
5. Cabinet Backs:	Required for all casework. (Dadoed Detail 2C and 7C, "Millwork Manual").
6. Cabinet Door Type:	Type "A". Type "B" for glass.
7. Shelves:	Per WIC Section 25A; 3/4-inch minimum; 1 inch thickness for spans 30" or greater. Facings shall be in addition to these thicknesses. (Shelf spans in excess of 4 foot not permitted).
8. Plastic Laminate:	
a. Exposed surfaces (including shelves and interior of open front cabinets):	.028-inch high-pressure plastic laminate, color and pattern selected by District. A maximum of 5 colors and patterns to be selected.
b. Semi-exposed surfaces (behind doors and inside drawers):	Low-pressure decorative polyester or melamine laminates ALA-85.
9. Shelf edge bands:	1mm PVC or PL on front edge. Color to match shelf.
10. Door and Drawer Edge Bands:	3mm PVC radiused 1/8" at edge. Solid color as selected by District.
11. Security Dust Panels:	Plywood, 3/4" thick at all lockable drawers.
12. Base:	4" high with 3" toe kick.
a. Finish	Plastic Laminate or match casework.

B. Plastic Laminates approved for use:

1. Nevamar®
2. Wilsonart®
3. Formica®

2.02 CASEWORK FINISH HARDWARE:

A. All casework shall be totally finished in the fabricators shop including the provision and installation of all required hardware. Hardware shall be as scheduled herein, or equal, with exposed surfaces to match the door hardware finishes in the room or area where casework is installed. The following schedule lists a standard of quality for all typical hardware items, some of which may not be required for this project. Shop drawings shall include hardware schedules.

1. Cabinet Hinge: Rockford RP-851 2 3/4 5 knuckle.
2. Cabinet Door Lock: National C-8173-915KA-26D pin tumbler.
3. Cabinet Drawer Lock: National C-8178-915KA-26D pin tumbler.
4. Cabinet Door Latch System:
 - a. Magnetic Catch: KV-916 (KV-918 on wardrobe doors).
 - b. Friction Catch: 2120 FlexaCatch by Bainbridge.
 - c. Slide Bolt: Surface Bolt by Quality Hardware.
5. Drawer Suspension:
 - a. Grass 6610, 100 lb.
 - b. Blum Metabox 3/4 Extension, 75 lb. Dynamic, 100 lb. Static.
6. Drawer and Door Pulls: Amerock BP-867 Steel Wire type (3 1/2" & 4" specified sizes).
7. Shelf Standards:
 - a. LD 32mm line boring system 5mm steel pins (shelving under 36" wide).
 - b. KV255 with KV256 supports (shelving 36" and over).
 - c. Provide earthquake pins in back row or notch shelf.
8. Glass Door Lock:
 - a. KV 965 (opening size under 16 square ft.).
 - b. National C-8140 Pin Tumbler (opening size 16 square ft. or larger).
9. Sliding Glass Door Track:
 - a. KV 1092 (opening size under 16 square ft.).
 - b. KVP-992 roll easy (opening size 16 square ft. or larger).

10. Support (Glass Shelves): KV #256-R or LD-KV348.
11. Sliding Glass Door Pull: KV #831 or Mepla 70.1.
12. Counter Top Hinge--Soss #204.

2.03 LAMINATED PLASTIC COUNTER TOPS:

A. Fabricate in accordance with Section 16 of the Manual of Millwork:

1. WIC Grade:	Premium.
2. Core Material:	.75-inch minimum. Industrial Grade Particle Board.
3. Plastic Laminate:	.050 inch Formica Color Core, matte finish or equivalent.
4. Adhesives:	Use manufacturer's recommended adhesives. Use clear types where glue lines will be exposed.
5. Backing Sheet:	Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
6. Fastenings:	Fasten countertops with concealed clips, screws, glue blocks or similar hidden fastenings in accordance with the "Architectural Woodwork Institute's Quality Standards for Premium Grade".
7. Standard Cabinet:	
a. Edge Covering:	3mm PVC.
b. Backsplash:	Square Butt (glued and screwed to tops).
c. Top of Backsplash:	Square self-edge.
8. Sink Cabinets.	
a. Core Material:	.075 min. Industrial Grade Particle Board.
b. Backsplash:	Coved.
c. Top of Backsplash:	Square self-edge or 1mm PVC.
d. Edge Covering:	No drip
e. Joints:	No joints permitted through sink openings or other locations where water is used.
f. Sink Opening Sealer:	At sink openings, seal cut edges with a penetrating sealer similar to WoodLife.

9. Plastic Colors and Pattern:	As selected from the manufacture's standard color range, 2 colors minimum, 12 colors maximum.
--------------------------------	---

2.04 FABRICATION; CASEWORK:

- A. WIC Casework Grade:
1. Laminated plastic covered modular casework, Deluxe Grade, flush overlay.
 2. Laminated plastic tops. Custom Grade.
- B. Types of Casework Units: Various types of units required are typically identified by a WIC model number. Furnish unit with all standard features, plus any modifications shown. Where not identified by model number, furnish unit as detailed and/or constructed similar to standard unit it most closely resembles. Furnish numbers of units shown (see drawings); typically, combinations of equal dimension modules.
- C. Closures: Fabricate cabinets to close tight to abutting construction and other Cabinets, including closing the voids where cabinets on adjacent walls meet in corners.
- D. Locks: Provide where indicated. Mount in specified pulls.
- E. Doors and Hinges: Cabinet construction and door hinges shall permit doors to swing 270° whenever possible.
- F. Holes and Cutouts for Related Work of Other Sections: Verify exact sizes and locations, prior to fabrication.

PART 3 - EXECUTION

3.01 INSPECTION:

- A. Examine building surfaces, mechanical and electrical rough-ins, and other related work for proper dimension and alignment.
- B. Do not start work until unsatisfactory conditions are corrected.

3.02 PREPARATION:

- A. Layout locations accurately. Install any stripping or furring required for casework attachment.
- B. Field cut openings as required to accept and/or match related work of other Sections.

3.03 INSTALLATION; CASEWORK:

- A. Install by factory trained representatives. Conform to WIC Standards typically, except where shown or specified otherwise.
- B. General:
 - 1. Install plumb and level, without racking or distortion.
 - 2. Install continuous cabinet base and anchor to floor.
 - 3. Set cabinets on base.
 - 4. Shim as necessary with concealed shims.
 - 5. Securely anchor in place to base and abutting construction to withstand strain of usage, to conform to OSA requirements, and as indicated.
 - 6. Prebore typically for attaching screws and nails, countersink flush typically.
 - 7. Scribe fit casework and filler strips to irregularities of walls, ceilings, windows and other abutting work; no scribe moldings.
 - 8. Countertops: Scribe fit tops, back splashes, and end splashes to irregularities of walls, windows, and other abutting work. Securely anchor tops to cabinet bodies.
 - 9. Adjust operating parts and hardware.
- C. Sinks:
 - 1. Cut out for sinks and faucets. Seal edges of cut-outs with penetrating wood sealer.
 - 2. Set sink rim and/or Hudee rim watertight to countertop in sealant or plumbers putty.
 - 3. Install loose backs at sink cabinets; cut accurately and fit over plumbing rough-in; and securely screw back in place.
- D. Keys: Deliver all keys, properly tagged, to District's Inspector for delivery to the District.

3.04 INSTALLATION; WALL SHELVING:

- A. Screw standards into solid backing. Screw bracket clips to shelving. Install brackets and shelving.

3.05 ADJUSTMENT AND CLEANING:

- A. Adjustment: Adjust operating parts, lubricate as required. Repair damaged surface. Install any missing parts.
- B. Cleaning: Wipe and brush surfaces clean.

END OF SECTION

SECTION 07 21 10**THERMAL BATT INSULATION****PART 1 - GENERAL****1.01 DESCRIPTION**

- A. Included: Provide building insulation and accessory materials as otherwise required by the Drawings and specified herein.
- B. Related Work in Other Sections:
 - 1. Insulation of mechanical ducts, piping and similar items.
 - 2. Rigid Insulation will be part of the Roofing Specifications.

1.02 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of insulation and with a history of successful production acceptable to the Architect.
- B. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.03 SUBMITTALS

- A. Product Data: Per the General Conditions – Submittal Procedures:
 - 1. Complete materials list showing all items proposed to be furnished and installed under this Section.
 - 2. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.

1.04 PRODUCT HANDLING

- A. Delivery and Storage:
 - 1. Deliver all packaged materials to the job site in their original unopened containers with all labels intact and legible at time of inspection.
 - 2. Store all materials in an approved manner, protecting from exposure to the elements.
- B. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.

- C. Replacements: 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.

PART 2 - PRODUCTS

2.01 BUILDING INSULATION

- A. All insulation delivered to the project shall be in original packaging indicating manufacture, insulation type and "R" value. Building insulation shall comply with California Quality Standards for insulating material.
- B. All insulation shall have a flame-spread rating not to exceed 25 and a smoke density not to exceed 450, in accordance with UBC Standard 42-1.
- C. Insulation installed where facing is exposed shall be FSK-25 type, having a flame-spread rating not to exceed 25 and a smoke density not to exceed 50, in accordance with ASTM E-84.
- D. All building fiber glass insulation shall be products of Owens/Corning Fiberglass, Manville, CertainTeed, or equal.
- E. Exterior Framed Walls: At new walls provide continuous Type 2 paper backed insulation with a minimum resistance of R-21 at 6" and R-25 at 8" studs. Where called out in drawings, install 1" thick rigid board insulation (R-4 per inch minimum)
- F. Attic Spaces: All attic spaces shall have continuous insulation of the proper type with a minimum thermal resistance value of R-21 at the walls.
- G. Batt Insulation at all roof decks will be R-38. At areas where underside of roof is exposed to view, a Post Frame Poly-Scrim-Kraft fiber glass blanket insulation is to be provided.
- H. Acoustic Insulation: All interior walls of all Offices, Conference Rooms, Classrooms, Music, Choir, Practice Rooms and Restrooms to be sound walls and shall have stud spaces filled with R-19 Quiet Batt acoustic sound insulation. See floor plans for additional sound walls that may be required. At walls adjacent to ceilings with glue on tiles, run batt insulation to roof deck. All T-Bar Ceilings to have R-11 Quiet Batt acoustic sound insulation laid on top of entire ceiling system.
- I. Insulation Fasteners: Screws and metal plates shall be Johns Manville Ultrafast Screws and Plates and tested and approved by Factory Mutual in accordance with their standard 4470 and listed in the current FM Approval Guide as such.

2.02 ACCESSORIES

- A. All other materials such as wire supports, fasteners and retainers not specifically described but required to complete the work shall be as recommended by approved manufacturer, provided and installed by the Contractor.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this section will be installed. Correct conditions detrimental to proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Except as otherwise specifically directed by Architect, install all building insulation in accordance with approved manufacturer's building insulation application instructions as approved by Architect.

3.03 VERIFICATION

- A. Upon completion of the installation in each case, visually inspect and verify that all insulation is complete and properly installed.

END OF SECTION

SECTION 07 26 00**CONCRETE MOISTURE VAPOR EMISSION CONTROL****PART 1 - GENERAL****1.01 WARRANTY**

- A. When a floor covering is installed on a below grade, on grade, or above grade concrete slab treated with Curranseal PMC3300 according to manufacturer's instruction, Curranseal shall warrant the floor covering system against failure due to moisture vapor migration or moisture-born contaminants for a period of fifteen (15) years from the date of original installation. The warranty shall cover all labor and materials needed to replace all floor covering that fails due to moisture vapor emission and moisture born contaminants.

PART 2 - PRODUCTS**2.01 MANUFACTURERS**

- A. Sealer / Hardener / Vapor Barrier / Curing Compound: PMC3300 Concrete surface treatment applied the day of the concrete pour to freshly poured concrete in lieu of other curing methods for concrete slabs either on grade, below grade or above grade receiving resilient flooring such as vinyl composition tile, sheet vinyl, carpet, sports flooring, rubber, wood flooring, epoxy coatings and overlays. ASTM C1315 Type 1 Class A, ASTM C309 Type 1 Class A, penetrating product to have no less than 25% solids content, leaving no sheen, volatile organic compound (VOC) content rating as required to suit regulatory requirements.
1. The product PMC3300 manufactured by: CURRANSEAL, P.O. Box 28508, Santa Ana, CA 92799, Phone: (714) 641-1121, Fax: (714) 641-1125, www.curranseal.com
 2. Other acceptable manufacturers are Creteseal or equal. Substitutions are considered per Spec Section 01 25 00 – Substitution Procedures. Note: Epoxy or resin type vapor systems are not equal, as they are not compatible with flooring adhesives.

PART 3 - EXECUTION

- 3.01 All floors to receive resilient flooring such as sheet vinyl, vinyl composition tile, rubber, wood flooring, carpet, epoxy coatings and overlays, shall be treated for moisture vapor emission with Concrete Surface Treatment PMC3300 Sealer / Hardener / Curing Compound. This treatment shall be applied the day of the concrete pour or as soon as harsh weather permits, prior to any other chemical treatments for concrete slabs either on grade, below grade or above grade.

- 3.02 Manufacturer technician will be on site the day of the concrete pour to install or train in application, document & return on every application thereafter to verify that proper procedures are followed.
- 3.03 Apply PMC3300 to the concrete slabs as soon as final finishing operations are complete and the concrete has hardened sufficiently to sustain foot traffic without damage. Harsh weather such as rain, snow, cold, wind, or jobsite conditions such as concrete not exposed to direct sunlight would affect the rate of concrete hydration and delay PMC3300 application until a more suitable application time permits as directed by Curranseal Technician.
- 3.04 Spray applies the PMC3300 at the rate of 200 square feet per gallon. Broom product evenly over the substrate until product has completely penetrated the surface. If within 2 hours after initial application areas are subjected to heavy rainfall and puddling occurs, reapply PMC3300 product to these areas as soon as weather condition permits.

END OF SECTION

SECTION 07 42 13
METAL WALL PANELS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Supplementary Conditions and Division 1 Specification Sections apply to this section.
- B. Scope of Work
 - 1. Insure all areas are free from defects and conform to plans and specifications.
 - 2. Mechanically attach HPR Organic Basesheet to entire wall surface.
 - 3. Install Latitude Series Wall Panel and all accessories to provide 10 year water tight warranted system.

1.02 SUMMARY

- A. This section includes pre-formed wall panel system complete with anchor clips, fasteners, flashing, and trim.
- B. Related Sections:
 - 1. Section 07 05 00 - Common Work Results for Thermal and Moisture Protection.
- C. Related Work Specified Elsewhere:
 - 1. Division 05 Section
 - 2. Division 06 Section
 - 3. Division 07 Section

1.03 REFERENCES

- A. American Iron and Steel Institute (AISI):
 - 1. Specification for the Design of Cold-Formed Steel Structural Members.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A240 Specification for Heat Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels: C.
 - 2. ASTM A792 Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
 - 3. ASTM A875 Specification for Steel Sheet, Zinc-5% Aluminum Alloy-Coated by the Hot Dip Process

4. ASTM B209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 5. ASTM B370 Specification for Copper Sheet and Strip for Building Construction
 6. ASTM E283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 7. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Air Pressure Difference
 8. ASTM E330 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference
 9. ASTM A653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed by the Hot-Dip Process.
 10. TAS 201 and 203 Specification for Missile Impact and Cyclic Air Test
 11. ASTM D1056 Specification for Flexible Cellular Materials – Sponge or Expanded Rubber
 12. ASTM D3575 Test Method for Flexible Cellular Materials Made of Olefin Polymers
 13. ASTM E1886 Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
- C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
1. Architectural Sheet Metal Manual, 5th Edition.

1.04 SUBMITTALS FOR REVIEW

- A. Shop Drawings: Show wall panels (and roofing system, if applicable) with flashings and accessories in elevations, sections and details. Include metal thickness and finishes, panel lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations. Indicate relationships with adjacent and interfacing work. Indicate fastener types and spacing; and provide fastener pullout values. Shop drawings must be completed by the wall panel manufacturer's engineering department. Any and/or all changes recommended by the successful bidder must be approved by the manufacturer in writing prior to submittal.
- B. Product Data: Include manufacturer's detailed material and system description, concealed anchor clips, sealant and closure installation instructions, and finish specifications. Indicate fastener types and spacing; and required fastener pullout values.
- C. Samples: Provide full-size samples of the following materials and system components. Samples shall be of identical material type, thickness, panel width, and material grade/alloy as the system specified for this project.
1. Submit sample of panel section, at least 4" long x full panel width showing panel profile and also a sample of color selected.

2. Submit sample of foam closure strips to fit specified panel profile.
 3. Submit sample of panel clip.
- D. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.

1.05 SUBMITTALS FOR INFORMATION

- A. Design and Test Reports: Provide the following certified test reports from an independent testing laboratory:
1. A letter from an officer of the manufacturing company certifying that the materials furnished for this project are the same as represented in tests and supporting data.
 2. Manufacturer's verifications that the panels are factory roll formed.
 3. ASTM E283 Test results must clearly demonstrate compliance with the performance requirements specified in article 1.9.ASTM E331 Test Report
 4. ASTM E330 Test results must clearly demonstrate compliance with the performance requirements specified in article 1.9.
 5. ASTM E331 Test results must clearly demonstrate compliance with the performance requirements specified in article 1.9.
- B. Mill production reports certifying that the metal thicknesses are within allowable tolerances of the nominal or minimum thickness or gauge specified.
- C. Design Loads: Submit copy of manufacturer's minimum design load calculations according to ASCE 7-10, Chapter 30 for Components and Cladding. In no case shall the design loads be taken to be less than those detailed in Design and Performance Criteria article.
- D. Qualification Data for Roofing Installer: Refer to Quality Assurance Article below.
- E. Certification of work progress inspection frequency: Refer to Quality Assurance Article below.

1.06 CONTRACT CLOSEOUT SUBMITTALS

- A. General: Comply with Requirements of Division 01 Section Closeout Submittals.
- B. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.
- C. Wall Panel Maintenance Instructions: Provide a manual of manufacturer's recommendations for maintenance of installed systems.
- D. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an Installer who has completed the Manufacturer's Approved Contractor course and is currently certified for the installation of the specified system.
- B. If required, fabricator/installer shall submit work experience and evidence of adequate financial Responsibility. The Owner's representative reserves the right to inspect fabrication facilities in determining qualifications.
- C. Source Limitations: Obtain all components of the wall panel system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the Manufacturer.
 - 1. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.
 - 2. Manufacturer shall have direct authority and control over all fabrication of steel components as well as the raw materials used in their fabrication.
- D. Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001 approval.
- E. Engage the Manufacturer's Field Representative to conduct inspections of work in progress minimum of 3 days per week as described herein and shall furnish electronic documentation of all such inspections.
- F. Manufacturer shall provide the Owner project with a written statement that they will provide a site inspection 3 days week that confirms that the project is being constructed as specified, by an experienced, full time employee of the company.
- G. Alternate Manufacturers: The following manufacturer criteria must be submitted. Alternate systems will not be considered for approval unless each of these items has been submitted for review at least 10 business days prior to bid opening:
 - 1. Submit each item listed in article 1.4 (A through E) for evaluation of the proposed system.
 - 2. Tests shall have been made for identical systems within the ranges of specified performance criteria.
 - 3. Empirical calculations for roof performance shall only be acceptable for positive loads.
 - 4. A list of a minimum of five (5) jobs where the proposed alternate material was used under similar conditions. The reference list shall include date of project, size of project, project address, and telephone number of architect/owner contact.
 - 5. A financial statement demonstrating a minimum of a 3:1 ratio of assets to liabilities.
 - 6. A written statement from the manufacturer stating that they will provide the building owner with a site inspection 2 day per week by an experienced, full time employee of the company.

7. A written statement from the manufacturer stating that they will provide the engineer of record with a site inspection 2 days per week by an experienced full-time employee of the company.
8. A written statement from a corporate officer of the manufacturing company stating that he or she has reviewed the specifications and confirms that the proposed system meets or exceeds all performance requirements listed as well as meets the panel size, gauge, weight, clip design, sealant design, and uplift pressures.
9. A copy of manufacturer's 10-year warranty. Warranty must include coverage for all trim, flashing, and penetrations associated with this roof.
10. Proof that the manufacturer has been in business for a minimum number of years equal to the warranty period required for this project.

1.08 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference approximately two (2) weeks before scheduled commencement of system installation and associated work.
- B. Require attendance of installer of each component of associated work which must precede or follow wall panel work (including mechanical or electrical work if any), Architect, Owner, system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, testing agencies and governing authorities.
- C. Objectives of conference to include:
 1. Review foreseeable methods and procedures related to work, including set up and mobilization areas for stored material and work area.
 2. Tour representative areas of building, inspect and discuss condition of substrates, penetrations and other preparatory work performed by others.
 3. Review structural loading limitations of wall framing and inspect for unacceptable variations in planarity.
 4. Review system requirements (drawings, specifications and other contract documents).
 5. Review required submittals both completed and yet to be completed.
 6. Review and finalize construction schedule related to work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 7. Review required inspection, testing, certifying and material usage accounting procedures.
 8. Review weather and forecasted weather conditions and procedures for unfavorable conditions, including possibility of temporary wall protection (if not mandatory requirement).
 9. Record discussion of conference including decisions and agreements (or disagreements) reached. Furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
 10. Review notification procedures for weather or non-working days.

- D. The Owner's Representative will designate one of the conference participants to record the proceedings and promptly distribute them to the participants for record.
- E. The intent of the conference is to resolve issues affecting the installation and performance of wall panel work. Do not proceed with work until such issues are resolved to the satisfaction of the Owner. This shall not be construed as interference with the progress of Work on the part of the Owner.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Manufacturer's Responsibilities:

- 1. All panels shall be shipped from the manufacturer with a strippable film or similar packaging material separating the individual panels to minimize flexing, stressing, scratching or otherwise damaging the material during transit to the job.
- 2. Fully cover steel with tarpaulins or similar protective cover during transit to prevent dirt and debris from coming in contact with the finished goods.

B. Installer's Responsibilities:

- 1. Stack pre-finished materials to prevent twisting, bending, abrasion and denting and elevate one end to facilitate moisture run-off.
- 2. Unload wall panels using a boom or crane, supporting the panels in at least two locations during lifting, and never lift more than three panels at a time.
- 3. Protect moisture-sensitive materials and water-based from the weather.
- 4. Inspect materials upon delivery. Reject and remove physically damaged or marred material from project site.

1.10 PROJECT CONDITIONS

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage and protection requirements for wall panel system.

1. Protection:

- a. Protect completed work from subsequent construction operations. Comply with Manufacturer's recommendations.
- b. Do not encumber the site with stored materials or equipment.
- c. Do not support wall-mounted equipment directly on the wall panel system.

B. Ascertain that work of other trades which penetrates the wall or is to be made watertight by the wall is in place and approved prior to installation.

1.11 DESIGN AND PERFORMANCE CRITERIA

A. Thermal Expansion and Contraction:

1. Completed metal wall panel and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.
 2. The design temperature differential shall be not less than 200 °F.
 3. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.
- B. Uniform wind load capacity:
1. Installed wall panel system shall withstand negative design wind loading pressures complying with the following criteria. Anchor clips shall be installed exactly as spacing given in article 3.0.
 2. Location of metal wall panel rigid connector shall be designed, per job condition, by the wall panel system manufacturer.
 - a. Design Code: 2016 CBC, ASCE 7-10, Chapter 30 for Components and Cladding.
 - b. Safety Factor: The panel system shall withstand a “proof load” equal to 150% of the design wind pressure, as per the ASTM E330 testing standard.
 - c. Wind Speed: 115 mph.
 - d. Ultimate Pullout Value: 500 pounds per each of the two fasteners holding the panel anchor to the wall substrate or framing system.
 3. Capacity shall be determined using uniform static air pressure method in accordance with ASTM E330. Allowable safe working loads shall be determined by dividing the ultimate test load by the safety factor specified above.
- C. ASTM E283: Static pressure air infiltration (doors, windows, curtain walls):
1. Pressure Leakage Rate
 - a. 1.57 PSF 0.06 cfm/sq.ft.
- D. ASTM E330: Uniform static load test for structural performance for standard panel profile:
1. Test results must provide an allowable pressure of no less than:
 - a. 100 lbs/sqft. for 1'-0" spans
- E. ASTM E331: Static pressure water infiltration (doors, windows, curtain walls):
1. Pressure Result: No Leakage
 - a. 5 Gal. /Hr. per S.F. and Static
 - b. Pressure of 12.0 Psf. for 15 minutes.

- F. Missile Impact Test and Cyclic Wind Pressure Test: The panel system shall be tested in accordance with ASTM E1886 and E1996 and FBC Test Protocols TAS 201 and TAS 203.

1.12 WARRANTIES

- A. Manufacturer shall execute a single warranty covering of the following criteria. Multiple-source warranties are not acceptable.
1. Manufacturer's ten (10) year watertight warranty.
 2. Manufacturer's standard twenty (20) year finish warranty covering checking, crazing, peeling, chalking, fading, or adhesion.
 3. Installer's two (3) year warranty covering wall panel system installation.
 4. Warranties shall commence on date of Substantial Completion.
 5. Provide a single warranty by a single approved manufacturer for standing seam roof areas, membrane roof areas, coping systems, and transitions between the material types.

1.13 MANUFACTURER'S INSPECTIONS

- A. When the project is in progress, the roofing system manufacturer will inspect the work not less than 3 days per week. In addition, the manufacturer will:
1. Keep the Architect or Owner informed as to the progress and quality of the work as observed.
 2. Provide job site inspections a minimum of 3 day's per week.
 3. Report to the Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
 4. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

PART 2 - PRODUCTS

2.01 PRODUCTS, GENERAL

- A. Refer to Division 01 Section "Common Product Requirements."
- B. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.
- C. Substitutions: Products proposed as equal to the products specified in this Section shall be submitted in accordance with Bidding Requirements and Division 01 provisions.
1. Proposals shall be accompanied by a copy of the manufacturer's standard specification section. That specification section shall be signed and sealed by a professional engineer licensed in the state in which the

installation is to take place. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.

2. Include a list of three (3) projects of similar type and extent, located within a one hundred mile radius from the location of the project. In addition, the three projects must be at least five (5) years old and be available for inspection by the Owner or Owner's Representative.
3. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.
4. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

2.02 ACCEPTABLE MANUFACTURERS

- A. The Panel shall be IMETCO LATITUDE Wall system as manufactured by Innovative Metals Company, Inc. (IMETCO), Sacramento CA Local Representative Rich Jones (559) 647-1196.
- B. Site Formed Panels: Bidder will not be allowed to supply panels formed at the job-site on portable roll formers; metal panels must be factory pre-manufactured and engineered for this project.

2.03 METAL WALL PANEL SYSTEM

- A. General.
 1. The products, quality, and performance criteria specified shall be regarded as the minimum standard of quality required for the project.
 2. Basis of Design: LATITUDE SERIES WALL PANEL System manufactured by the Garland Company, Cleveland, OH.
- B. Materials.
 1. Panel material: 22 gauge, G90 galvanized steel, per ASTM A653 or Galvalume steel, type AZ-50, smooth as per ASTM A792.
 2. Flashing and flat stock material: Fabricate in profiles indicated on drawings of same material, thickness, and finish as wall panel system, unless indicated otherwise.
- C. Finish on surfaces:
 1. Exposed surfaces for coated panels:
 - a. Two coat coil applied, baked-on full-strength (70% resin) fluorocarbon coating system (polyvinylidene fluoride, PVF2), applied by manufacturer's approved applicator.
 - b. Coating system shall provide nominal 1.0 mil dry film thickness, consisting of primer and color coat.
 - c. Color shall be from Garland premium color chart.

2. Unexposed surfaces for coated panels shall be baked-on polyester coating with .20 - .30 dry film thickness (TDF).
3. Exposed and unexposed surfaces for uncoated panels shall be as shipped from the mill.

D. Characteristics:

1. Fabrication: Panels shall be factory roll-formed from the specified metal. Field rolled panels will not be allowed.
2. Panels shall be as indicated on project drawings.
 - a. The standard profile shall provide panels 12" wide.
 - b. Alternate profile panels shall be used to provide reveals 12" accent bands as shown on project drawings.
 - c. Web elements of the ribs shall be choose one: asymmetrical or symmetrical angle.
3. Panel orientation: choose one: Horizontal
4. Configuration: Panel shall be choose one: 12" wide (nominal) with interlocking seams incorporating concealed anchor clips allowing thermal movement.
5. Panel Depth (Concealed Leg)
6. Panel lengths: Up to 20 feet maximum length.

E. Accessories:

1. Anchor Clips: Clips shall be R-Mer Guard" 18 Gauge galvalume steel designed to allow thermal movement of the panel in each direction along the longitudinal dimension.
 - a. Clips shall be spaced 12" o.c. vertically and 16" o.c. horizontally at each stud minimum.
2. Fasteners:
 - a. Concealed fasteners: Corrosion resistant steel screws, #12-14 x 1/2" Pancake Head. screw length appropriate for substrate (2" min. at rigid insulation with 3/4" penetration into studs), hex washer head. A-point for plywood substrate.
 - b. 10' Sill Starter Cleat
3. Provide and install 16 ga x 1-1/2" wide light gauge steel furring strips (50 ksi minimum) at 12" o.c. as required for alignment and/ or if needed to provide a complete installation.
4. Provide all miscellaneous accessories for complete installation.

2.04 ACCESSORY PRODUCTS

A. Sealant:

1. Acceptable product:
 - a. Concealed Application: Non-curing butyl sealant or equal.
 - b. Exposed Application: Garland SS sealant or equal.
 2. Colors: As selected by architect from sealant manufacturer's standard selection.
- B. Foam Closures: Inside corners, outside corners, door and window jambs, and batten reveal terminations: Factory precut closed cell foam meeting ASTM D1056 and/or D3574.
- C. Underlayment:
 1. Underlayment shall be applied over entire wall substrate area.
 2. Underlayment shall be one ply of HPR Organic Basesheet. Seams shall be lapped in accordance with manufacturer's recommendations.
- D. Exterior Framed Walls: Where called out in drawings, install 1" thick rigid board insulation (R-4 per inch minimum). See drawings for exact R-value.

2.05 FABRICATION

- A. Shop fabricate metal panels and flashing components to the maximum extent possible, forming metal work with clear, sharp, straight, and uniform bends and rises. Hem exposed edges of flashings.
- B. Form flashing components from full single width sheet in minimum ten (10'-0") feet sections. Provide shop fabricated, mitered corners, joined using closed end pop rivets and joint sealant.
- C. Fabricate panels and related sheet metal work in accordance with approved shop drawings and applicable standards.

PART 3 - EXECUTION

3.01 EXECUTION, GENERAL

- A. Comply with requirements of Division 01 Section "Common Execution Requirements."

3.02 PREPARATION

- A. Inspection: Examine the alignment and placement of the building structure and substrate. Correct any objectionable warp, waves or buckles in the substrate before proceeding with installation of the pre-formed metal panels.

- B. Pre-installation conference: Prior to beginning metal wall panel work, convene a pre-installation conference as specified in Part 1 of this Specification.
- C. It is understood that the ongoing operations of the Owner are of a critical nature as to leak sensitivity. Do not work on more roof area than can be restored completely watertight in one day.

3.03 INSTALLATION, GENERAL

- A. Install roof system when the atmospheric dry bulb temperature is minimum forty (40) degrees Fahrenheit and rising.
- B. Install all components of the roof system in exact accordance with the manufacturer's standard published procedures as applicable to these project conditions and substrates.

3.04 WALL PANEL INSTALLATION

- A. Comply with all details and install roofing materials and flashings in accordance with approved Manufacturer's details and / or shop drawings and manufacturer's product data within specified erection tolerances.
- B. Isolate dissimilar metals and masonry or concrete from metals with bituminous coating. Use gasketed fasteners where required to prevent corrosive action between fastener, substrate, and panels.
- C. Limit exposed fasteners to extent indicated on details.
- D. Anchorage shall allow for temperature expansion/contraction movement without stress or elongation of panels, clips, or anchors. Attach clips to substrate using fasteners of size and spacing as determined by manufacturer's design analysis to resist specified wind pressure and thermal movement forces.
- E. Seal laps and joints in accordance with system manufacturer's product data.
- F. Coordinate flashing and sheet metal work to provide weathertight conditions at wall panel terminations. Fabricate and install in accordance with standards of SMACNA Manual.
- G. Provide for temperature expansion/contraction movement of panels at wall panel penetrations and wall panel mounted equipment, in accordance with system manufacturer's product data and design calculations.
- H. Installed system shall be true to line and plane and free of dents, and physical defects. In light gauge panels with wide flat surfaces, some oil canning may be present. Oil canning does not affect the finish or structural integrity of the panel and is therefore not cause for rejection.
- I. Form joints in linear sheet metal to allow for one fourth (1/4) inch minimum expansion at twenty (20'-0") feet on center maximum and eight (8'-0") feet from corners.

- J. At joints in linear sheet metal items, set sheet metal items in two (2) one fourth (1/4) inch beads of butyl sealant. Extend sealant over all metal surfaces. Mate components for positive seal. Allow no sealant to migrate onto exposed surfaces.

3.05 CLEANING

- A. Clean installed work in accordance with the manufacturer's instructions.
- B. Replace damaged work than cannot be restored by normal cleaning methods.

3.06 CONSTRUCTION WASTE MANAGEMENT

- A. Remove and properly dispose of waste products generated during construction. Comply with requirements of authorities having jurisdiction.

3.07 FINAL INSPECTION

- A. At completion of installation and associated work, meet with Contractor, Architect, installer, installer of associated work, Owner, system manufacturer's representative, and other representatives directly concerned with performance of system.
- B. Inspect work and flashing of penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- D. Notify the Contractor, Architect & Owner upon completion of corrections.
- E. Following the final inspection, provide written notice of acceptance of the installation from the system manufacturer.
- F. Immediately correct leakage during construction. If the Contractor does not respond within twenty four (24) hours, the Owner will exercise rights to correct the Work under the terms of the Conditions of the Contract.

3.08 DEMONSTRATION AND TRAINING

- A. At a time and date agreed to by the Owner, instruct the Owner's facility manager, or other representative designated by the Owner, on the following procedures:
 - 1. Troubleshooting procedures.
 - 2. Notification procedures for reporting leaks or other problems.
 - 3. Maintenance.
 - 4. The Owner's obligations for maintaining the warranty in effect and force.
 - 5. The Manufacturer's obligations for maintaining the warranty in effect and force.

END OF SECTION

SECTION 07 42 13.23**METAL COMPOSITE MATERIAL WALL PANELS****PART 1 - GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SUMMARY

- A. Section includes metal composite material wall panels.

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, metal composite material panel Installer, metal composite material panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal composite material panels, including installers of doors, windows, and louvers.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to metal composite material panel installation, including manufacturer's written instructions.
 - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 - 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal composite material panels.
 - 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
 - 7. Review temporary protection requirements for metal composite material panel assembly during and after installation.
 - 8. Review procedures for repair of panels damaged after installation.
 - 9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal composite material panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal composite material panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Composite Material Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal composite material panel accessories.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal composite material panels to include in maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

- B. 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 metal composite material panel assembly, including corner, soffits, supports, attachments, and accessories.
 2. Water-Spray Test: Conduct water-spray test of mockup of metal composite material panel assembly, testing for water penetration according to AAMA 501.2.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal composite material panels, and other manufactured items so as not to be damaged or deformed. Package metal composite material panels for protection during transportation and handling.
- B. Unload, store, and erect metal composite material panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal composite material panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal composite material panels to ensure dryness, with positive slope for drainage of water. Do not store metal composite material panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal composite material panels during installation.
- E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.09 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal composite material panels to be performed according to manufacturers' written instructions and warranty requirements.

1.010 COORDINATION

- A. Coordinate metal composite material panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.011 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal composite material panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal composite material panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal composite material panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 330:
 - 1. Wind Loads: As indicated on Drawing sheet S1.1.
 - 2. Other Design Loads: As indicated on Drawing sheet S1.1.

3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
 1. Test-Pressure Difference: 1.57 lbf/sq. ft..
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
 1. Test-Pressure Difference: 2.86 lbf/sq. ft..
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations 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.
- E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- F. Fire Propagation Characteristics: Metal composite material wall panel system passes NFPA 285 testing.

2.02 METAL COMPOSITE MATERIAL WALL PANELS

- A. Metal Composite Material Wall Panel Systems: Provide factory-formed and -assembled, metal composite material wall panels fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.
 1. Aluco Bond Plus Wall and Soffit Panels (ICC ESR-1185)
- B. Aluminum-Faced Composite Wall Panels: Formed with 0.020-inch-thick, coil-coated anodized aluminum sheet facings.
 1. Panel Thickness: 4mm (w/ 0.020" thick aluminum face sheets).
 2. Core: fire retardant core material product per ASTM E84 w/ a flame spread index of 25 or less and a smoke developed index of 450 or less. Panels also comply with NFPA 285 for an intermediate scale multi-story test showing that ACM met the conditions of acceptance.
 3. Exterior Finish: Two-coat fluoropolymer.

- a. Color: As indicated in drawings.
- C. Attachment Assembly Components: Formed from extruded aluminum.
- D. Attachment Assembly: Manufacturer's standard per ^{ICC} ESR-1185.

2.03 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal composite material panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal composite material panels unless otherwise indicated.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal composite material panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal composite material panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal composite material panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal composite material panels and remain weathertight; and as recommended in writing by metal composite material panel manufacturer.

2.04 FABRICATION

- A. General: Fabricate and finish metal composite material panels and accessories at the factory, 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.
- B. Fabricate metal composite material 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.
- C. Sheet Metal Flashing and Trim: 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.

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 Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.05 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- 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 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. Aluminum Panels and Accessories:
 1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal composite material panel supports, and other conditions affecting performance of the Work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal composite material wall panel manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal composite material wall 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 roughing-in for components and assemblies penetrating metal composite material panels to verify actual locations of penetrations relative to seam locations of metal composite material panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal composite material panel manufacturer's written recommendations.

3.03 METAL COMPOSITE MATERIAL PANEL INSTALLATION

- A. General: Install metal composite material panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor metal composite material panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal composite material panels.
 - 2. Flash and seal metal composite material panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal composite material panels are installed.
 - 3. Install screw fasteners in predrilled holes.

4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal composite material panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Align bottoms of metal composite material panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 2. Copper Panels: Use copper, stainless-steel or hardware-bronze fasteners.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal composite material panel manufacturer.
- D. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
- E. Installation: Attach metal composite material wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.
1. Wet Seal Systems: Seal horizontal and vertical joints between adjacent metal composite material wall panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 07 92 00 "Joint Sealants."
 2. Dry Seal Systems: Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gasket system.

3. Rainscreen Systems: Do not apply sealants to joints unless otherwise indicated.
- F. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-turned flanges of wall panels to panel clips with manufacturer's standard fasteners.
1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 07 92 00 "Joint Sealants."
 2. Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gaskets.
- G. Subgirt-and-Spline Installation: Install support assembly at locations, spacings, and with fasteners recommended by manufacturer. Use manufacturer's standard subgirts and splines that provide support and complete secondary drainage assembly, draining to the exterior at horizontal joints. Attach metal composite material wall panels by interlocking perimeter extrusions attached to panels with subgirts and splines. Fully engage integral subgirt-and-spline gaskets and leave horizontal and vertical joints with open reveal. Terminate edge of panels flush with perimeter extrusions.
1. Install wall panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.
 2. Do not apply sealants to joints unless otherwise indicated.
- H. Track-Support Installation: Install support assembly at locations, spacings, and with fasteners recommended by manufacturer. Use manufacturer's standard horizontal tracks and vertical drain channels that provide support and secondary drainage assembly, draining to the exterior at horizontal joints through drain tube. Attach metal composite material wall panels to tracks by interlocking panel edges with manufacturer's standard "T" clips.
1. Attach routed-and-turned flanges of wall panels to perimeter extrusions with manufacturer's standard fasteners.
 2. Attach flush wall panels to perimeter extrusions by engaging panel edges and by attaching with manufacturer's standard structural silicone adhesive.
 3. Install wall panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.
 4. Do not apply sealants to joints unless otherwise indicated.
- I. Rainscreen-Principle Installation: Install using manufacturer's standard assembly with vertical channel that provides support and secondary drainage assembly, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at

locations, spacings, and with fasteners recommended by manufacturer. Attach metal composite material wall panels by inserting horizontal support pins into notches in vertical channels and into flanges of panels. Leave horizontal and vertical joints with open reveal.

1. Install wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.
 2. Do not apply sealants to joints unless otherwise indicated.
- J. Accessory Installation: 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 metal composite material panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal composite material panel manufacturer; or, if not indicated, provide types recommended in writing by metal composite material panel manufacturer.
- K. 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 are permanently watertight.
1. Install exposed flashing and trim that is without 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 performance.
 2. 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 expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.04 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal composite material wall panel units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.

- B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal composite material wall panel installation, including accessories.
- D. Metal composite material wall panels will be considered defective if they do not pass test and inspections.
- E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

3.06 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal composite material panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal composite material panel installation, clean finished surfaces as recommended by metal composite material panel manufacturer. Maintain in a clean condition during construction.
- B. After metal composite material panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal composite material panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 42 13.23**METAL COMPOSITE MATERIAL WALL PANELS****PART 1 - GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SUMMARY

- A. Section includes metal composite material wall panels.

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, metal composite material panel Installer, metal composite material panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal composite material panels, including installers of doors, windows, and louvers.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to metal composite material panel installation, including manufacturer's written instructions.
 - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 - 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal composite material panels.
 - 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
 - 7. Review temporary protection requirements for metal composite material panel assembly during and after installation.
 - 8. Review procedures for repair of panels damaged after installation.
 - 9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal composite material panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal composite material panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Composite Material Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal composite material panel accessories.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal composite material panels to include in maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

- B. 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 metal composite material panel assembly, including corner, soffits, supports, attachments, and accessories.
 2. Water-Spray Test: Conduct water-spray test of mockup of metal composite material panel assembly, testing for water penetration according to AAMA 501.2.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal composite material panels, and other manufactured items so as not to be damaged or deformed. Package metal composite material panels for protection during transportation and handling.
- B. Unload, store, and erect metal composite material panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal composite material panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal composite material panels to ensure dryness, with positive slope for drainage of water. Do not store metal composite material panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal composite material panels during installation.
- E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.09 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal composite material panels to be performed according to manufacturers' written instructions and warranty requirements.

1.010 COORDINATION

- A. Coordinate metal composite material panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.011 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal composite material panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal composite material panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal composite material panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 330:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.

3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
 1. Test-Pressure Difference: 1.57 lbf/sq. ft..
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
 1. Test-Pressure Difference: 2.86 lbf/sq. ft..
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations 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.
- E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- F. Fire Propagation Characteristics: Metal composite material wall panel system passes NFPA 285 testing.

2.02 METAL COMPOSITE MATERIAL WALL PANELS

- A. Metal Composite Material Wall Panel Systems: Provide factory-formed and -assembled, metal composite material wall panels fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.
 1. Aluco Bond
- B. Aluminum-Faced Composite Wall Panels: Formed with 0.020-inch-thick, coil-coated anodized aluminum sheet facings.
 1. Panel Thickness: 0.118 inch.
 2. Core: Standard.
 3. Exterior Finish: Two-coat fluoropolymer.
 - a. Color: As selected by Architect from manufacturer's full range.
- C. Attachment Assembly Components: Formed from extruded aluminum.

- D. Attachment Assembly: Manufacturer's standard.

2.03 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal composite material panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal composite material panels unless otherwise indicated.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal composite material panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal composite material panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal composite material panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal composite material panels and remain weathertight; and as recommended in writing by metal composite material panel manufacturer.

2.04 FABRICATION

- A. General: Fabricate and finish metal composite material panels and accessories at the factory, 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.
- B. Fabricate metal composite material 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.
- C. Sheet Metal Flashing and Trim: 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.

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 Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.05 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- 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 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. Aluminum Panels and Accessories:
 1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal composite material panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal composite material wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal composite material wall 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 roughing-in for components and assemblies penetrating metal composite material panels to verify actual locations of penetrations relative to seam locations of metal composite material panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal composite material panel manufacturer's written recommendations.

3.03 METAL COMPOSITE MATERIAL PANEL INSTALLATION

- A. General: Install metal composite material panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor metal composite material panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 1. Shim or otherwise plumb substrates receiving metal composite material panels.
 2. Flash and seal metal composite material panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal composite material panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal composite material panel work proceeds.

6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Align bottoms of metal composite material panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 2. Copper Panels: Use copper, stainless-steel or hardware-bronze fasteners.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal composite material panel manufacturer.
- D. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
- E. Installation: Attach metal composite material wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.
1. Wet Seal Systems: Seal horizontal and vertical joints between adjacent metal composite material wall panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 07 92 00 "Joint Sealants."
 2. Dry Seal Systems: Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gasket system.
 3. Rainscreen Systems: Do not apply sealants to joints unless otherwise indicated.
- F. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-retained flanges of wall panels to panel clips with manufacturer's standard fasteners.

1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 07 92 00 "Joint Sealants."
 2. Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gaskets.
- G. Subgirt-and-Spline Installation: Install support assembly at locations, spacings, and with fasteners recommended by manufacturer. Use manufacturer's standard subgirts and splines that provide support and complete secondary drainage assembly, craining to the exterior at horizontal joints. Attach metal composite material wall panels by interlocking perimeter extrusions attached to panels with subgirts and splines. Fully engage integral subgirt-and-spline gaskets and leave horizontal and vertical joints with open reveal. Terminate edge of panels flush with perimeter extrusions.
1. Install wall panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.
 2. Do not apply sealants to joints unless otherwise indicated.
- H. Track-Support Installation: Install support assembly at locations, spacings, and with fasteners recommended by manufacturer. Use manufacturer's standard horizontal tracks and vertical drain channels that provide support and secondary drainage assembly, draining to the exterior at horizontal joints through drain tube. Attach metal composite material wall panels to tracks by interlocking panel edges with manufacturer's standard "T" clips.
1. Attach routed-and-turned flanges of wall panels to perimeter extrusions with manufacturer's standard fasteners.
 2. Attach flush wall panels to perimeter extrusions by engaging panel edges and by attaching with manufacturer's standard structural silicone adhesive.
 3. Install wall panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.
 4. Do not apply sealants to joints unless otherwise indicated.
- I. Rainscreen-Principle Installation: Install using manufacturer's standard assembly with vertical channel that provides support and secondary drainage assembly, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by manufacturer. Attach metal composite material wall panels by inserting horizontal support pins into notches in vertical channels and into flanges of panels. Leave horizontal and vertical joints with open reveal.
1. Install wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.

2. Do not apply sealants to joints unless otherwise indicated.
- J. Accessory Installation: 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 metal composite material panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal composite material panel manufacturer; or, if not indicated, provide types recommended in writing by metal composite material panel manufacturer.
- K. 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 are permanently watertight.
1. Install exposed flashing and trim that is without 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 performance.
 2. 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 expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.04 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal composite material wall panel units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.
- B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal composite material wall panel installation, including accessories.

- D. Metal composite material wall panels will be considered defective if they do not pass test and inspections.
- E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

3.06 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal composite material panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal composite material panel installation, clean finished surfaces as recommended by metal composite material panel manufacturer. Maintain in a clean condition during construction.
- B. After metal composite material panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal composite material panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 52 00**MODIFIED BITUMINOUS SHEET ROOFING****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Cold-process Modified built-up asphalt roofing system on Metal deck.
- B. Roof insulation. Rigid insulation and cover board to meet R-10 Minimum on plans.
- C. Roof surfacing consisting of mineral granulated, cool roof cap sheet with acrylic top coating

1.02 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience. All materials shall be from single source manufacturer for basesheets, interplys, capsheets, adhesives, mastics, and coatings.
- C. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a 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.
- D. Flashings: Comply with requirements of Division 7 Section "Sheet Metal Flashing and Trim." Provide base flashings, perimeter flashings, detail flashings and component materials that comply with requirements and recommendations of the following:
 - 1. FMG 1-49 Loss Prevention Data Sheet for Perimeter Flashings.
 - 2. FMG 1-29 Loss Prevention Data Sheet for Above Deck Roof Components.

MODIFIED BITUMINOUS SHEET ROOFING

3. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.
4. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.

1.04 SUBSTITUTION

- A. In addition to complying with criteria specified in Section 01 25 00, provide the following data when non-specified systems are substituted.
 1. Provide 5 job references available for inspections within 100 miles of project location where substitutes were used under similar conditions.

1.05 SUBMITTALS

- A. Product Data
 1. Submit product data under provisions of Section 01 33 00.
 2. Submit product data indicating membrane and bitumen materials, base flashing materials, and accessories.
 3. Provide total system breakdown, by layer, in weight and composition.
 4. Provide letter of certification, signed by roofing manufacturer, that all products used in completed roof assembly are asbestos free.
 5. Submit manufacturer's installation instructions.
 6. Submit manufacturer's certificate that products are physically and chemically compatible with each other and meet listed ASTM or Federal Specifications.
 7. Submit manufacturer's certificate that products comply with current safety and environmental regulations, including hazardous materials labeling and air quality/VOC regulations
 8. Provide Energy Star Compliance information for each type of product within the roofing system
 9. Base, perimeter, and detail flashings, cants, and membrane terminations
 10. Insulation fastening patterns for winduplift required from manufacturer's engineer services and stamped by California Engineer.
- B. Submits samples for verification for the following products:

MODIFIED BITUMINOUS SHEET ROOFING

1. 12-by-12-inch square of ply sheet and flashing backer sheet
 2. 12-by-12-inch square of mineral-granule-surfaced cap sheet flashing sheet, of color specified..
 3. 12-by-12-inch square of roof insulation.
 4. Six insulation fasteners of each type, length, and finish
- C. Installers Certification: Submit written and signed certification from manufacturer that installer is approved to install specified guarantee Systems.
- D. Manufacturers Certification: Submit written and signed certification from manufacturer that roof deck and details and roofing systems comply with manufacturers recommendations and are suitable for application, climate zone, slope.
1. Submit evidence of meeting performance requirements, including FMG listing.
- E. Qualification Data: For Installer, and manufacturer, and manufacturer's technical representative.
- F. Qualification Data: For testing agency and testing agency personnel.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system roofing system and system components
1. Include report indicating compliance with load-strain properties requirements.
- H. Manufacturer Certificates: Indicating compliance of proposed products with requirements, including:
1. Product Compatibility: Indicate manufacturer has verified compatibility of roofing system components, including but not limited to: Roofing base and ply sheets, membrane backer and flashing sheets, reinforcement fabric felts and mats, adhesives, mastics, coatings, and sealants.
- I. Manufacturer Approval of Testing Agency: Manufacturer's letter indicating acceptance of qualifications and approval of testing agency to perform inspections specified under Part 3 Article "Field Quality Control.,"
1. Indicate manufacturer's compliance with approval of testing agency's requirements for authority to perform final roofing inspection and manufacturer's warranty certification

MODIFIED BITUMINOUS SHEET ROOFING

- J. Maintenance Data and Training Materials: For roofing system to include in maintenance manuals and Owner's training library.
- K. Warranties: Special warranties and service agreements specified in this Section.
- L. Inspection Reports: Copy of roofing system manufacturer's daily and final technical inspection reports of completed roofing installation.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that has UL listing and FMG approval for roofing system and with minimum 10 years experience in materials of like design and application.
- B. Installer: 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 warranty.
 - 1. Installer: Company specializing in applying specified roofing system with minimum 5 years documented experience.
 - 2. Installer: Company approved by materials manufacturer for specified guarantee work.
 - 3. Installing Foreman: Individual specializing in applying specified roofing system with minimum 10 years documented experience.
- C. Manufacturer's Technical Representative Qualifications: An individual experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this section. **Manufacturer's Technical Representative Qualifications: An authorized full-time employee representative of manufacturer experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project. **Manufacturer Representative to inspect roof system installation 3 days a week with written reports to architect.****
- D. Source Limitations: Obtain all components for roofing system from single roofing system manufacturer.
 - 1. Exterior Fire Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
- E. Preliminary Roofing Conference

1. Before starting roof deck construction, conduct conference at Project site. Comply with requirements for preinstallation conferences in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roof deck construction and roofing system including, but not limited to, the following:
 - a. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, [deck Installer,] and other installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
 - b. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 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 work restrictions and requirements for temporary facilities and controls.
 - e. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - f. Review structural loading limitations of roof deck during and after roofing.
 - g. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 - h. Review governing regulations and requirements for insurance and certificates if applicable.
 - i. Review temporary protection requirements for roofing system during and after installation.
 - j. Review roof observation and repair procedures after roofing installation.

F. PRE-INSTALLATION CONFERENCE

1. Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

MODIFIED BITUMINOUS SHEET ROOFING

- a. Meet with Owner, [Architect,] Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, [deck Installer,] and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
- b. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
- 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. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
- e. Review structural loading limitations of roof deck during and after roofing.
- f. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
- g. Review governing regulations and requirements for insurance and certificates if applicable.
- h. Review temporary protection requirements for roofing system during and after installation.
- i. Review roof observation and repair procedures after roofing installation.

1.07 REGULATORY REQUIREMENTS

- A. Fire Hazard Classification: UL Class A
- B. Provide materials clearly marked with UL labels, ASTM standards and hazardous materials designations.
- C. Comply with all safety and regulations and manufacturers recommendations, including those associated with cold adhesive product systems.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01 60 00.

1. Where roofing system is indicated as requiring FMG classification or UL listing, containers shall bear label indicating manufacture in compliance with FMG classification or UL listing quality assurance requirements.
- B. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- C. Store and protect products under provisions of Section 01 60 00.
 1. Protect stored liquid material from direct sunlight.
 - a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- D. Store products in weather protected environment, clear of ground and moisture. Cover with manufacturers recommended canvas or cloth covers.
 1. 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.
- E. Stand roll materials on end.
- F. Handle and store roofing materials and place equipment in a manner to avoid temporary overloading or permanent deflection of deck

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply roofing membrane during inclement weather, or when rain is anticipated during work period.
- B. Do not apply roofing membrane to damp, wet or frozen deck surface, including dew/condensate.
- C. 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 SEQUENCING AND SCHEDULING

- A. Coordinate work under provisions of Section 01 11 00, 01 31 13, and 01 50 00.
- B. Coordinate the work of installing associated metal flashings as the work of this Section proceeds.

1.11 GUARANTEE AND WARRANTY

- A. Contractor's Guarantee

MODIFIED BITUMINOUS SHEET ROOFING

1. Provide Owner with written Guarantee per Section 00 65 39 on Contractor's letterhead, and signed by General Contractor and roofing system installer for 3 Year Workmanship Warranty.
2. Warranty, General: Warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
3. Special Warranty: Submit roofing system Manufacturer's special warranty, on warranty form at end of this section, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
 - a. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation fasteners and other components of roofing system.
 - b. Warranty Period: 30 years from date of Recording of Notice of Completion. No Dollar Limit on labor and materials.

Warranty renewal requirements at 20 year Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
 - c. Warranty Period: 30 years from date of Recording of Notice of Completion.
4. Make inspections and emergency repairs to defects or leaks in the roof system within twenty-four (24) hours of receipt of notice from the Owner.
5. Restore the affected areas to the standard of the original specifications as soon as weather permits.

2. PART 2 - PRODUCTS

2.01 COLD-PROCESS BUILT-UP ASPHALT ROOFING

1. Basis of Design: Characteristics of specific products manufactured by The Garland Company, www.garlandco.com, are indicated to establish required level of quality, appearance, and performance. The Architect will consider requests for substitutions, under the provisions of Section 01 61 00, and as follows:

MODIFIED BITUMINOUS SHEET ROOFING

2. Drawings and specifications indicate information based upon the specific products indicated in this Section. Do not modify intended aesthetic effect, as judged solely by the Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Submit comprehensive explanatory data to Architect for review where modifications are proposed.
 3. In addition to the general substitution requirements indicated elsewhere, substitutions will not be considered for approval unless the following items are properly submitted in writing:
 - a. Manufacturer's test data indicating ratings within the specified ranges along with a written statement from a corporate officer of the manufacturer that the proposed system meets or exceeds all performance requirements listed.
 - b. A listing of a minimum of five projects where the proposed roofing system was used under similar conditions. The reference shall include completion date, project size and telephone contact number for the Architect or Owner Representative.
 - c. A financial statement demonstrating a 3:1 ratio of assets to liabilities.
 - d. A written statement that the manufacturer will provide the project inspection as indicated in this section.
 - e. A sample warranty indicating coverage as indicated in this section.
- B. The Architect will only consider comparable products by alternate manufacturers listed in this Section, and requests for substitutions, under the provisions of Section 01610

2.02 SHEET MATERIALS

- A. BASE-SHEET MATERIALS – ONE PLY
1. Roofing Membrane Ply
 - a. The Garland Company, Flexbase Plus 80 ASTM D 6162
Type III ASTM D 5147
- B. FLASHING MATERIALS
1. Base Sheet at Flashing:
 - a. The Garland Company, Inc. Versiply 40 ASTM D-5147

MODIFIED BITUMINOUS SHEET ROOFING

C. MINERAL SURFACED COOL ROOF CAP SHEET

1. Cap Sheet: SBS-modified asphalt sheet; granular surfaced; suitable for application method specified. Granule Color: White
 - a. The Garland Company, StressPly Plus FR Mineral ASTM D 6162. Type III Test Method ASTM 5147

D. ASPHALT MATERIALS

1. Cold-Applied Adhesive: Roofing system manufacturer's standard asphalt-based, one-part asbestos-free, cold-applied adhesive specially formulated for compatibility and use with built-up roofing membranes and flashings, with low-VOC formulation acceptable to authorities having jurisdiction.
 - a. The Garland Company, Weather King Plus WC Adhesive

2.03 AUXILIARY ROOFING MEMBRANE MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with built-up roofing.
- B. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application. Silver Flash by The Garland Company, Inc.
- C. Cold-Applied Flashing Adhesive: Roofing system manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with built-up roofing base flashings.
- D. Mastic Sealant: Polyisobutylene, plain or modified bitumen, nonhardening, nonmigrating, nonskinning, and nondrying.
- E. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM 4470; designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength; and acceptable to roofing system manufacturer.
- F. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim."
- G. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

2.04 ROOF INSULATION

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated. Polyisocyanurate and ½" wood fiber board, asphalt coated on all sides. Mechanically attach 1st layer of Polyisocyanurate to deck 2" Rigid. Solid mop ½" Wood Fiber board, asphalt coated on all sides in Type IV asphalt.
1. Manufacturers:
 - a. Commercial Innovations
 - b. Celotex
 - c. G.P. Gypsum
 - d. Johns Manville
- B. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.05 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Wood Nailer Strips and Cants: Comply with requirements in Division 6 Section "Rough Carpentry."
- D. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
- E. Roof walk pads, if required, to maintain warranty of roofing system. Refer to drawings for service paths required to maintain rooftop equipment.

2.06 COATING MATERIALS

- A. Roof Coating/Top Coat: Acrylic Latex coating, highly reflective, elastomeric, and compatible with Modified Bitumen surfaces, meeting CCRC "Cool Roof" requirements. Title 24.
1. Garland Company Inc. Pyramic Plus LO Roof Coating

2.07 OTHER MATERIALS Versiply 40/StressPly Plus FR Mineral on all Walls/Curbs in Type IV asphalt.

A. Garland Flat Stock 22 Ga. for all Coping Cap/Metal Flashings.

PART 3 - EXECUTION

2.01 SURFACE CONDITIONS

A. Inspection

1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of 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.
 - a. Verify that deck is supported and secured.
 - b. Verify that deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys or eaves.
 - c. Verify that surface substrate is properly prepared and dry.
 - d. Verify that roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, blocking and cant strips are in place and that roof drains are securely clamped in place.
 - e. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation
 - f. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

2.02 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

MODIFIED BITUMINOUS SHEET ROOFING

- 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. Provide approved UL approved fire extinguishers readily accessible at areas of roofing work. Strictly comply with all state, local, and federal fire and safety regulations.
- D. Cover roof drains to prevent debris entry. Remove cover at end of each days work.

2.03 DRAINAGE SUBSTRATE REVIEW

- A. Verify crickets and transitions are constructed in compliance with roof deck criteria. Fill all voids, splits and holes.
- B. Verify roof drainage provides minimum 1/2 inch per foot fall at all areas, including cricket valleys.

2.04 PROTECTION

- A. Where traffic must continue over finished roof installation, protect surfaces to the satisfaction of Architect and materials manufacturer.
- B. Do not drop roofing materials on roofing deck.

2.05 INSTALLATION, GENERAL

- A. Install roofing system in accordance with manufacturer's recommendations.
- B. Install roofing membrane, base flashings, and component materials in compliance with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system as as listed in FMG's "Approval Guide" for fire/windstorm classification indicated. Comply with recommendations in FMG Loss Prevention Data Sheet 1-49.
- C. Install roofing system in accordance with the following NRCA Manual Plates and NRCA recommendations; modify as required to comply with requirements of FMG references above:
 - 1. Base Flashing at Parapet Wall: Plates BUR-1 and BUR-1S.
 - 2. Base Flashing and Counterflashing at Parapet Wall: Plates BUR-4 and BUR-4S.
 - 3. Base Flashing and Counterflashing at Parapet Wall, Movement Joint: Plates BUR-6 and BUR-6S
 - 4. Perimeter Edge, Raised: Plates BUR- and BUR-2S.
 - 5. Perimeter Edge, Gravel-stop: Plates BUR-3 and BUR-3S.

MODIFIED BITUMINOUS SHEET ROOFING

6. Scupper, Raised: Plates BUR-21 and BUR-21S.
7. Gutter at Draining Edge: Plates BUR-22 and BUR-22S.
8. Expansion Joint, with metal cover: Plates BUR-7 and BUR-7S and Division 7 Section "Sheet Metal Flashing and Trim."
9. Expansion Joint, with premanufactured cover: Plates BUR-7A and BUR-7AS and Division 7 Section "Roof Expansion Assemblies."
10. Curb Detail at Rooftop HVAC Units, Premanufactured: Plates BUR-12 and BUR-12S.
11. Curb Detail at Rooftop HVAC Units, Job-Built, Wood: Plates BUR-13 and BUR-13S.
12. Curb Detail at Skylight, Roof Hatch, and Smoke Vents: Plates 14 and 14S
13. Penetration, Structural Member: Plates BUR-14 and BUR-14S.
14. Penetration, Sheet Metal Enclosure: Plates 15 and 15S
15. Penetration, Stack Flashing: Plates BUR-17 and BUR-17S.
16. Penetration, Pocket: Plates BUR-19 and BUR-19S.
17. Roof Drain: Plates BUR-20 and BUR-22S.

2.06 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system manufacturer's written instructions for installing roof insulation.
- C. Wood Cant Strips: Install and secure preformed 45-degree insulation wood cant strips at junctures of built-up roofing membrane system with vertical surfaces or angle changes greater than 45 degrees.
- D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

MODIFIED BITUMINOUS SHEET ROOFING

- F. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- G. Mechanically Fastened : Install insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - 2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

2.07 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install built-up roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."
- B. Start installation of built-up roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Cooperate with testing and inspecting agencies engaged or required to perform services for installing built-up roofing system.
- D. Coordinate installing roofing system components so insulation and roofing membrane sheets are not exposed to precipitation or left exposed at the end of the workday or when rain is forecast.
 - 1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- E. Cold Process Asphalt Heating
 - 1. An in-line heat exchange unit may be used to facilitate application
 - a. Do not exceed maximum adhesive temperature of 100° F.
 - b. Heat exchange unit: Use heat transfer oil approved by heating equipment manufacturer.

MODIFIED BITUMINOUS SHEET ROOFING

- c. Follow operation procedures recommended by heating equipment manufacturer.
- F. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

2.08 ROOFING MEMBRANE INSTALLATION

- A. Install one ply sheet starting at low point of roofing system. Align ply sheets without stretching. Shingle side laps of ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane. Shingle in direction to shed water. Extend ply sheets over and terminate beyond cants.
1. Embed ply sheet in a solid mopping application of cold fluid-applied adhesive applied at rate required by roofing system manufacturer. Minimum Rate of Application to be not less than 2 ½ - 3 gallons per 100 s.f.
- B. 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 mopping application of cold fluid-applied adhesive applied at rate required by roofing system manufacturer. Minimum Rate: to be not less than 3 gallons per 100 Sq. Ft.

2.09 FLASHINGS AND STRIPPING INSTALLATION

- A. Install base flashing over can't strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:
1. Prime substrates with asphalt primer if required by roofing system manufacturer.
 2. Backer Sheet Application: Mechanically fasten backer sheet to walls or parapets. Adhere backer sheet over roofing membrane at cants in Type IV hot asphalt a solid mopping of hot roofing asphalt.
 3. Flashing Sheet Application: Adhere flashing sheet to substrate in Type IV hot asphalt applied at rate required by roofing system manufacturer.
- B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4- 6 inches on to field of roofing membrane.

- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
- D. Install stripping, according to roofing system manufacturer's written instructions, where metal flanges and edgings are set on built-up roofing.
 - 1. Flashing-Sheet Stripping: Install flashing-sheet stripping in a continuous coating of asphalt roofing cement or in a solid mopping of hot roofing asphalt applied at not less than 425 deg F, and extend onto roofing membrane.
- E. Roof penetrations and flashings
 - 1. Provide zinc flashing or other roof penetration assembly as approved by manufacturer for each individual component. Provide cut sheet of each assembly with roofing submittals. Coordinate flashing assembly with installer at pre-construction meeting.
 - a. ZincJak flashings by Commerical Innovations (888) 744-3439, or equal. Zinc, lead-free pipe flashing and drain pans for low slope roof applications.
- F. Roof Drains: Set 30-by-30-inch zinc flashing in bed of asphalt roofing cement on completed roofing membrane. Cover metal flashing with stripping and extend a minimum of 4 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
 - 1. Install flashing-sheet stripping by same method as installing base flashing.
 - 2. ZincJak flashings by Commerical Innovations (888) 744-3439, or equal. Zinc, lead-free pipe flashing and drain pans for low slope roof applications.

2.10 ROOF COATING

- A. Apply coatings to roofing membrane and base flashings not less than 40 days following completion of roofing membrane according to manufacturer's written instructions, by spray, roller, or other suitable application method, prime surface as required. Materials shall be installed in a two coat application, 2nd coat applied perpendicular to 1st coat. Spray and backroll first coat applying 1.5 gallons per 100 s.f. Spray second coat applying 1.5 gallons per 100 s.f.

2.11 FIELD QUALITY CONTROL

- A. Manufacturer's Representative: Local manufacturers field representative shall provide inspections, reports, and job site visits during the installation of roof system. 3 days per week minimum.

MODIFIED BITUMINOUS SHEET ROOFING

- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
 - 1. Notify Architect and the Owner 48 hours in advance of date and time of inspection.
- C. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

2.12 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing 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.

2.13 SCHEDULE OF SPECIAL WARRANTIES AND SERVICE AGREEMENTS

- A. The following documents are referenced in this Section and are attached following this Section; complete and submit documents in accordance with requirements:
 - 1. Manufacturer's Special Warranty – Thirty Year Term.
 - 2. Roofing Installer's Warranty – Three Year Term.

END OF SECTION

SECTION 07 54 23
MEMBRANE ROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes TPO Mechanically Attached roofing system. Roofing is applied at roof sections where there is NO MECHANICAL EQUIPMENT mounted and canopy sections.
- B. OWNER SUPPLIED MATERIALS thru CMAS CONTRACT.
- C. Related Work Specified Elsewhere:
1. Metal Roof Decks: Refer to Division 05 Section - Metal Decking.
 2. Rough Carpentry: Section 06 10 00 - Rough Carpentry.
 3. Sheet Metal Flashing and Trim: Section 07 62 00 - Sheet Metal Flashing and Trim.
 4. Sheet Metal Roof Accessories: Section 07 72 00 - Roof Hatch.

1.03 REFERENCES

- A. American Society of Civil Engineers (ASCE):
1. ASCE 7-05, Minimum Design Loads for Buildings and Other Structures.
- B. American Society for Testing and Materials (ASTM):
1. D 6754 – 02 Standard Specification for Keytone Ethylene Ester Based Sheet Roofing
 2. D 751 - Standard Test Methods for Coated Fabrics.
 3. E 108 - Standard Test Methods for Fire Testing of Roof Coverings.
 4. ASTM D451 Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.
 5. ASTM D1079 Standard Terminology Relating to Roofing, Waterproofing and Bituminous Materials.
- C. Factory Mutual Research (FM):
1. Roof Assembly Classifications.
- D. National Roofing Contractors Association (NRCA):
1. Roofing and Waterproofing Manual.

- E. Underwriters Laboratories, Inc. (UL):
 - 1. Fire Hazard Classifications.
- F. Warnock Hersey (WH):
 - 1. Fire Hazard Classifications.

1.04 SUBMITTALS FOR REVIEW

- A. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements.
- B. Samples: Submit two (2) samples of the following:
 - 1. Membrane
 - 2. Fasteners
 - 3. Insulation
- C. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.
- D. Any material submitted as equal to the specified material must be accompanied by a report signed and sealed by a professional engineer licensed in the state in which the installation is to take place. This report shall show that the submitted equal meets the Design and Performance criteria in this specification. Substitution requests submitted without licensed engineer approval will be rejected for non-conformance.

1.05 SUBMITTALS FOR INFORMATION

- A. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required for installing the membrane.
- B. Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.
- C. Manufacturer's Certificate: Certify that the roof system is adhered properly to meet or exceed the requirements of FM 1-90.
- D. Manufacturer's Certificate: Certify that the roof system furnished is approved or accepted by Factory Mutual Approval Standard 4470.
- E. Manufacturer's Certificate: Certify that materials are manufactured in the United States and conform to requirements specified herein, are chemically and

physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

- F. Manufacturer's Certificate: Submit a certified copy of the roofing manufacturer's ISO 9001 compliance certificate.
- G. Written certification from the roofing system manufacturer certifying the applicator is currently authorized for the installation of the specified roof system.
- H. Design Loads: Submit copy of manufacturer's minimum design load calculations according to ASCE 7-10, In no case shall the design loads be taken to be less than those detailed in Design and Performance Criteria article of this specification.
- I. Qualification data for firms and individuals identified in Quality Assurance Article below.

1.06 CONTRACT CLOSEOUT SUBMITTALS

- A. General: Comply with Requirements of Division 01 Section - Closeout Submittals.
- B. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.
- C. Roofing Maintenance Instructions. Provide a manual of manufacturer's recommendations for maintenance of installed roofing systems.
- D. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.
- E. Demonstration and Training Schedule: Provide a schedule of proposed dates and times for instruction of Owner's personnel in the maintenance requirements for completed roofing work. Refer to Part 3 for additional requirements.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with not less than 12 years documented experience and have ISO 9001 certification.
- B. Installer Qualifications: Company specializing in roofing installation with not less than 5 years experience and authorized by roofing system manufacturer as qualified to install manufacturer's roofing materials.
- C. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress. Maintain proper supervision of workmen.

- D. Maintain a copy of the Contract Documents in the possession of the Supervisor/Foreman and on the roof at all times.
- E. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.
 - 1. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.
- F. Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001.

1.08 PRE-INSTALLATION CONFERENCE

- A. Pre-Installation Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of modified bituminous roofing system installation and associated work.
- B. Require attendance of installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing that must precede or follow roofing work (including mechanical work if any), Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, testing agencies and governing authorities. Objectives of conference include:
 - 1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
 - 2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.
 - 3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
 - 4. Review roofing system requirements (drawings, specifications and other contract documents).
 - 5. Review required submittals both completed and yet to be completed.
 - 6. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - 7. Review required inspection, testing, certifying and material usage accounting procedures.
 - 8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).
 - 9. Record discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.

10. Review notification procedures for weather or non-working days.
- C. The Owner's Representative will designate one of the conference participants to record the proceedings and promptly distribute them to the participants for record.
- D. The intent of the conference is to resolve issues affecting the installation and performance of roofing work. Do not proceed with roofing work until such issues are resolved to the satisfaction of the Owner and Architect or Engineer of Record. This shall not be construed as interference with the progress of Work on the part of the Owner or Architect or Engineer of Record.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to prevent moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).
- C. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.
- D. Secure all material and equipment on the job site. If any material or equipment is stored on the roof, assure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the Contractor's actions will be the sole responsibility of the Contractor, and the deck will be repaired or replaced at his expense.

1.10 MANUFACTURER'S INSPECTIONS

- A. When the Project is in progress, the roofing system manufacturer will provide the following:
 1. Report progress and quality of the work as observed.
 2. Provide job site inspections a minimum of three days a week throughout the course of construction.
 3. Provide electronic inspection reports submitted weekly to the Owner and/or Architect.
 4. Report to the Architect and/or Owner in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
 5. Confirm after completion that manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.11 PROJECT CONDITIONS

- A. Proceed with roofing work only when existing and forecasted weather conditions will permit a unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.
- B. Do not apply roofing insulation or membrane to damp deck surface.
- C. Do not expose materials subject to water or solar damage in quantities greater than can be weatherproofed during same day.

1.12 SEQUENCING AND SCHEDULING

- A. Sequence installation of roofing with related units of work specified in other Sections to ensure that roof assemblies, including roof accessories, flashing, trim and joint sealers, are protected against damage from effects of weather, corrosion and adjacent construction activity.

1.13 WARRANTY

- A. Upon completion of installation, and acceptance by the Owner and Architect, the manufacturer will supply to the Owner (20)-year watertight warranty.
- B. Installer will submit a three (3)-year warranty to the membrane manufacturer with a copy directly to Owner.

1.14 DESIGN AND PERFORMANCE CRITERIA

- A. Uniform Wind Uplift Load Capacity
 - 1. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria. Attachment shall be installed exactly as given in Part 3.
 - a. Design Code: ASCE 7-10, Method 2 for Components.
 - b. Max wind uplift pressure = 90 psf (strength level).

PART 2 - PRODUCTS

2.01 PRODUCTS, GENERAL

- A. Refer to Division 01 Section Common Product Requirements.
- B. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.
- C. Substitutions: Products proposed as equal to the products specified in this Section shall be submitted in accordance with Bidding Requirements and Division 01 provisions.

1. Proposals shall be accompanied by a copy of the manufacturer's standard specification Section. That specification Section shall be signed and sealed by a professional engineer licensed in the state in which the installation is to take place. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.
2. Include a list of three (3) projects of similar type and extent, located within a one hundred mile radius from the location of the project. In addition, the three projects must be at least five (5) years old and be available for inspection by the Architect, Owner or Owner's Representative.
3. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.
4. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

2.02 ACCEPTABLE MANUFACTURERS

- A. The design is based upon roofing systems by The Garland Company, Inc.

2.03 DESCRIPTION

A. WELDTITE MEMBRANE

1. WeldTite Plus 60 Membrane (ASTM D 6754)
2. Membrane Thickness: (ASTM D 751) 60 mil nominal.
3. Thickness over Scrim (ASTM D 751): 0.33 inches
4. Breaking Strength (ASTM D 751): 508 lbf/in
5. Tearing Strength (ASTM D 751): 122 lbf/in
6. Elongation (ASTM D 751): 48 percent.
7. Factory Seam Strength (ASTM D 751) 459 lbf
8. Solar Reflectivity (ASTM E 903) .811
9. Emissivity (ASTM E 903) .919
10. SRI (ASTM E903) 109

B. FLASHING MEMBRANE

1. Nominal 60-mil WeldTite membrane shall be used for all flashing requirements to match the field membrane and warranty expectations selected for the roofing system.
2. WeldTite Inside Corners: Pre-molded corner flashing for inside corners. 80 mil thickness. Color - White.
3. WeldTite Outside Corners: Pre-molded corner flashing for outside corners. 80 mil thickness. Color - White.
4. WeldTite T-Joint Covers: 40 mil thick non-reinforced PVC flashing cut into a 4.5 inch (114mm) diameter circle used to seal step-offs at splice intersections.
5. WeldTite Pipe Flashings: A pre-molded flashing and clamping ring used for pipe penetrations. Available for 1 inch to 6 inch (25 - 152mm) diameter pipes.
6. WeldTite Split Pipe Seals: Pre-fabricated flashing consisting of 60 mil thick reinforced Sure-Flex Membrane for pipes 1 inch to 6 inch (25 -

152mm) in diameter. A split (cut) and overlap tab are incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration.

7. WeldTite Non-Reinforced Flashing: 80 mil thick rolls 12 inches and 24 inches wide. Used for inside/outside corners and field fabricated pipe flashings when use of pre-molded accessories is not feasible.
8. WeldTite Heat Weldable Walkway Rolls: Sure-Flex Membrane offering superior tear, puncture and weather resistance and designed to protect Sure-Flex membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to Sure-Flex membrane using an automated heat welder or hand held heat welder. Walkway Rolls are 36 inches (914mm) wide by 60 feet (18.3 M) long and are nominal 80 mils thick.

C. ACCEPTABLE SUBSTRATE (S)

1. Authorized rigid insulation, cover board or slip sheet.

D. WELDTITE ADHESIVES

1. WeldTite Bonding Adhesive: Solvent-based contact adhesive that allows bonding of Sure-Flex membrane to various porous and non-porous substrates.
 - a. Base: Synthetic Rubber.
 - b. Color: Pale Yellow.
 - c. Solids: 24.2 percent.

2.04 RELATED MATERIALS

A. INSULATION

1. Polyisocyanurate: *2" MIN UNLESS OTHERWISE NOTED (MIN 1/4" PER INCH)*
Mechanically attached to FMI-90
2. Roof Insulation top layer: Dens Dek roof board 4' x 8'.
3. Thickness: 1/4 inches
4. Attachment Method: Adhered with Insta-Stik by Dow Products.
5. Tapered Insulation (as required and shown on drawings for crickets, etc.)

B. FASTENERS

1. HP-X Fastener: A heavy duty #15 threaded fastener with a #3 Phillips drive used with Piranha Fastening Plate to secure Mechanically Fastened Roofing Systems. It is used on minimum 22 gauge steel decks or minimum 15/32" CDX plywood decks. It is also designed to offer an optimum combination of driving performance, back-out and corrosion resistance with excellent pullout performance.
2. Piranha Plate: A 2-3/8" diameter metal barbed fastening plate used with HP-X, CD-10 or HD 14-10 Fasteners for membrane or insulation securement. This plate can be used for membrane or insulation securement on Mechanically Fastened Roofing Systems.

3. Insulation Fastening Plate: A nominal 3-inch metal plate used for insulation attachment in conjunction with the appropriate fastener.

PART 3 - EXECUTION

3.01 EXECUTION, GENERAL

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Clean surfaces thoroughly prior to installation.
- D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- E. Do not commence Work until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment.

3.02 SUBSTRATE PREPARATION

- A. Structural Concrete Deck:
 1. Minimum deck thickness for structural concrete is 4 inches (102 mm).
 2. Allow roof deck to cured prior to application of the roofing system. Where curing is in question, evaluate surface moisture and deck's dryness with the ASTM D 4263 or hot bitumen test procedures.
 3. Repair cracks greater than 1/8 inch (3 mm) in width in accordance with the deck manufacturer's recommendations.
 4. Sumps for the roof drains shall be provided in the casting of the deck.
 5. Where insulation is to be adhered with hot asphalt, prime the deck with asphalt/concrete primer, ASTM D 41 at the rate of one gallon per 100 square feet (0.4 l/sm). Allow the primer to dry prior to the application of the roofing system.
- B. Steel Deck:
 1. Metal decks shall be a minimum uncoated thickness of 22 gauge and have a G-90 galvanized finish on all panels.
 2. Decks must comply with the gauge and span requirements in the current Factory Mutual Approval Guide and be installed in accordance with Loss Prevention Data Sheet 1-28 or specific FM approval.
 3. Remove any surface corrosion and repair severely corroded areas. Properly fasten loose or inadequately secured decking.
- C. Wood Deck (Plank / Heavy Timber):
 1. Wood boards shall be at least 1 inch (25 mm) nominal thickness and have a nominal width of 4 feet-6 inches (1372 mm).

2. All boards shall have a bearing on rafters at each end and be securely nailed.
 3. Cover knotholes or cracks in excess of 1/4 inch (6 mm) with securely nailed sheet metal.
- D. Wood Deck (Plywood Deck):
1. Plywood sheathing shall be CDX grade, minimum 4 ply, and not less than 15/32 inch (12 mm) thick.
 2. Install deck over joists spaced 24 inches (610 mm) o.c. or less. Install deck with all sides bearing on and secured to joist and cross blocking.
- E. Lightweight Insulating Concrete Deck:
1. Lightweight insulating concrete decks are required to have a minimum thickness of 2 inches (51 mm), a minimum compressive strength of 200 psi (1.38 MPa) and a minimum density of 22 pcf (352 kg/sm) for Adhered Roofing Systems.
 2. Moisture content of existing Lightweight concrete must be under 20 percent when insulation is to be fastened directly to it.

3.03 WOOD NAILERS

- A. Install treated lumber at the same heights as insulation layer or adjacent construction \pm 1/4 inch Continuous treated wood nailers are to be installed at all perimeters, around roof projections and penetrations as shown in approved details. In re-cover applications, the surface under the wood nailers shall be FREE OF ALL GRAVEL and shall be as even as possible.
- B. Where wood nailers are installed directly on the substrate, the substrate shall be carefully examined to confirm that the entire area provides a suitable fastening surface. All defects shall be repaired by the appropriate trade prior to installation.
- C. Nailers shall be at least 3½ inch wide and 1.5 inch high and installed and anchored in such a manner to resist a force of 250 lbs. per linear foot of wood blocking in any direction.
- D. Nailers along parapets, curbs and expansion joints are recommended for insulated decking.

3.04 ROOF INSULATION

- A. General
1. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch (6 mm). Stagger joints both horizontally and vertically if multiple layers are provided.
 2. Secure insulation to the substrate with the required mechanical fasteners or insulation adhesive in accordance with the manufacturer's current application guidelines.

3. Securely attach insulation to the roof deck for Adhered or Mechanically Fastened Roofing Systems. Attachment must have been successfully tested to meet or exceed the calculated uplift pressure required by the International Building Code (ASCE-7) or ANSI/SPRI WD-1.

3.05 INSTALLATION OF WELDTITE MEMBRANE

A. Quality Control

1. It will be the responsibility of the roofing contractor to initiate and maintain a QC program to govern all aspects of the installation of the WeldTite Roofing System.
2. The project foreman and or supervisor will be responsible for the daily execution of the QC program which will include but is not limited to the supervision, inspection and probing of all heat welding incorporated within the WeldTite Roofing System.
3. If inconsistencies in the quality of the application of the composite, membrane and/or welds are found, all work shall cease until corrective actions are taken to ensure the continuity the installation.

B. Mechanically Fastened WeldTite Roofing Systems

1. Unroll and position membrane without stretching. Provide and secure both perimeter and field membrane sheets in accordance with the manufacturer's most current specifications and details.
2. Secure the membrane with the required fasteners and plates centered over the pre-printed marks approximately 1 1/2 inches (39mm) from the edge of the membrane sheet.
3. Install adjoining membrane sheets in the same manner in accordance with the manufacturer's current application requirements.
4. Attachment Schedule:
 - a. Field (Zone 1) Fastener Density: 12 inches on center
 - b. Perimeter (Zones 2 and 3) Fastener Density: 6 inches on center
 - c. Perimeter (Half-width) Sheets: 2

C. WeldTite Fully Adhered Roofing Systems

1. Position WeldTite membrane over the acceptable substrate. Fold membrane sheet back lengthwise so half the underside of the membrane is exposed.
2. Apply WeldTite Bonding Adhesive in accordance with the manufacturer's published instructions, to the exposed underside of the membrane and the corresponding substrate area. Do not apply Bonding Adhesive along the splice edge of the membrane to be hot air welded over the adjoining sheet. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
3. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded section of the membrane sheet

immediately after rolling the membrane into the adhesive with a soft bristle push broom to achieve maximum contact.

4. Fold back the unbonded half of the sheet lengthwise and repeat the bonding procedures.
5. Position adjoining sheets to allow a minimum overlap of 2 inches (51mm).
6. Hot-air weld the WeldTite membrane sheets using the Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures.
7. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches (51mm) and complete the bonding procedures as stated previously.

D. Hot Air Welding

1. General

- a. All field seams exceeding 10 feet in length shall be welded with an approved automatic welder.
- b. All field seams must be clean and dry prior to initiating any field welding.
- c. Remove foreign materials from the seams (dirt, oils, etc.) with Acetone or authorized alternative. Use CLEAN WHITE COTTON cloths and allow approximately five minutes for solvents to dissipate before initiating the automatic welder. Do not use denim or synthetic rags for cleaning.
- d. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld.
- e. Contaminated areas within a seam will inhibit proper welding and will require a membrane patch

2. Hand Welding

- a. The lap or seam area of the membrane should be intermittently tack welded to hold the membrane in place.
- b. The back "interior" edge of the membrane shall be welded first, with a thin, continuous weld to concentrate heat along the exterior edge of the lap during the final welding pass.
- c. The nozzle of the hand held hot air welder shall be inserted into the lap at a 45° angle to the lap. Once the polymer on the material begins to flow, a hand roller shall be use to apply pressure at a right angle to the tip of the hand welder. Properly welded seams shall utilize a 1-1/2 inch wide nozzle, to create a homogeneous weld, a minimum of 1-1/2 inches in width.
- d. Smaller nozzles may be used for corners, and other field detailing, maintaining a minimum 1 inch weld.

3. Automatic Machine Welding

- a. Follow all manufacturers' instructions for the safe operation of the automatic welder.

- b. Follow local code requirements for electric supply, grounding and surge protection.
- c. The use of a dedicated, portable generator is highly recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.
- d. Properly welded seams shall utilize a 1-1/2 inch wide nozzle, to create a homogeneous weld, a minimum of 1-1/2 inches in width.

E. Inspection

1. The job foreman and/or supervisor shall initiate daily inspections of all completed work which shall include, but is not limited to the probing of all field welding with a dull pointed instrument to assure the quality of the application and ensure that any equipment or operator deficiencies are immediately resolved.
2. Ensure that all aspects of the installation (sheet layout, attachment, welding, flashing details, etc.) are in strict accordance with the most current WeldTite Roofing Systems Specifications and Details.
3. Excessive patching of field seams because of inexperienced or poor workmanship will not be accepted at time of FINAL INSPECTION FOR WARRANTY ACCEPTANCE.

3.06 FLASHING

- A. Clean all vents, pipes, conduits, tubes, walls, and stacks to bare metal. All protrusions must be properly secured to the roof deck with approved fasteners. Remove and discard all lead, pipes and drain flashing. Flash all penetrations according to approved details.
- B. Remove all loose and/or deteriorated cant strips and flashing.
- C. Flash all curbs, parapets and interior walls in strict accordance with approved WeldTite details.
- D. All flashing shall be adhered to properly prepared, approved substrate(s) with WeldTite Bonding Adhesive applied in sufficient quantity to ensure total adhesion.
- E. The base flange of all membrane flashing shall extend out on to the plane of the deck, beyond the wood nailers to a maximum width of 8 inches.
- F. Vertical flashing shall be terminated no less than 8 inch above the plane of the deck with approved termination bar and counter-flashing or metal cap flashing.
- G. When using adhesive, vertical wall flashing termination shall not exceed 30 inches without supplemental mechanical attachment of the flashing between the deck and the termination point of the flashing.
- H. Complete all inside and outside corner flashing details with pre-formed corners or an approved field fabrication detail.

- I. Probe all seams with a dull, pointed probe to ensure the weld has created a homogeneous bond.
- J. Install penetration accessories in strict accordance with approved details. Ensure penetration accessories have not impeded in any way the working specification.

3.07 METAL FLASHING

- A. All perimeter edge details are to be fabricated from WeldTite Clad Metal.
- B. Ensure all fascia extend a minimum of 2 inch lower than the bottom of the wood nailers.
- C. Fasten all metal flashing to wood nailers or approved substrate with approved fasteners 8 inches on center.
- D. Break and install WeldTite Clad metal in accordance with approved details, ensuring proper attachment, maintaining 1/2 inch expansion joints and the installation of a minimum 2 inch bond breaker tape prior to sealing the joint.
- E. Solidly weld WeldTite Clad expansion joints with a 6 inch strip of WeldTite membrane welded to the WeldTite Clad, covering the bond breaker tape (cover plates are optional).
- F. Roof Drains
 - 1. Flash all roof drains in accordance with WeldTite roof drain details.
 - 2. Replace all worn or broken parts that may cut the WeldTite membrane or prevent a watertight seal. This includes the clamping ring and strainer basket.
 - 3. Replace all drain bolts or clamps used to hold the drain compression ring to the drain bowl.
 - 4. WeldTite non-reinforced 60 mil membrane shall be used for flashing the drain assembly. Drain assemblies and basins or "sumps" must be free of any asphalt or coal tar pitch residue prior to installation.
 - 5. The drain target sheet should be sized and installed to provide for a minimum of 12 inch of exposed 60 mil on all sides of the drain.

3.08 TEMPORARY SEALS

- A. At the end of each working day or at the sign of rain, install temporary, 100% watertight seal(s) where the completed new roofing adjoins the uncovered deck or existing roof surface.
- B. The authorized roofing contractor shall create and maintain the temporary seal in such a manner to prevent water from traveling beneath the new and/or existing roof system.
- C. The use of plastic roofing cement is permissible when sealing to an existing built up roof.

- D. If water is allowed to enter beneath the newly completed roofing, the affected area(s) shall be removed and replaced at no additional expense to the building owner.
- E. Prior to the commencement of work, cut out and remove all contaminated membrane, insulation, roof cement or sealant and properly dispose off site.

3.09 WALKWAYS

- A. WeldTite walkways shall be installed at staging areas for roof top equipment maintenance or areas subject to regular foot traffic such as roof top ladders, roof hatches, etc.
- B. Walkway Installation
 - 1. Roofing membrane to receive walkway material shall be clean and dry.
 - 2. Cut and position the WeldTite walkway material as directed by the specifications or agreement.
 - 3. Hot air weld the entire perimeter of the walk way to the previously cleaned WeldTite roofing membrane. Avoid excessive heating of the walk way material to prevent scorching the underlying roofing membrane.

3.10 FIELD QUALITY CONTROL

- A. Perform field inspection and testing as required under provisions of Division 01 Section Quality Requirements.
- B. Correct defects or irregularities discovered during field inspection.
- C. Require attendance of roofing materials manufacturers' representatives at site during installation of the roofing system. A copy of the specification should also be on site at all times.

3.11 CLEANING

- A. Remove adhesive drippings from all walls, windows, floors, ladders and finished surfaces.
- B. In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this Section, consult manufacturer of surfaces for cleaning instructions and conform to their instructions.
- C. Repair or replace defaced or disfigured finishes caused by work of this Section.

3.12 CONSTRUCTION WASTE MANAGEMENT

- A. Remove and properly dispose of waste products generated during roofing procedures. Comply with requirements of authorities having jurisdiction.

3.13 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with Contractor, Architect, installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. The roofing system manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the Roofing Contractor.
- D. If core cuts verify the presence of damp or wet materials, the [Roofing] Contractor shall be required to replace the damaged areas at his own expense.
- E. Repair or replace deteriorated or defective work found at time above inspection as required to produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- F. Notify the Contractor, Architect, Owner upon completion of corrections.
- G. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.
- H. Immediately correct roof leakage during construction. If the Contractor does not respond within twenty four (24) hours, the Owner will exercise rights to correct the Work under the terms of the Conditions of the Contract.

3.14 DEMONSTRATION AND TRAINING

- A. At a time and date agreed to by the Owner, instruct the Owner's facility manager, or other representative designated by the Owner, on the following procedures:
 - 1. Roof troubleshooting procedures.
 - 2. Notification procedures for reporting leaks or other apparent roofing problems.
 - 3. Roofing maintenance.
 - 4. The Owner's obligations for maintaining the roofing warranty in effect and force.
 - 5. The Manufacturer's obligations for maintaining the roofing warranty in effect and force.

END OF SECTION

SECTION 07 62 00**SHEET METAL FLASHING AND TRIM****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes:
1. Manufactured reglets with counterflashing.
 2. Formed roof-drainage sheet metal fabrications.
 3. Formed low-slope roof sheet metal fabrications.
 4. Formed steep-slope roof sheet metal fabrications.
 5. Formed wall sheet metal fabrications.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For sheet metal flashing and trim.
1. Include plans, elevations, sections, and attachment details.
 2. Distinguish between shop- and field-assembled work.
 3. Include identification of finish for each item.
 4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.
- C. Samples: For each exposed product and for each color and texture specified.

1.03 SUBMITTALS

- A. Product certificates.
- B. Product test reports.
- C. Sample warranty.
- D. Maintenance data.

1.04 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

1.05 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Final Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- D. SPRI Wind Design Standard: Manufacture and install copings, roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:
 - 1. Design Pressure: As indicated on Drawings.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 - 1. As-Milled Finish: Mill
 - 2. Factory Prime Coating: Where painting after installation is required, pretreat metal with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of 0.2 mil.

3. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
4. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - a. Color: To be selected by Architect.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 2B (bright, cold rolled finish).
- D. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
 1. Exposed Coil-Coated Finish:
 - a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 2. Color: As selected by Architect from manufacturer's full range.

2.03 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F; and complying with physical requirements of ASTM D 226/D 226M for Type I and Type II felts.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Atlas Roofing Corporation; Summit.
 - b. Engineered Coated Products; Nova-Seal II.
 - c. SDP Advanced Polymer Products Inc; Palisade.
- C. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.-Conn.; Grace Ice and Water Shield HT.
 - c. Henry Company; Blueskin PE200 HT.
 - d. Kirsch Building Products, LLC; Sharkskin Ultra SA.
 - e. Metal-Fab Manufacturing, LLC; MetShield.
 - f. Owens Corning; WeatherLock Specialty Tile & Metal Underlayment.
 - g. Polyguard Products, Inc.; Deck Guard HT.
 - h. Protecto Wrap Company; Protecto Jiffy Seal Ice & Water Guard HT.
 - i. SDP Advanced Polymer Products Inc; Palisade SA-HT.
2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.
3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.

D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.04 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Solder:

1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead with maximum lead content of 0.2 percent.

- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

- H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

- I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.05 MANUFACTURED REGLETS

- A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Cheney Flashing Company.
 - b. Fry Reglet Corporation.
 - c. Heckmann Building Products, Inc.
 - d. Hickman, W. P. Company.

- e. Hohmann & Barnard, Inc.
 - f. Keystone Flashing Company, Inc.
 - g. National Sheet Metal Systems, Inc.
- 3. Material: Galvanized steel, 0.022 inch thick.
 - 4. Finish: Mill

2.06 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 1. Obtain field measurements for accurate fit before shop fabrication.
 - 2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

2.07 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch-long sections. Furnish flat-stock gutter brackets and gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
- B. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen.
- C. Built-in Gutters: Fabricate to cross section required, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required. Fabricate in minimum 96-inch-long sections. Fabricate expansion joints and accessories from same metal as gutters unless otherwise indicated.
1. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen
 2. Fabricate from the Following Materials:
 - a. Stainless Steel: 0.016 inch thick.
- D. Downspouts: Fabricate round downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors.
1. Hanger Style: C-clamps.
 2. Fabricate from the following materials:
 - a. Galvanized Steel: 0.022 inch thick.
- E. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:
1. Galvanized Steel: 0.028 inch thick.
- F. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes. Fabricate from the following materials:
1. Galvanized Steel: 0.028 inch thick.
- G. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
1. Aluminum: 0.040 inch thick.
 2. Stainless Steel: 0.019 inch thick.

2.08 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop): Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long sections. Furnish with 6-inch- wide, joint cover plates.
1. Fabricate from the Following Materials: All roof edge flashing are to be supplied by Roofing Manufacturer to match metal roofing and or metal siding.
 - a. Aluminum: 0.050 inch thick.
 - b. Stainless Steel: 0.019 inch thick.
 - c. Galvanized Steel: 0.028 inch thick.
 - d. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
- B. Copings and Parapet Caps:
1. Fabricate from the Following Materials: All copings and parapet caps are to be supplied by Roofing Manufacturer to match metal roofing and or metal siding.
- C. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Galvanized Steel: 0.028 inch thick.
- D. Counterflashing and Flashing Receivers: Fabricate from the following materials:
1. Galvanized Steel: 0.022 inch thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.019 inch thick.
 2. Galvanized Steel: 0.028 inch thick.
 3. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
- F. Roof-Drain Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.016 inch thick.

2.09 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials: To be supplied by Roofing Manufacturer to match metal roofing and or metal siding
- B. Valley Flashing: Fabricate from the following materials: To be supplied by Roofing Manufacturer to match metal roofing and or metal siding
- C. Drip Edges: Fabricate from the following materials: To be supplied by Roofing Manufacturer to match metal roofing and or metal siding

- D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:. To be supplied by Roofing Manufacturer to match metal roofing and or metal siding

2.10 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:
1. Stainless Steel: 0.016 inch thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
1. Aluminum: 0.032 inch thick.
 2. Stainless Steel: 0.016 inch thick.
 3. Galvanized Steel: 0.022 inch thick.
 4. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

PART 3 - EXECUTION

3.01 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.

3.02 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 - Joint Sealants.
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel and aluminum sheet.
 2. Do not use torches for soldering.
 3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

4. **Stainless-Steel Soldering:** Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

H. **Rivets:** Rivet joints in uncoated aluminum where necessary for strength.

3.03 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. **General:** Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. **Hanging Gutters:** Join sections with riveted and soldered joints. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
 1. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
 2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.
- C. **Built-in Gutters:** Join sections with riveted and soldered joints. Provide for thermal expansion. Slope to downspouts. Provide end closures and seal watertight with sealant.
 1. Install underlayment layer in built-in gutter trough and extend to drip edge at eaves and under underlayment on roof sheathing. Lap sides minimum of 2 inches over underlying course. Lap ends minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with roofing nails. Install slip sheet over underlayment.
 2. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
- D. **Downspouts:** Join sections with 1-1/2-inch telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c.
- E. **Splash Pans:** Install where downspouts discharge on low-slope roofs. Set in asphalt roofing cement or elastomeric sealant compatible with the substrate.
- F. **Parapet Scuppers:** Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
- G. **Conductor Heads:** Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch below scupper or gutter discharge.

- H. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches in direction of water flow.

3.04 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.05 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.06 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION

SECTION 07 72 00**ROOF HATCH****PART 1 - GENERAL****1.01 SUMMARY**

- A. Work included: Furnishing and installing factory fabricated roof hatches.
- B. Related Work:
 - 1. Section 07 54 23 – Membrane Roofing

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM), 100 Bar Harbor Drive, West Conshocken, PA 19428-2959; (610) 832-9585, fax (610) 832-9555.
 - 1. ASTM A 36-93a: Standard Specification for Structural Steel.

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's product data for all materials in this specification.
- B. Shop Drawings: Show profiles, accessories, location, and dimensions.
- C. Samples: Manufacturer to provide upon request; sized to represent material adequately.

1.04 PRODUCT HANDLING

- A. All materials shall be delivered in manufacturer's original packaging.
- B. Store materials in a dry, protected, well-vented area. The contractor shall thoroughly inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.
- C. Remove protective wrapping immediately after installation.

1.05 SUBSTITUTIONS

- A. Substitutions will be reviewed under the provisions of 01 25 00 – Substitution Procedures.

1.06 JOB CONDITIONS

- A. Verify that other trades with related work are complete before installing roof hatch(s).
- B. Mounting surfaces shall be straight and secure; substrates shall be of proper width.
- C. Refer to the construction documents, shop drawings, and manufacturer's installation instructions.
- D. Coordinate installation with roof membrane and roof insulation manufacturer's instructions before starting.
- E. Observe all appropriate OSHA safety guidelines for this work.

1.07 WARRANTY/GUARANTEEE

- A. **Manufacturer's Standard Warranty:** Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge. Electrical motors, special finishes, and other special equipment (if applicable) shall be warranted separately by the manufacturers of those products.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design is The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-203-934-6363, Fax: 1-203-933-8478, Web: www.bilco.com
- B. Other Manufacturers: Babcock-Davis, Acudor.

2.02 ROOF HATCH

- A. Furnish and install where indicated on plans metal roof hatch Type S, size width: 3'0" x length: 2'6". Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.
- B. Performance characteristics:
 - 1. Cover shall be reinforced to support a minimum live load of 40 psf with a maximum deflection of 1/150th of the span or a maximum design pressure of + or - 70 psf with a factor of safety of 2.
 - 2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
 - 3. Operation of the cover shall not be affected by temperature.
 - 4. Entire hatch shall be weathertight with fully welded corner joints on cover and curb.
- C. Cover: Shall be 14 gauge paint bond G-90 galvanized steel with a 3" beaded flange with formed reinforcing members. Cover shall have a heavy extruded

EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.

- D. Cover insulation: Shall be fiberglass of 1" thickness, fully covered and protected by a metal liner 22 gauge paint bond G-90 galvanized steel.
- E. Curb: Shall be 12" in height and of 14 gauge paint bond G-90 galvanized steel. The curb shall be formed with a 3-1/2" flange with 7/16" holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6" on center, to be bent inward to hold single ply roofing membrane securely in place.
- F. Curb insulation: Shall be rigid, high-density fiberboard of 1" thickness on outside of curb.
- G. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe for steel construction: through bolted to the curb assembly.
- H. Hardware
 - 1. Heavy pintle hinges shall be provided.
 - 2. Cover shall be equipped with a spring latch with interior and exterior turn handles.
 - 3. Roof hatch shall be equipped with interior and exterior padlock hasps.
 - 4. The latch strike shall be a stamped component bolted to the curb assembly.
 - 5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" diameter red vinyl grip handle to permit easy release for closing.
 - 6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.
 - 7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
- I. Finishes: Factory finish shall be alkyd based red oxide primed steel.
- J. Models S-20 (galvanized steel cover and curb) and S-50 (aluminum cover and curb) shall be Miami-Dade Product Control approved, NOA # 10-0113.01 (Exp. 12/2/14) meeting large and small missile impact requirements.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that roof hatch installation will not disrupt other trades. Verify that the substrate is dry, clean, and free of foreign matter. Report and correct defects prior to any installation.

3.02 INSTALLATION

- A. Submit product design drawings for review and approval to the architect or specifier before fabrication.
- B. The installer shall check as-built conditions and verify the manufacturer's roof hatch details for accuracy to fit the application prior to fabrication. The installer shall comply with the roof hatch Manufacturer's installation instructions.
- C. The installer shall furnish mechanical fasteners consistent with the roof requirements.

END OF SECTION

SECTION 07 72 36**SMOKE VENTS****PART 1 - GENERAL****1.01 SUMMARY**

- A. Work included: Furnishing and installing factory fabricated automatic roof fire vents.
- B. Related Work:
 - 1. Section 07 54 23 - Membrane Roofing

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM), 100 Bar Harbor Drive, West Conshocken, PA 19428-2959; (610) 832-9585, fax (610) 832-9555
 - 1. ASTM A 36-93a: Standard Specification for Structural Steel
- B. Underwriters Laboratories (UL), 333 Pfingsten Road, Northbrook, IL, 60062, (847) 272-8800, fax (847) 272-8129
- C. International Organization for Standardization (ISO), ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, phone +41 22 749 01 11, fax +41 22 733 34 30
 - 1. ISO 9001:2008 Certified

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's product data for all materials in this specification.
- B. Shop Drawings: Show profiles, accessories, location, fusible links, adjacent construction interface, and dimensions.
- C. Samples: Manufacturer to provide upon request; sized to represent material adequately.
- D. Contract Closeout: Roof fire vent manufacturer shall provide the manufacturer's Warranty prior to the contract closeout

1.04 PRODUCT HANDLING

- A. All materials shall be delivered in manufacturer's original packaging.

- B. Store materials in a dry, protected, well-vented area. The contractor shall thoroughly inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.
- C. Remove protective wrapping immediately after installation.

1.05 SUBSTITUTIONS

- A. Proposals for substitution products shall be accepted only from bidding contractors and not less than (10) working days before bid due date. Contractor guarantees that proposed substitution shall meet the performance and quality standards of this specification.

1.06 JOB CONDITIONS

- A. Verify that other trades with related work are complete before installing roof fire vent(s).
- B. Mounting surfaces shall be straight and secure; substrates shall be of proper width.
- C. Refer to the construction documents, shop drawings, and manufacturer's installation instructions.
- D. Coordinate installation with roof membrane and roof insulation manufacturer's instructions before starting.
- E. Observe all appropriate OSHA safety guidelines for this work.

1.07 WARRANTY/GUARANTEE

- A. Manufacturer's standard warranty: Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge. Special finishes and other special equipment shall be warranted separately by the manufacturers of those products.
- B. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. The BILCO Company, P.O. Box 1203, New Haven, CT 06505
1-203-934-6363, Fax: 1-203-933-8478, Web: www.bilco.com

2.02 AUTOMATIC ROOF FIRE VENT

- A. Furnish and install where indicated on plans metal fire vent Type ACDSH, 48"x96". Length denotes hinge side. The roof fire vent shall be double leaf. The roof fire vent shall be preassembled from the manufacturer.
- B. Performance characteristics:
1. Vent(s) shall be UL listed.
 2. Covers shall be reinforced to support a minimum live load of 40 psf with a maximum deflection of 1/150th of the span or 90 psf wind uplift.
 3. Operation: Corrosion resistant gas springs shall open the vent covers simultaneously when latch is manually released or when heat breaks the UL listed fusible link. Opening shall be in a controlled manner to avoid damage to surrounding roof surfaces.
 4. Entire roof fire vent shall be weathertight with fully welded corner joints on cover and curb.
 5. Latch mechanisms shall hold the covers in the closed position without overstressing the fusible link and withstand 90 psf wind uplift forces acting on the cover.
 6. Latch operation: When heat parts the UL listed fusible link, the latch shall release instantaneously, allowing vent covers to open. The latch shall be designed for easy resetting, after a fire or test, so that the covers cannot be latched closed unless the mechanism has been reset properly. Manufacturer shall provide instructions for resetting the latch with each unit.
 7. Sound Transmission Rating: Vent(s) shall carry STC-46 sound rating.
- C. Covers: Shall be 14 gauge paint bond G-90 galvanized steel with a 5" beaded flange with formed reinforcing members.
- D. Gasket: PVC gaskets shall be permanently adhered to the underside of the covers and on top of the curb.
- E. Cover insulation: Shall be fiberglass of 3" in thickness, fully covered and protected by a 14 gauge paint bond G-90 galvanized steel liner.
- F. Curb: Shall be 12" in height and of 14 gauge paint bond G-90 galvanized with a fixed center channel. Curb shall be formed with a 5" flange with 7/16" holes provided for securing to roof deck. Curb shall be equipped with integral metal capflashing of the same gauge and material as the curb and feature the Bil-Clip® flashing system, including stamped tabs, 6" on center, to be bent inward to hold single-ply roofing membrane securely in place.
- G. Curb insulation: Shall be 3" fiberglass insulation, fully enclosed by a 14 gauge paint bond G-90 galvanized steel liner.
- H. Lifting mechanisms: Corrosion resistant gas springs open covers automatically against a 10 lb/ft² snow/wind load. Gas springs shall have built in dampers to assure a controlled rate of opening and automatically lock the covers in the full open position. A release mechanism shall be provided to allow the covers to be closed.

- I. Latch mechanism: Shall be the BILCO Thermolatch® II positive hold/release mechanism with a separate latching point for each cover controlled by a single UL listed 165°F fusible link. Fusible link shall be curb mounted on a non-hinged end to allow the latching mechanism to be easily reset from the roof level.
- J. Hardware: Corrosion resistant gas springs and hot dip galvanized steel stop cables. All other hardware is zinc plated/chromate sealed
- K. Finish: Factory finish shall be alkyd base red oxide primer.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that roof fire vent installation will not disrupt other trades. Verify that the substrate is dry, clean, and free of foreign matter. Report and correct defects prior to any installation.

3.02 INSTALLATION

- A. Submit product design drawings for review and approval to the architect or specifier before fabrication.
- B. The installer shall check as-built conditions and verify the manufacturer's roof fire vent details for accuracy to fit the application prior to fabrication. The installer shall comply with the roof fire vent manufacturer's installation instructions.
- C. The installer shall furnish mechanical fasteners consistent with the roof requirements.
- D. The manufacturer shall provide instructions for resetting the latching device with each unit.
- E. The installer shall test the vent(s) for proper operation after installation fusing the link. A replacement fusible link shall be supplied with vent by the manufacturer.

END OF SECTION

SECTION 07 84 13
PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings containing penetrating items:
 - 1. Floors.
 - 2. Walls and partitions.

1.02 RELATED SECTIONS

- A. Section 07 21 10 - Thermal Batt Insulation: Safing insulation and accessories.
- B. Section 07 92 00 - Joint Sealants: For non-fire-resistive-rated joint sealants.
- C. Division 22 Sections: Duct and piping penetrations.
- D. Division 26 Sections: Cable and conduit penetrations.

1.03 SYSTEM PERFORMANCE REQUIREMENTS:

- A. General: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
- B. F-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.
- C. T-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupy-able floor areas. T-rated assemblies are required where the following conditions exist:
 - 1. Penetrations located outside of wall cavities.
 - 2. Penetrations located outside fire-resistive shaft enclosures.
 - 3. Penetrations located in construction containing fire-protection-rated openings.
 - 4. Penetrating items larger than a 4-inch diameter nominal pipe or 16 sq. in. In overall cross-sectional area.

- D. Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E 119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
- E. For firestopping 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.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- F. For Firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84.

1.04 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Submit for each type of through-penetration firestop system product specified.
 - 1. Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.
- C. Shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system, and each kind of construction condition penetrated and kind of penetrating item. Include firestop design of qualified testing and inspecting agency evidencing compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustration, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop configuration for construction and penetrating items.
- D. Product certificates signed by manufacturers of firestopping products certifying that products furnished comply with specified requirements.
- E. Product test reports from, and based on tests performed by, a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on comprehensive testing of current products.
- F. Qualification data for firms and persons specified in AQuality Assurance@ article to demonstrate their capabilities and experience. Include list of completed

projects with project names of Architects and Owners, and other information specified.

1.05 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide firestop systems that comply with the following requirements and those specified under the ASystem Performance Requirements@ article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to though-penetration firestop system designations listed by UL in their AFire Resistance Directory@, by Warnock Hersey, or be another qualified testing and inspecting agency.
- B. Installer Qualifications: Engage an experienced Installer who has completed firestopping that is similar in material, design, and extent to the indicated for Project and that has performed successfully.
- C. Single- Source Responsibility: Obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.
- D. Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, APolarized Light Microscopy.@
- E. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designed through-penetration firestop systems are installed per specified requirements.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturers= labels identifying product and manufacturer; date of manufacturer; lot number; shelf life, if applicable; qualified testing and inspecting agency=s classification marking applicable to Project; curing time; and mixing instructions for multi-component materials.
- B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.07 PROJECT CONDITIONS

- A. Environmental Conditions: 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.
- B. Ventilation: Ventilate firestopping per firestopping manufacturer=s instructions by natural means or, where this is inadequate, forced air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - 1. Instant Firestop Mfg., Inc.
 - 2. Isolatek International.
 - 3. RectorSeal Corporation (The).
 - 4. 3M Fire Protection Products.
 - 5. Tremco.

2.02 FIRESTOPPING, GENERAL

- A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.
- B. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with ASystem Performance Requirements@ article in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designed fire-resistance-rated systems. Accessories include but are not limited to the following items:
 - 1. Permanent forming/damming/backing materials including the following:
 - a. Semirefractory fiber (material wool) insulation.
 - b. Ceramic fiber.
 - c. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - d. Fire rated formboard.
 - e. Joint fillers for joint sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.03 MIXING

- A. For those products requiring mixing prior to application, comply with firestopping manufacturer=s directions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items substrates, and other conditions affecting performance of firestopping. Do not proceed with unstaallation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
 - 1. Remove all foreign materials from surfaces of opening and joint substrates and form penetrating items that could interfere with adhesion of firestopping.
 - 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of development optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer=s recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping=s seal with substrates.

3.03 INSTALLING THROUGH-PENETRATION FIRESTOPS

- A. General: Comply with the ASystem Performance Requirements@ article in Part 1 and the through-penetration firestop manufacturer=s installation instructions and drawings pertaining to products and applications indicated.

- B. Install forming/damming materials and other accessories to types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials from through-penetration firestop systems by proven techniques to produce the following results:
 - 1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.
- B. Protect firestopping 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, deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION

SECTION 07 90 00
JOINT PROTECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Throughout the work, caulk and seal all joints where shown on the Drawings and elsewhere as required to provide a positive barrier against passage of air and passage of moisture.
- B. Related Work Described Elsewhere:
 - 1. Adhere strictly to the caulking and sealant details shown on the Drawings.

1.02 QUALITY ASSURANCE

- A. Qualifications of Manufacturers: Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.
- B. Qualifications of Installers:
 - 1. Proper caulking and proper installation of sealants require that installers be thoroughly trained and experienced in the necessary skills and thoroughly familiar with the specified requirements.
 - 2. For caulking and installation of sealants throughout the work, use only personnel who have been specifically trained in such procedures and who are completely familiar with the joint details shown on the drawings and the installation requirements called for in this section.

1.03 SUBMITTALS

- A. Manufacturer's Data: Within 30 calendar days after award of the contract, submit:
 - 1. A complete materials list showing all items proposed to be furnished and installed under this section.
 - 2. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.
 - 3. Specifications, installation instructions, and general recommendations from the materials manufacturers showing procedures under which it is proposed that the materials will be installed.
- B. Samples: Accompanying the submittal required in Paragraph 1-03, submit samples of each sealant, each backing material, each primer and each bond breaker proposed to be used.

1.04 PRODUCT HANDLING

- A. Delivery and Storage: Deliver all materials of this section to the job site in the original unopened containers with all labels intact and legible at time of use. Store only under conditions recommended by the manufacturers. Do not retain on the job site any material which has exceeded the shelf life recommended by its manufacturer.
- B. Protection: use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.
- C. Replacements: 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.

PART 2 - PRODUCTS

2.01 SEALANTS

- A. General: Except as specifically otherwise directed by the Architect, use only the type of sealants described in this Article.
- B. Sealant: Provide two-component, rubber based compound complying with Fed Spec TT-S-00227c, with each color of sealant and each class of sealant the product of a single manufacturer selected from the following, or equal products approved in advance by the Architect.
 - 1. Class A (for non-traffic bearing horizontal surfaces):
 - a. "Novacaulk 200 Series", manufactured by Novagard Corp., 835 New York Avenue, Trenton, New Jersey 08638;
 - b. "Paramastic", manufactured by Parr, Inc., 18400 Syracuse Avenue, Cleveland, Ohio 44110;
 - c. "Hornflex TG" of "Vertiseal", manufactured by A.C. Horn, Inc., 3701 East Union Pacific Avenue, Los Angeles, California 90023.
 - 2. Class B (for vertical surfaces):
 - a. "Churchill 3C-50", manufactured by Churchill Chemical Corp., 3137 East 26th Street, Los Angeles, California 90023;
 - b. "Ultratite 101 Series", manufactured by Essex Chemical Corp., 19451 Susana Road, Compton, California 90221;
 - c. "Rubber Caulk 250 Sealant", manufactured by Products Research and Chemical corp., 5454 San Fernando Road, Glendale, California 91203.
 - 3. For other services, provide products especially formulated for the proposed use and approved in advance by the Architect.

2.02 PRIMERS

- A. Use only those primers which are non-staining, have been tested for durability on the surfaces to be sealed, and are specifically recommended for this installation by the manufacturer of the sealant used.

2.03 BOND MATERIALS

- A. General: Use only those backup materials which are specifically recommended for this installation by the manufacturer of the sealant used, and which are nonabsorbent and non-staining.

2.04 BOND-PREVENTIVE MATERIALS

- A. Use only one of the following as best suited for the application and as recommended by the manufacturer of the sealant used.
 - 1. Polyethylene tape, pressure-sensitive adhesive, with the adhesive required only to hold tape to the construction materials as indicated.
 - 2. Aluminum foil conforming to MIL-SPEC-MIL-A-148E.
 - 3. Wax paper conforming to Fed. Spec. UU-P-270.

2.05 MASKING TAPE

- A. For masking around joints, provide masking tape conforming to Fed. Spec. UU-T-106c.

2.06 OTHER MATERIALS

- A. All other materials, not specifically described, but required for complete and proper caulking and installation of sealants, shall be first quality of their respective kinds, new, and as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Concrete and Ceramic Tile and Similar Surfaces:
 - 1. All surfaces in contact with sealant shall be dry, sound, and well brushed and wiped free from dust.
 - 2. Use solvent to remove oil and grease, wiping the surfaces with clean rags.

3. Where surfaces have been treated, remove the surface treatment by sandblasting or wire brushing.
4. Remove all laitance and mortar from the joint cavity.
5. Where backstop is required, insert the approved backup material in the joint cavity to the depth required.

B. Steel Surfaces:

1. Steel surfaces in contact with sealant shall be sandblasted or, if sandblasting would not be practical or would damage adjacent finish, the metal shall be scraped or wire-brushed to remove mill scale.
2. Use solvent to remove oil and grease, wiping the surfaces with clean rags.
3. Remove protective coatings on steel by sandblasting or by a solvent that leaves no residue.

C. Aluminum Surfaces

1. Aluminum surfaces in contact with sealant shall be cleaned of temporary protective coatings, dirt, oil, and grease.
2. When masking tape is used for a protective cover, remove the tape just prior to applying the sealant.
3. Use only such solvents to remove protective coatings as are recommended for that purpose by the manufacturer of the aluminum work, and which are nonstaining.

3.03 INSTALLATION OF BACKUP MATERIAL

- A. Use only the backup material recommended by the manufacturer of the sealant and approved by the Architect for the particular installation, compressing the backup material 25% to 50% to secure a positive and secure fit. When using backup of tube or rod stock, avoid lengthwise stretching of the material. Do not twist or braid hose or rod backup stock.

3.04 PRIMING

- A. Use only the primer recommended by the manufacturer of the sealant and approved by the Architect for the particular installation. Apply the primer in strict accordance with the manufacturer's recommendations as approved by the Architect.

3.05 BOND-BREAKER INSTALLATION

- A. Install an approved bond-breaker where recommended by the manufacturer of the sealant and where directed by the Architect, adhering strictly to the installation recommendations as approved by the Architect.

3.06 INSTALLATION OF SEALANTS

- A. General: Prior to start of installation in each joint, verify the joint type and verify that the required proportion of width of joint to depth of joint has been secured.

- B. **Equipment:** Apply sealant under pressure with hand or power-actuated gun or other appropriate means. Guns shall have nozzle of proper size and shall provide sufficient pressure to completely fill joints as designed.
- C. **Masking:** Thoroughly and completely mask all joints where the appearance of sealant on adjacent surfaces would be objectionable.
- D. **Installation of Sealant:** Install the sealant in strict accordance with the manufacturer's recommendations as approved by the Architect, thoroughly filling all joints to the recommended depth.
- E. **Tooling:** Tool all joints to the profile shown or as directed by Architect.
- F. **Cleaning Up:**
 - 1. Remove masking tape immediately after joints have been tooled.
 - 2. Clean adjacent surfaces free from sealant as the installation progresses. Use solvent or cleaning agent as recommended by the sealant manufacturer.

END OF SECTION

SECTION 08 11 13**HOLLOW METAL DOORS AND FRAMES****PART 1 - GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SUMMARY**A. Section Includes:**

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Flush Wood Doors".
3. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
4. Division 08 Section "Door Hardware".
5. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 1. Elevations of each door design.
 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of anchorages, joints, field splices, and connections.
 6. Details of accessories.
 7. Details of moldings, removable stops, and glazing.
 8. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
 1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
 - C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
 - 1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
 - 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
 - 3. Smoke Control Door Assemblies: Comply with NFPA 105.
 - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
 - D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
 - E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.
- 1.05 DELIVERY, STORAGE, AND HANDLING
- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
 - B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
 - C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.07 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:
 - 1. CECO Door Products (C).
 - 2. Curries Company (CU).
 - 3. Security Metal Products (SMP).

2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.03 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.

- B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Design: Flush panel.
 2. Core Construction: Manufacturer's standard polystyrene. Where indicated, provide doors fabricated as thermal-rated assemblies with a minimum R-value of 2.8 or better.
 3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
 4. Vertical Edges: Vertical edges to have the face sheets spot welded and filled full height with an epoxy filler. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Design: Flush panel.
 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
 4. Vertical Edges: Vertical edges to have the face sheets spot welded and filled full height with an epoxy filler. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Manufacturers Basis of Design:

1. Curries Company (CU) - Polystyrene Core - 707 Series.

2.04 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
 3. Manufacturers Basis of Design:
 - a. Curries Company (CU) – M Series.
- C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
 3. Manufacturers Basis of Design:
 - a. Curries Company (CU) - M Series.
- D. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- E. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.05 FRAME ANCHORS

- A. Jamb Anchors:
 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
 3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.06 HOLLOW METAL PANELS

- A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal components.

2.07 LOUVERS

- A. Metal Louvers: Door manufacturer's standard metal louvers unless otherwise indicated.
 - 1. Blade Type: Vision proof inverted V or inverted Y.
 - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.
- B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.
 - 1. Manufacturers: Subject to compliance with requirements, provide door manufacturers standard louver to meet rating indicated.
 - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

2.08 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.
- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.
- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.
- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

2.09 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.10 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
 - 1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
 - 2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
 - 3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
 - 4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
- D. Hollow Metal Frames:
 - 1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
 - 3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
 - 5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
 - 6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
 - 7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.

8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 9. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
 10. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.11 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by

HOLLOW METAL DOORS AND FRAMES

primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
 - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.

4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.04 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION

SECTION 08 14 23.16
PLASTIC LAMINATE FACED WOOD DOORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Solid core doors with high pressure decorative laminate faces.
2. Factory fitting wood doors to frames and factory machining for hardware.
3. Louvers installed in flush wood doors.
4. Light frames and glazing installed in wood doors.

B. Related Sections:

1. Division 08 Section "Hollow Metal Doors and Frames" for wood doors in steel frames.
2. Division 08 Section "Glazing" for glass view panels in wood doors.
3. Division 08 Section "Door Hardware" for door hardware for flush wood doors and wood frames.

C. Standards and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A208.1 – Wood Particleboard.
2. Intertek Testing Service (ITS Warnock Hersey) - Certification Listings for Fire Doors.
3. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
4. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
5. UL 10C - Positive Pressure Fire Tests of Door Assemblies; UL 1784 - Standard for Air Leakage Tests of Door Assemblies.
- 6.
7. Window and Door Manufacturers Association - WDMA I.S.1-A Architectural Wood Flush Doors.

1.03 SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, trim for openings, and WDMA I.S.1-A or AWS classifications. Include factory finishing specifications.
- B. Shop Drawings shall include:
 - 1. Indicate location, size, and hand of each door.
 - 2. Indicate dimensions and locations of mortises and holes for hardware.
 - 3. Indicate dimensions and locations of cutouts.
 - 4. Indicate requirements for veneer matching.
 - 5. Indicate location and extent of hardware blocking.
 - 6. Indicate construction details not covered in Product Data.
 - 7. Indicate doors to be factory finished and finish requirements.
 - 8. Indicate fire protection ratings for fire rated doors.
- C. Warranty: Sample of special warranties.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package pre-finished doors individually in plastic bags and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top rail with opening number used on Shop Drawings.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.06 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction and delaminating of face.
 - 2. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

3. Warranty Period for Solid Core Interior Doors: Life of installation according to manufacturer's written warranty.

PART 2 - PRODUCTS

2.01 DOOR CONSTRUCTION – GENERAL

- A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty; Aesthetic Grade: Custom.
- B. Fire Rated Doors: Provide construction and core as needed to provide fire ratings indicated.
 1. Category A Edge Construction: Provide fire rated door edge construction with intumescent seals concealed by outer stile (Category A) at 45, 60, and 90 minute rated doors. Comply with specified requirements for exposed edges.
 2. Pairs: Provide fire retardant stiles that are listed and labeled for applications indicated without formed steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - a. Where required or specified, provide formed steel edges and astragals with intumescent seals. Finish steel edges and astragals with baked enamel.

2.02 CORE CONSTRUCTION

- A. Structural Composite Core Wood Doors:
 1. Structural Composite Lumber: Engineered hardwood composite wood products tested in accordance with WDMA I.S.1A, Testing Cellulosic Composite Materials for Use in Fenestration Products containing no added Urea Formaldehyde. Comply with minimum performance levels below:
 - a. Screw Withdrawal, Face: 700 lbf (3100 N).
 - b. Screw Withdrawal, Edge: 550 lbf (2440 N).
 2. LEED: Meet requirements of EQ4.4.
 3. Sound Transmission Class: Have an operable STC rating of 30.
- B. Particleboard Core Doors:
 1. Particleboard: Wood fiber based materials complying with ANSI A208.1 Particleboard standard. Grade LD-2.
 2. Adhesive: Fully bonded construction using Polyurethane (PUR) glue.
 3. Blocking: As indicated under article "Blocking".

C. Fire Resistant Composite Core Doors:

1. Core: Non-combustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire protection rating indicated.
2. Blocking: As indicated under article "Blocking".
3. Edge Construction: At hinge stiles, provide laminated edge construction with improved screw holding capability and split resistance. Comply with specified requirements for exposed edges.

2.03 BLOCKING

A. Fire Rated Doors:

1. Provide blocking as indicated below:
 - a. HB1: 5 inch in doors indicated to have closers and overhead stops.

2.04 PLASTIC LAMINATE FACED WOOD DOORS

A. Manufacturers (Standard Doors): Subject to compliance with requirements, provide products by one of the following:

1. ASSA ABLOY Wood Doors (GR): GPD
2. Eggers Industries (EG): Premium
3. Marshfield (MF): Signature
4. VT Industries (VT): Artistry

2.05 LOUVERS

A. Metal Louvers: Door manufacturer's standard metal louvers unless otherwise indicated.

1. Blade Type: Vision proof inverted V or inverted Y.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish.

2.06 LIGHT FRAMES AND GLAZING

A. Metal Frames for Light Openings in Fire Rated Doors over 20-minute Rating: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated.

1. Manufacturers:
 - a. Air Louver (LV).

- b. All Metal Stamping (AP).
- c. Anemostat (AN).
- d. Pemko (PE).

- B. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with the flush wood door manufacturer's written instructions.

2.07 FABRICATION

- A. Factory fit doors to suit frame opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 1. Comply with requirements in NFPA 80 for fire rated doors.
- B. Factory machine doors for hardware that is not surface applied. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - 2. Metal Astragals: Factory machine astragals and formed steel edges for hardware for pairs of fire rated doors.
- C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
- D. Openings: Cut and trim openings through doors in factory.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Comply with applicable requirements in Division 08 Section "Glazing."
 - 3. Louvers: Factory install louvers in prepared openings.
- E. Electrical Raceways: Provide flush wood doors receiving electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through wire transfer hardware or wiring harness specified in hardware sets in Division 08 "Door Hardware". Wire nut connections are not acceptable.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.

2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
 1. Install fire rated doors in corresponding fire rated frames according to NFPA 80.
- C. Factory Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Field modifications to doors shall not be permitted, except those specifically allowed by manufacturer or fire rating requirements.

3.03 ADJUSTING

- A. Operation: Re-hang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Access doors and frames for walls and ceilings.
 2. Floor access doors and frames.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each door face material.
- D. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 tested according to the following test method:
1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
 2. NFPA 288 for fire-rated access door assemblies installed horizontally.
 3. Continuous hinges shall not obscure fire rating labels of doors or door frames.

2.02 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
1. Access Panel Solutions.
 2. Acudor Products, Inc.

3. Alfab, Inc.
 4. Babcock-Davis.
 5. Cendrex Inc.
 6. Elmdor/Stoneman Manufacturing Co.; Div. of Acorn Engineering Co.
 7. Jensen Industries; Div. of Broan-Nutone, LLC.
 8. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
 9. Karp Associates, Inc.
 10. Larsen's Manufacturing Company.
 11. Maxam Metal Products Limited.
 12. Metropolitan Door Industries Corp.
 13. MIFAB, Inc.
 14. Milcor Inc.
- C. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- D. Flush Access Doors with Exposed Flanges
1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
 2. Locations: Wall and ceiling .
 3. Door Size: On drawings.
 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage
 - a. Finish: Factory prime
 5. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage.
 - a. Finish: Factory prime.
 6. Frame Material: Same material, thickness, and finish as door
 7. Hinges: Manufacturer's standard
 8. Hardware: Lock.
- E. Flush Access Doors with Concealed Flanges:
1. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board plaster beads for concealed flange installation.
 2. Locations: Wall and ceiling
 3. Door Size: On drawings
 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage
 - a. Finish: Factory prime
 5. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage
 - a. Finish: Factory prime.
 6. Frame Material: Same material and thickness as door
 7. Hinges: Manufacturer's standard
 8. Hardware: Lock.

F. Recessed Access Doors

1. Assembly Description: Fabricate door in the form of a pan recessed 5/8 inch for gypsum board and 1 inch for plaster infill. Provide frame with gypsum board bead for concealed flange or plaster bead for concealed flange installation.
2. Locations: Wall and ceiling.
3. Door Size: On drawings
4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage
 - a. Finish: Factory prime.
5. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage
 - a. Finish: Factory prime
6. Frame Material: Same material and thickness as door.
7. Hinges: Manufacturer's standard .
8. Hardware: Lock.

G. Fire-Rated, Flush Access Doors with Exposed Flanges:

1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
2. Locations: Wall and ceiling
3. Fire-Resistance Rating: Not less than that of adjacent construction.
4. Temperature-Rise Rating: 450 deg F at the end of 30 minutes.
5. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage.
 - a. Finish: Factory prime
6. Frame Material: Same material, thickness, and finish as door
7. Hinges: Manufacturer's standard.
8. Hardware: Lock.

H. Fire-Rated, Flush Access Doors with Concealed Flanges

1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
2. Locations: Wall and ceiling
3. Fire-Resistance Rating: Not less than that of adjacent construction.
4. Temperature-Rise Rating: 450 deg F at the end of 30 minutes.
5. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage.
 - a. Finish: Factory prime
6. Frame Material: Same material, thickness, and finish as door

7. Hinges: Manufacturer's standard.
8. Hardware: Lock.

I. Hardware:

1. Latch: Cam latch by flush key
2. Lock: Cylinder

2.03 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- E. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- F. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- G. Aluminum Sheet: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15; with minimum sheet thickness according to ANSI H35.2.
- H. Frame Anchors: Same type as door face.
- I. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.04 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.

1. For recessed doors with plaster infill, provide self-furring expanded metal lath attached to door panel.
- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
1. For cylinder locks, furnish two keys per lock and key all locks alike.
 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.05 FINISHES

- 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.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel and Metallic-Coated-Steel Finishes:
1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.02 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08 33 20**OVERHEAD COILING COUNTER DOORS****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Overhead Coiling Counter Doors, manually operated.

1.02 RELATED SECTIONS:

- A. Section 05 50 00 – Metal Fabrications
- B. Section 06 20 00 – Finish Carpentry
- C. Section 08 71 00 – Door Hardware

1.03 REFERENCES

- A. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Submit under provisions of Section 01 33 00:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Details of construction and fabrication.
 - 4. Installation methods.
- C. Shop Drawings: Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent construction.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches long, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- C. Store materials in a dry, warm, ventilated weathertight location.

1.07 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 COORDINATION

- A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: info@overheaddoor.com.
- B. Substitutions: Cookson Company.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00.

2.02 OVERHEAD COILING COUNTER FIRE DOOR (B39)

- A. Overhead Coiling Counter Fire Doors: Model 641 Counter Fire Doors.
 - 1. Label: Provide rolling fire doors certified with the following listing.
 - a. UL 1-1/2-Hour Class B Label for installation in non-masonry walls, face mounted or between jambs. ULC 1-1/2-Hour Class B Label for installation in non-masonry walls, face mounted or between jambs.

2. Curtain: Interlocking slats, Type F-158 fabricated of 22 gauge stainless steel. Endlocks shall be attached to ends of alternate slats to maintain curtain alignment and prevent lateral slat movement.
3. Finish: Slats and hood shall be stainless steel with No. 4 satin finish.
4. Bottom Bar:
 - a. Single stainless steel angle bottom bar with 1/4 inch (6 mm) foam astragal.
5. Guides:
 - a. Stainless steel shapes with brush smoke seals.
 - b. Fastening Guides to Non-Masonry Fire Walls: Comply with the manufacturer's listing.
6. Brackets: Black powder coated steel to support counterbalance, curtain and hood.
7. Counterbalance: Helical torsion spring type. Counterbalance shall be housed in a steel tube or pipe barrel.
8. Hood:
 - a. Galvanized painted steel. Hood support provided for wall openings over 13 feet 6 inch (4.11 m) wide.
 - b. FM approved hood shall be equipped with thermally controlled, internal flame baffle.
 - c. Provide with UL Listed exterior brush smoke seal.
9. Manual Operation:
 - a. Manual push.
10. Automatic Closure:
 - a. Standard Fire Door: UL approved release mechanism equipped with a 165 degree fusible link.
11. Locking:
 - a. Two interior bottom bar slides bolt for manually operated doors.
 - b. Fire rated counter doors shall not "lock" in open position.
12. Wall Mounting Condition:
 - a. Between jambs mounting

2.03 OVERHEAD COILING STEEL COUNTER DOORS (E13, E14)

A. Stainless Steel Counter Doors: Overhead Door Corporation, 651 Series.

1. Wall Mounting Condition:
 - a. Face-of-wall mounting.

2. Curtain: Interlocking slats, Type F-158 fabricated of 22 gauge stainless steel. Endlocks attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.
3. Finish:
 - a. Slats and hood stainless steel with a No. 4 stainless steel finish.
4. Bottom Bar: Single stainless steel angle bottom bar.
5. Guides:
 - a. Stainless steel shapes.
6. Brackets: Steel plate to support counterbalance, curtain and hood.
7. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel.
8. Hood: Provided with intermediate support brackets as required and fabricated of:
 - a. Stainless steel.
9. Operation:
 - a. Manual push up.
10. Locking:
 - a. Slide bolt locks suitable for use with padlock

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify opening sizes, tolerances and conditions are acceptable.
- B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 92 00 – Joint Sealants.
- F. Install perimeter trim and closures.

3.04 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.05 CLEANING

- A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
- B. Remove labels and visible markings.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

3.06 PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION

SECTION 08 51 33
ALUMINUM SERVING WINDOWS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes aluminum serving windows for various locations.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.
- D. Product Schedule: For aluminum serving windows. Use same designations indicated on Drawings.

1.03 INFORMATIONAL SUBMITTALS

- A. Sample warranties.

1.04 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period:
 - a. Window: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Nissen sliding serving windows or comparable product by one of the following:
 - 1. Humphrey Doors & Windows

2.02 ALUMINUM SERVING WINDOWS

- A. Operating Types: [As indicated on Drawings].

- B. Frames and Sashes: Nonthermal aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
- C. Glass at Exterior: Insulating-Glass Units: ASTM E 2190. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
 - 2. Innerlayer Color: Clear unless otherwise indicated.
- D. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- E. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- F. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
 - 1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.03 ACCESSORIES

- A. Key Locks
- B. 410 Speak Hole

2.04 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
- B. Aluminum Frames: Complying with SMA 1004 or SMA 1201.

2.05 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

- E. Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design wind loads of window units.
- F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.06 ALUMINUM FINISHES

- A. Anodic Finish: Class I complying with AAMA 611.
 - 1. Color: As selected by Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Coordinate sliding window installation with aluminum storefront frame installer and install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- E. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- F. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- G. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

SECTION 08 71 00**DOOR HARDWARE****PART 1 - GENERAL**

- 1.01 REFERENCE:
Requirements in Addenda, Alternates, Conditions, and Division 1 collectively apply to this work.
- 1.02 DESCRIPTION:
- A. Principal Work Items Are:
1. Work Furnished but Installed By Another Section:
 - a. Finish hardware complete.
 - b. For certain items: Keyed cylinders only.
 - c. For certain items: Padlocks only.
- B. Related Work Specified Elsewhere:
1. Structural Steel Framing: Section 05 12 00.
 2. Rough Carpentry: Section 06 10 00.
 3. Finish Carpentry: Section 06 20 00.
 4. Hollow Metal Doors and Frames: Section 08 11 13.
 5. Signage: Section 10 14 00.
 6. Toilet and Bath Accessories: Section 10 80 00.
 7. Stage Curtains: Section 11 06 20.
 8. Hardware complete by Respective Sections:
 - a. Custom Casework: Section 06 41 10.
 - b. Toilet Partitions: Section 10 17 00.
 - c. Laminated Plastic Casework: Section 06 41 16.
 - d. Chain link Fences and Gates: Section 32 31 13.
 - e. Roof Hatch: Section 07 72 00.
 - f. Overhead Coiling Counter Doors: Section 08 33 20.
 9. Hardware Complete by Respective Sections, Except for Padlocks:
 - a. Chain Link Fences and Gates: Section 32 31 13.
 - b. Structural Steel Framing: Section 05 12 00.
 - c. Roof Hatch: Section 07 72 00 (Roof Accessories).
 - d. Flagpoles: Section 10 75 00.
- 1.03 SUBSTITUTIONS:
Only written approval of District will permit substitutions for materials specified. Refer to Section 01 25 00, Substitution Procedures.
- 1.04 QUALITY ASSURANCE:
- A. Supplier Qualifications: Hardware Supplier to have a qualified Hardware Consultant available for project site meetings when requested by District.
- B. Requirements of Regulatory Agencies; Codes:
1. All hardware shall comply with applicable fire and building codes.
 2. All exit hardware to be operable from inside without use of key, or any special knowledge or effort.

C. General Requirements of this document.

1.05 SUBMITTAL:

A. Hardware List:

1. Submit two copies for all items.
2. Identify each item by number and manufacturer's name to facilitate checking and job identification and checking.
3. Catalog Cut: With Hardware List, submit one catalog cut of each item.

B. Certificate: Hardware Supplier's certification of hardware inspection required in Paragraph 3.02, Field Quality Control.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Packaging, marking and labeling: Individually pack or wrap each item of finish hardware. Group small items together and mark package with door number, hardware schedule number, building number and location in work. Identify permanent keys similarly on attached tags.

B. Delivery, handling and storage: Deliver packaged hardware to project site in strong containers. Handle with care to prevent damage. Store inside building in clean, dry, secure space.

1.07 JOB CONDITIONS:

A. Sequencing, Scheduling:

1. Coordinate with related work of other sections.
2. Furnish templates to other sections as required and in a timely fashion.
3. Furnish reinforcing units and template hardware to metal frame and door manufacturer for application at factory.

1.08 GUARANTEE:

Section 01 77 01, Contract Close-out.

1.09 CHANGES IN THE WORK:

Should changes be made in the Finish Hardware, the Hardware Supplier shall credit the District with the full purchase price. No restocking charge will be permitted or allowed.

PART 2 - PRODUCTS

2.01 HARDWARE - GENERAL:

A. Hardware to be complete, all items fully operable, new, in perfect condition; same manufacturer throughout for each product type. Hardware not specifically described shall be similar to items specified for similar uses and locations.

B. Labeled Openings: Hardware shall conform to label requirements. All labeled doors shall be self-closing.

2.02 TEMPLATE HARDWARE:

Mortise type hardware and hardware applied to metal frames and doors shall be made to template. Other hardware shall also be made to template wherever possible. Provide templates.

2.03 FASTENERS:

A. General: Furnish all necessary fasteners required to securely anchor all hardware in position for heavy use and long life. Fastener types and sizes to be per hardware manufacturer's recommendations, suitable for fastening to material to which hardware is applied. Fastener materials and finishes to match hardware items. At no time are self-tapping/threading fasteners allowed on panic/exit hardware or any of the device's parts including strike plates. At no time will self tapping/threading fasteners be allowed on panic exit hardware or any of the devices parts including strike plates.

B. Screws:

1. To Wood: Wood screws, full-threaded typically.
2. To Metal: Machine screws.
3. For Butt Hinges: Phillips head, flat countersunk, full-thread.
4. For Strikes, Face Plates and Similar Items: Phillips head, flat, countersunk, except oval head on push-pull and kick plates.

C. Through Bolts and Grommets (sex-bolts): Use to fasten following items:

1. Closer and closer shoes to doors and panels-above-doors.
2. Panic hardware to doors.
3. Door stop-and-holders to doors.
4. Push plates and pull plates to doors.

D. Fastening to Concrete or Masonry: Use appropriate expansion anchors or lead shields, with machine screws.

2.04 BUTT HINGES:

A. Types:

1. Exterior Hinges: Heavy duty, ball bearing, non-removable pins (NRP) at outswinging doors, flat button tips, sheardized or zinc-plated prior to final plating.
2. Interior Hinges: Ball bearing typical; flat button tips.
3. Roton hinges to be used where specified.

B. Sizes: As follows, unless otherwise indicated.

1. Typical Door Thickness and Frame Conditions:

Door Thickness	Door Width	Butt Size
1 3/4"	to 2' 4"	4"x 4"
1 3/4"	to 3' 4"	4 1/2" x 4 1/2"
1 3/4"	over 3' 4"	5" x 5"

2. Thicker Doors and Frames with Projecting Trim: Size hinges to following criteria to provide proper width to clear trim projection when doors are fully open.

- a. Doors 2 1/4" Thick or Less:
(2 x door thickness) + (trim projection) – (1/2").

C. Number of Hinges per Door Leaf:

1. Doors 4' 0" to 7' 5" High: 1 1/2 pair.

2.05 DOOR CLOSER:

A. General: ALL SWING DOORS TO HAVE CLOSERS. Heavy duty, surface-mount, flat case, full rack-and pinion action, fully hydraulic, tamper proof concealed adjustment screws, covers attached with machine screws and lock washers.

B. Types:

1. LCN 4011 & 4111 Series (handed).
2. Arms to permit 180° door opening wherever possible; and be adjustable.
3. Parallel arms for outswinging doors typical. LCN 4111 (handed).
- 3a. Regular arm installation for inswinging doors typical. LCN 4011 (handed).
4. Accessories: Shoes, adaptors, drop plates, and other necessary items to suit installation conditions.
5. All labeled doors shall be self-closing; closer to suit label requirements for opening.
6. Set Closer for operation by a maximum opening force of 5 lbs. for exterior doors and 5 lbs. for interior doors. Required fire doors: the minimum opening force allowable by the appropriate administrative authority, not to exceed 15 lbs.
7. Door closers and gate closers shall be adjusted so that from an open position of 90 degrees, the time required to move the door to a position 12 degrees from the latch is 5 seconds minimum. Door and gate spring hinges shall be adjusted so that from the open position of 70 degrees, the door or gate shall move to the closed position in 1.5 seconds minimum.

2.06 DOORS STOPS AND STOP-AND-HOLDERS:

A. Types as indicated; bronze or brass body, finish as indicated; risers when necessary.
1. Anchor at Concrete Floors: Trimco 1209. No overhead combination stop-closer is allowed.

B. Stops and adjustable holders to be floor type typical, wall type where conditions will not permit floor type; strikes of proper clearance between door and floor.

C. At frame walls add solid backing behind all wall bumpers.

2.07 ACCESSORIES AND MISCELLANEOUS:

A. Push Plates, Door Pulls and Plates: 8" x 16" push plates typical; 5" minimum pull on 4" x 16" plate typical; .050" thick plates typical. Cut out for cylinders and one-way thumb turns as required.

B. Kick Plates: Typical beveled three sides, 10" high x 2" less than door width .064 thick.

C. Thresholds: Pemko 276A.

D. Weather Seals: Pemko No. 295AV. Provide protection as may be required for dissimilar metals.

E. Silencers: At doors with pressed metal frames, furnish Glynn Johnson, No. GJ64, rubber silencers: Three per single door, four per leaf for pairs of doors.

F. Key Cabinet: Furnish key cabinet to accommodate 100 keys minimum for all schools.

- G. Barrel Bolts with Padlock Holes: 8" bolt with rust resistant finish. Furnish loose for installation by District.
- H. Fastenings:
1. Phillips head, flat countersunk, except oval head on push-pull and kickplates.
 2. Through-bolts (sex-bolts) (steel):
 - a. Closer (shoes to doors and panels-above-doors).
 - b. Panic devices.
 - c. Door stop-and-holders to doors
 - d. Self tapper screws can be used to fasten push / pull plates or kickplates ONLY...
- I. Door Sweep: Pemko 345AV or Reese 353A.
- J. Miscellaneous: As indicated and required.
- 2.08 LOCKSETS AND LATCH SETS AND PADLOCKS:
- A. General: All doors from all rooms or spaces shall have locks or latches of a type which are operable at all times from the inside by merely turning the lever (lever hardware required) and not requiring any special knowledge or effort, except those doors provided with exit devices.
- B. Exterior Door Requiring Panic Devices: Exterior doors of Classrooms, Media Centers, Library, Gymnasium, Assembly areas (Multi-purpose Rooms), Food Service areas and Auxiliary Buildings where electrical equipment is housed shall have panic device hardware with exterior flush pull handles.
- C. Cylinders, keyways: All exterior / I/C core cylinders with housing shall be furnished by F.U.S.D. and installed by Contractor. All I/C core housings shall be furnished by and installed by the Contractor. At final acceptance of work, all exterior cylinders shall be furnished and installed by F.U.S.D. All keying and keyway information to be provided by F.U.S.D. Maintenance Lock/Key Department. Contact Phil Badillo or Randy Ward at 457-3261.
- D. Locksets: To be Schlage 'ND' series, Rhodes (no substitutes) Functions to be as follows:
- a. Office, Administration, workroom interior doors shall be RHO ND70 626
 - b. Storeroom doors shall be RHO ND80 626
 - c. Staff Single Accommodation Toilets doors shall be RHO ND85 626
 - d. Interior Prep Room doors shall be RHO ND10 626
- E. Exit Devices: All exit devices to be Sargent #3828 unless otherwise specified or approved by CUSD. Exit devices requiring locks shall be furnished by F.U.S.D. with Schlage removable core cylinders. Exterior pull handles omitted where possible.
1. Exit devices to be mounted according to District Standards as per Detail PD-1.
 2. Exit devices measurements for installation are to be done when door is in it's opening and not prior.

3. Any questions regarding changes in the installation of exit hardware as per CUSD district standards then the contractor is to arrange a meeting with a representative from the following: CUSD Facilities, architect, hardware manufacturer, CUSD Key / Lock Shop department, and the hardware subcontractor's installer.

F. Door Closers: LCN 4011 & 4111 Series (handed).

G. Strikes:

1. Furnish wrought box strikes at all locks, latches and deadlocks.
2. Extended Lips: Provide extended lips on strike with length and shape as required to protect jamb and trim from marring by latch bolt and avoid possible of tearing clothing.

H. Padlocks: Master padlocks keyed as per direction of F.U.S.D. Maintenance.

I. Provide strike cover plate at all exterior doors where panic devices are not used.

J. Refrigerated walk-in boxes: All walk-in boxes with deadbolt locks or keyed locking devices shall be Schlage only.

2.09 FINISHES:

A. Typical finishes, except where otherwise indicated:

1. Locksets and Latchsets: US 26D (Dull Chrome)
2. Butt Hinges:
 - a. Interior Doors: US 26D
 - b. Exterior Doors: Prime Coat
3. Closer: Sprayed to match finish hardware US 26D.
4. Panic Bars: US 26D
5. Stops, Stop-and-holders: US 26D
6. Kickplates: Stainless Steel No. 4
7. Pull and Push Plates: US 26D
8. Miscellaneous: US 26D, or as noted

2.10 HARDWARE MANUFACTURERS:

A. General:

1. Specified Manufacturer shall establish a standard of quality.

B. List:

<u>ITEMS</u>	<u>DESCRIPTION</u>	
1. Continuous Hinges	Roton	Half surface 780-054HD 83
2. Butts Hinges	BB, NRP	Hager, Stanley, Lawrence
3. Panic Devices	Sargent 3828	
4. Shim Kit	Sargent 558	
5. Pull Handle Panic	Sargent 28 K HTB	W/Cyl. Hole in pull
	Sargent 28 D GTB	Blank pull
6. Locksets	(See Schedule for Function)	Rhodes
7. Deadbolts	Not Allowed	
8. Cylinders	Schlage	
	A. Exterior	F.U.S.D. furnished
	B. Interior	Schlage - Classic (no substitutes)
9. Door Closer	LCN 4011 & 4111 series (handed)	

10. Mullion	Yale M200 (removable)	All pair Ext. Doors
11. Weatherstrip	Metal w/rubber bulb	Top/sides
12. Door Sweep ext.	Surface mount blade	Pemko
13. Door Stops	Builders Brass (B)	Quality, Glynn Johnson
14. Door Holders	Builders Brass (B)	Quality, Glynn Johnson
15. Thresholds	Pemko (P)	Builders Brass Ives Builders Brass
16. Flush Bolts	Ives (I)	Builders Brass
17. Astragal	Trimco	
18. Drip Cap	Pemko (P)	
19. Push Plate	Ives (I)	
20. Pulls	Corbin (c)	None
21. Kick Plate	Ives (I)	
22. Flag Pole Holders	Builders Brass (B)	None
23. Door Sweep	Pemko (P)	Reese
24. Key Cabinet	Corbin	National
25. Miscellaneous	Builders Brass (B)	

2.11 KEYING FOR ALL LOCKS:

A. Keying:

1. All keying to be as directed by the District. The Contractor to coordinate keying with District, prior to submitting keying to lock manufacturer.
2. Stamp all keys "Do Not Duplicate."

B. Construction Keying:

1. All interior locks to be construction keyed by Hardware Supplier with keying information provided by F.U.S.D. and installed by Contractor. Construction keys to be provided by Hardware Supplier.
2. All exterior construction cylinders and construction keys shall be furnished by F.U.S.D. Key/Lock Department and Installed by Contractor.
3. At the time of final acceptance of work, F.U.S.D. will remove construction cylinders and key door to new system.

2.12 CABINET HARDWARE:

A. General:

1. Specified manufacturer shall establish a standard of quality.
2. Substitutions: Refer to Paragraph 1.03

B. List:

1. Cabinet hardware shall be Corbin, Hager, or Lawrence.

2.13 LIST OF CERTAIN HARDWARE ITEMS:

A. Padlocks: Master padlocks.

1. For hollow metal gates, service yard gates, chain link gates, roof screen gates, flagpole and roof hatches (see 2.08 H).
2. For disconnect switches on air conditioning units: Master #7 keyed P607.

B. Flagpole Holders: Builders Brass No. 350.

C. Spare Locksets: Deliver to Inspector at project site, for transmittal to the District.

PART 3 - INSPECTION

3.01 INSTALLATION:

By Specifications, Section 06 20 00.

3.02 FIELD QUALITY CONTROL:

At 10% completion and 90% completion, contractor to notify F.U.S.D. lock personnel at (559) 457-3331 to examine all hardware for proper function and installation. Contractor to certify that examination was made; all hardware is properly installed, and conforms to contract Document requirements. Contractor shall provide to the District all items called out on hardware schedule and plans that are omitted during construction.

3.03 FINISH HARDWARE SCHEDULE:

Qty.	Desc.	Model	Part 2, Section 2.10, B, List, Item	
------	-------	-------	-------------------------------------	--

Hardware 101:

1 PAIR DOORS (EXTERIOR ENRTY FROM FOYER #101)

6'-0" X 7'-0" X 1-3/4" ALUM X ALUM

RHRB ACTIVE 180

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 628 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)				
WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)				
1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13

Hardware 102:

1 PAIR DOORS (EXTERIOR ENRTY FROM FOYER #101)

6'-0" X 7'-0" X 1-3/4" ALUM X ALUM

RHRB ACTIVE 180

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 628 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)				

WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)

1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMO	13

Hardware 103:

1 PAIR DOORS (EXTERIOR ENRTY FROM HALLWAY #157)

6'-0" X 7'-0" X 1-3/4" ALUM X ALUM

RHRB ACTIVE 180

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3

BACKING PLATES & CRUSH RINGS BY CUSD

1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9

DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)

WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)

1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13

Hardware 104:

1 PAIR DOORS (EXTERIOR ENRTY FROM HALLWAY #155)

6'-0" X 7'-0" X 1-3/4" ALUM X ALUM

RHRB ACTIVE 180

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3

BACKING PLATES & CRUSH RINGS BY CUSD

1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9

DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)

WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)

1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13

Hardware 105:

1 PAIR DOORS (EXTERIOR FROM STORAGE #113)

6'-0" X 7'-0" X 1-3/4" HM X HM

RHRB ACTIVE 180

6	Hinges	BB1279 4.5 x 4.5 NRP	652	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3

BACKING PLATES & CRUSH RINGS BY CUSD

1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
2	Door Sweep	345 AV 36"		5

1 set	Weatherstrip	297AV		11
1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13
2	Silencer	1229A		4
2	Kick Plate	190S 10" x 34"	630	21

Hardware 106:

1 DOOR (EXTERIOR FROM KINDERGARTEN 4 #114)

3'-0" X 7'-0" X 1-3/4" HM X HM

RHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21

Hardware 107:

1 DOOR (EXTERIOR FROM TOILET 3 #115)

3'-0" X 7'-0" X 1-3/4" HM X HM

RHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
RESTROOM SIGN BY OTHERS				

Hardware 108:

1 DOOR (EXTERIOR FROM TOILET 4 #117)

3'-0" X 7'-0" X 1-3/4" HM X HM

LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15

1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
	RESTROOM SIGN	BY OTHERS		

Hardware 109:

1 DOOR (EXTERIOR FROM KINDERGARTEN 2 #118)

3'-0" X 7'-0" X 1-3/4" HM X HM

LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
	BACKING PLATES & CRUSH RINGS BY CUSD			
1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21

Hardware 110:

1 PAIR DOORS (EXTERIOR FROM HALLWAY #157)

6'-0" X 7'-0" X 1-3/4" ALUM X ALUM

RHRB ACTIVE 180

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
	BACKING PLATES & CRUSH RINGS BY CUSD			
1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
	DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)			
	WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)			
1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13

Hardware 111:

1 DOOR (EXTERIOR FROM ELEC. #119)

3'-0" X 7'-0" X 1-3/4" HM X HM

RHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
	BACKING PLATES & CRUSH RINGS BY CUSD			
1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15

1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21

Hardware 112:

1 DOOR (EXTERIOR FROM SECRETARY #127)

3'-0" X 7'-0" X 1-3/4" HM X HM

RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21

Hardware 113:

1 DOOR (EXTERIOR FROM SECRETARY #127)

3'-0" X 7'-0" X 1-3/4" HM X HM

LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21

Hardware 114:

1 DOOR (EXTERIOR FROM NURSE #132)

3'-0" X 7'-0" X 1-3/4" HM X HM

RHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15

1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21

Hardware 115:

1 PAIR DOORS (EXTERIOR FROM HALLWAY #158)

6'-0" X 7'-0" X 1-3/4" ALUM X ALUM

RHRB ACTIVE 180

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)				
WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)				
1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13

Hardware 116:

1 DOOR (EXTERIOR FROM BOYS #138)

3'-0" X 7'-0" X 1-3/4" HM X HM

RHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
	RESTROOM SIGN	BY OTHERS		

Hardware 117:

1 DOOR (EXTERIOR FROM GIRLS #139)

3'-0" X 7'-0" X 1-3/4" HM X HM

LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15

1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
	RESTROOM SIGN	BY OTHERS		

Hardware 118:

1 PAIR DOORS (EXTERIOR FROM HALLWAY #155) RHRB ACTIVE 90
 6'-0" X 7'-0" X 1-3/4" ALUM X ALUM LHRB ACTIVE 180

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
	BACKING PLATES & CRUSH RINGS BY CUSD			
1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
	DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)			
	WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)			
1	Threshold	272A 72"		15
2	Door Stop	1209	TRIMCO	13

Hardware 119:

1 DOOR (CORRIDOR #157 FROM CLASSROOM #102) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 120:

1 DOOR (CORRIDOR #155 FROM MENS RESTROOM #104) 45 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 121:

1 DOOR (MENS RESTROOM #104 TO STORAGE 104A)

3'-0" X 7'-0" X 1-3/4" WD X HM LHR ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		17

Hardware 122:

1 DOOR (CORRIDOR #155 FROM KINDERGARTEN 3 #105)

20 MIN

3'-0" X 7'-0" X 1-3/4" WD X HM

RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 123:

1 DOOR (KINDERGARTEN 3 #105 TO WORKROOM #107)

3'-0" X 7'-0" X 1-3/4" WD X HM

RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		17
1	Kick Plate	190S 10" x 34"	630	21

Hardware 124:

1 DOOR (KINDERGARTEN 3 #105 TO TOILET 1 #106)

3'-0" X 7'-0" X 1-3/4" WD X HM

RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND10S RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1 set	Silencer	1229A		
	RESTROOM SIGN	BY OTHERS		

Hardware 125:

1 DOOR (KINDERGARTEN 1 #109 TO TOILET 2 #108)

3'-0" X 7'-0" X 1-3/4" WD X HM

			LH	ACTIVE 90
3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND10S RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1 set	Silencer	1229A		
	RESTROOM SIGN	BY OTHERS		

Hardware 126:

1 DOOR (KINDERGARTEN 1 #109 TO WORKROOM #107)

3'-0" X 7'-0" X 1-3/4" WD X HM

			LH	ACTIVE 90
3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1 set	Silencer	1229A		

Hardware 127:

1 DOOR (CORRIDOR #155 FROM KINDERGARTEN 1 #109)

3'-0" X 7'-0" X 1-3/4" WD X HM

			20 MIN	LHR	ACTIVE 90
3	Hinges	BB1279 4.5 x 4.5 NRP	600		1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626		6
1	Closer	4111 X Sex Bolt	689		9
1	Door Stop	1209	TRIMCO		13
1	Kick Plate	190S 10" x 34"	630		21
1	Smoke Seal	PK55D			

Hardware 128:

1 DOOR (CORRIDOR #155 FROM STORAGE #110)

3'-0" X 7'-0" X 1-3/4" WD X HM

			45 MIN	RHRB	ACTIVE 180
3	Hinges	BB1279 4.5 x 4.5 NRP	600		1
1	Lockset	Schlage ND80PD RHO	626		6
1	Closer	4111 X Sex Bolt	689		9
1	Door Stop	1209	TRIMCO		13
1	Kick Plate	190S 10" x 34"	630		21
1	Smoke Seal	PK55D			

Hardware 129:

1 DOOR (CORRIDOR #155 FROM KINDERGARTEN 4 #114)

20 MIN

3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 130:

1 DOOR (KINDERGARTEN 4 #114 TO WORKROOM #116)

3'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1 set	Silencer	1229A		

Hardware 131:

1 DOOR (KINDERGARTEN 4 #114 TO TOILET 3 #115)

3'-0" X 7'-0" X 1-3/4" WD X HM LH ACTIVE 150

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND10S RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1 set	Silencer	1229A		
	RESTROOM SIGN	BY OTHERS		

Hardware 132:

1 DOOR (KINDERGARTEN 2 #118 TO TOILET 4 #117)

3'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 150

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND10S RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1 set	Silencer	1229A		
	RESTROOM SIGN	BY OTHERS		

Hardware 133:

1 DOOR (KINDERGARTEN 2 #118 TO WORKROOM #116)

3'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1 set	Silencer	1229A		

Hardware 134:**1 DOOR (CORRIDOR #155 FROM KINDERGARTEN 2 #118)**

3'-0" X 7'-0" X 1-3/4" WD X HM 20 MIN LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 135:**1 DOOR (CORRIDOR #157 FROM P #120)**

3'-0" X 6'-0" X 1-3/4" WD X HM 20 MIN LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 136:**1 DOOR (HALLWAY #122E TO CSL 2 #122B)**

3'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 135

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 137:**1 DOOR (EXTERIOR FROM BALL #123)**

3'-0" X 7'-0" X 1-3/4" HM X HM DUTCH DOOR LHRB ACTIVE 180

4	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND95PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Flush Bolt	3922		16

Hardware 138:

1 DOOR (WAITING AREA #125 TO I.T. #124)

3'-0" X 7'-0" X 1-3/4" WD X HM

LH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 139:

1 DOOR (FOYER #101 FROM WAITING AREA #125)

3'-0" X 7'-0" X 1-3/4" WD X HM

20 MIN

LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 140:

1 DOOR (HALLWAY #122E FROM STORAGE #122D)

3'-0" X 7'-0" X 1-3/4" WD X HM

LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 141:

1 DOOR (HALLWAY #122E FROM CSL 1 #122A)

3'-0" X 7'-0" X 1-3/4" WD X HM

RH ACTIVE 135

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 142:

1 DOOR (SECRETARY #127 TO CONFERENCE #128)

3'-0" X 7'-0" X 1-3/4" WD X HM

LH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 143:

1 DOOR (SECRETARY #127 TO V.P. #129)

3'-0" X 7'-0" X 1-3/4" WD X HM

RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 144:

1 DOOR (SECRETARY #127 TO PRINCIPAL #130)

3'-0" X 7'-0" X 1-3/4" WD X HM

LH ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 145:

1 DOOR (SECRETARY #127 TO H.S.L. #131)

3'-0" X 7'-0" X 1-3/4" WD X HM

LH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 146:

1 DOOR (SECRETARY #127 TO NURSE #132)

3'-0" X 7'-0" X 1-3/4" WD X HM

RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 147:

1 DOOR (SECRETARY #127 TO WORKROOM #134)

3'-0" X 7'-0" X 1-3/4" WD X HM LH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 148:

1 DOOR (CORRIDOR #155 TO WORKROOM #134)

3'-0" X 7'-0" X 1-3/4" WD X HM 20 MIN RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 149:

1 DOOR (HALLWAY #122E FROM CSL 3 #122C)

3'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 135

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13

Hardware 150:

1 DOOR (CORRIDOR #158 FROM WOMEN 1 #136)

3'-0" X 7'-0" X 1-3/4" WD X HM 20 MIN LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		
	RESTROOM SIGN	BY OTHERS		

Hardware 151:

1 DOOR (NURSE #132 FROM TOILET 5 #133)

3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND40S RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		
	RESTROOM SIGN	BY OTHERS		

Hardware 152:

1 DOOR (CORRIDOR #155 FROM BOYS 2 #137) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		
	RESTROOM SIGN	BY OTHERS		

Hardware 153:

1 DOOR (CORRIDOR #155 FROM GIRLS 2 #140) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		
	RESTROOM SIGN	BY OTHERS		

Hardware 154:

1 DOOR (CORRIDOR #155 FROM SDC CLASSROOM 1 #141) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 155:

1 DOOR (SDC CLASSROOM 1 #141 TO SDC CLASSROOM 2 #142)
 3'-0" X 7'-0" X 1-3/4" WD X HM LH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
---	--------	----------------------	-----	---

1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 156:

1 DOOR (CORRIDOR #155 FROM SDC CLASSROOM 2 #142) **20 MIN**
 3'-0" X 7'-0" X 1-3/4" WD X HM **RHRB ACTIVE 90**

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 157:

1 DOOR (CORRIDOR #155 FROM CLASSROOM 3 #143) **20 MIN**
 3'-0" X 7'-0" X 1-3/4" WD X HM **LHRB ACTIVE 90**

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 158:

1 DOOR (CLASSROOM 3 #143 FROM CLASSROOM 4 #144) **LHRB ACTIVE 90**
 3'-0" X 7'-0" X 1-3/4" WD X HM

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 159:

1 DOOR (CORRIDOR #155 FROM CLASSROOM 4 #144) **20 MIN**
 3'-0" X 7'-0" X 1-3/4" WD X HM **RHRB ACTIVE 90**

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 160:

1 DOOR (CORRIDOR #155 FROM STORAGE #146) **45 MIN**
 3'-0" X 7'-0" X 1-3/4" WD X HM **LHRB ACTIVE 180**

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
---	--------	----------------------	-----	---

1	Lockset	Schlage ND80PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 161:

1 DOOR (CORRIDOR #155 FROM CLASSROOM 7 #147) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 162:

1 DOOR (CORRIDOR #155 FROM CLASSROOM 6 #148) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 163:

1 DOOR (CLASSROOM 6 #148 FROM CLASSROOM 5 #149) LHRB ACTIVE 90
 3'-0" X 7'-0" X 1-3/4" WD X HM

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 164:

1 DOOR (CORRIDOR #155 FROM CLASSROOM 5 #149) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 165:

1 DOOR (CORRIDOR #155 FROM RESOURCE #150) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
---	--------	----------------------	-----	---

1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 166:

1 DOOR (CORRIDOR #155 FROM RESOURCE #150)

3'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1 set	Silencer	1229A		

Hardware 167:

1 DOOR (MEDIA LAB #152 FROM A.V. #151)

3'-0" X 7'-0" X 1-3/4" WD X HM 45 MIN RHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 168:

1 DOOR (WORK #153 FROM STORAGE #156)

3'-0" X 7'-0" X 1-3/4" WD X HM 20 MIN RHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 169:

1 DOOR (FOYER #101 FROM MEDIA LAB #152)

3'-0" X 7'-0" X 1-3/4" WD X HM 20 MIN LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 170:

1 DOOR (CORRIDOR #155 TO VESTIBULE #122E) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM LH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 171:

1 DOOR (MEDIA LAB #152 FROM WORK #153)
 3'-0" X 3'-2" X 1" WD X WD RHRB ACTIVE 90

1	Pivot Spring	7112	626	6
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Door Stop	1209	TRIMCO	13

Hardware 201:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 14 #203) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 202:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 13 #204) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 203:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 12 #205) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 204:

1 DOOR (CLASSROOM 12 #205 FROM CLASSROOM 11 #206)

3'-0" X 7'-0" X 1-3/4" WD X HM

LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 205:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 11 #206)

3'-0" X 7'-0" X 1-3/4" WD X HM

20 MIN

RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 206:

1 PAIR DOOR (CORRIDOR #201 FROM STORAGE #208)

3'-0" X 7'-0" X 1-3/4" WD X HM

45 MIN

RHRB ACTIVE 180

6	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
2	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Retractable Flush Bolt			16
1	Threshold	272A 72"		15
1	Smoke Seal	PK55D		

Hardware 207:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 11 #206)

20 MIN

3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 208:

1 DOOR (CLASSROOM 9 #210 FROM CLASSROOM 8 #209)

3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 209:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 9 #210)

3'-0" X 7'-0" X 1-3/4" WD X HM 20 MIN
RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 210:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 10 #211)

3'-0" X 7'-0" X 1-3/4" WD X HM 20 MIN
LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 211:

1 DOOR (CORRIDOR #201 FROM CLASSROOM #213)

3'-0" X 7'-0" X 1-3/4" WD X HM 20 MIN
LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 212:

1 DOOR (CLASSROOM 10 #211 FROM CLASSROOM #213)

3'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 213:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 15 #215)

3'-0" X 7'-0" X 1-3/4" WD X HM 20 MIN LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 214:

1 DOOR (CLASROOM 17 #216 FROM CLASSROOM 15 #215)

3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 215:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 17 #216)

3'-0" X 7'-0" X 1-3/4" WD X HM 20 MIN LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 216:

1 DOOR (CORRIDOR #201 FROM HALLWAY #218)

3'-0" X 7'-0" X 1-3/4" WD X HM 20 MIN LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 217:

1 PAIR DOORS (HALLWAY #218 FROM STORAGE #219)

6'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

6	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
2	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Flush Bolt	3922	626	4
1 set	Silencer	1229A		

Hardware 218:

1 DOOR (HALLWAY #218 TO JAN/ STOR. #217)

3'-0" X 7'-0" X 1-3/4" WD X HM 45 MIN LH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
2	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		

Hardware 219:

1 DOOR (HALLWAY #218 TO MEN 2 #222)

3'-0" X 7'-0" X 1-3/4" WD X HM LH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		
	RESTROOM SIGN	BY OTHERS		

Hardware 220:

1 DOOR (HALLWAY #218 TO WOMEN 2 #223)

3'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13

1 set Silencer 1229A
RESTROOM SIGN BY OTHERS

Hardware 221:

1 DOOR (CORRIDOR #201 FROM BOYS 3 #220) 20 MIN
3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		
	RESTROOM SIGN	BY OTHERS		

Hardware 222:

1 DOOR (CORRIDOR #201 FROM GIRLS 3 #221) 20 MIN
3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21
1	Smoke Seal	PK55D		
	RESTROOM SIGN	BY OTHERS		

Hardware 223:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 18 #224) 20 MIN
3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 224:

1 DOOR (CLASROOM 19 #225 FROM CLASSROOM 18 #224)
3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13

1 set Silencer 1229A

Hardware 225:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 19 #225) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 226:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 20 #226) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 227:

1 DOOR (CLASSROOM 20 #226 FROM CLASSROOM 21 #227) LHRB ACTIVE 90
 3'-0" X 7'-0" X 1-3/4" WD X HM

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 228:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 21 #227) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 229:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 21 #227) 20 MIN
 3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13

1 Smoke Seal PK55D

Hardware 230:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 24 #230) 20 MIN
3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 231:

1 DOOR (CLASROOM 23 #231 FROM CLASSROOM 24 #230)
3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 232:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 23 #231) 20 MIN
3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 233:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 22 #232) 20 MIN
3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Smoke Seal	PK55D		

Hardware 234:

1 DOOR (CORRIDOR #201 FROM CLASSROOM 16 #233) 20 MIN
3'-0" X 7'-0" X 1-3/4" WD X HM LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13

1 Smoke Seal PK55D

Hardware 301:

1 PAIR DOORS (EXTERIOR FROM MULTI-PURPOSE #301)

6'-0" X 7'-0" X 1-3/4" ALUM X ALUM

RHRB ACTIVE 180

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)				
WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)				
1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13

Hardware 302:

1 PAIR DOORS (EXTERIOR FROM MULTI-PURPOSE #301)

6'-0" X 7'-0" X 1-3/4" ALUM X ALUM

RHRB ACTIVE 180

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)				
WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)				
1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13

Hardware 303:

1 PAIR DOORS (EXTERIOR FROM MULTI-PURPOSE #301)

6'-0" X 7'-0" X 1-3/4" ALUM X ALUM

RHRB ACTIVE 180

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4

1	Shim Kit	558		3
	BACKING PLATES & CRUSH RINGS BY CUSD			
1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
	DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)			
	WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)			
1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13

Hardware 304:

1 PAIR DOORS (EXTERIOR FROM STAFF LOUNGE #302)

6'-0" X 7'-0" X 1-3/4" ALUM X ALUM

RHRB ACTIVE 180

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
	BACKING PLATES & CRUSH RINGS BY CUSD			
1	Removable Mullion	M100	600	10
2	Closer	4111 X Sex Bolt	689	9
	DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)			
	WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)			
1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13

Hardware 305:

1 DOOR (EXTERIOR FROM HALL #308)

4'-0" X 7'-0" X 1-3/4" HM X HM

LHRB ACTIVE 180

4	Hinges	BB1279 5 x 5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828G x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
	BACKING PLATES & CRUSH RINGS BY CUSD			
1	Closer	4111 HO X Sex Bolt	689	9
1	Door Sweep	345 AV 48"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 48"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 46"	630	21

Hardware 306:

1 DOOR (EXTERIOR FROM MECH #313)

3'-0" X 7'-0" X 1-3/4" HM X HM

LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3

BACKING PLATES & CRUSH RINGS BY CUSD

1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21

Hardware 307:

1 DOOR (EXTERIOR FROM PLATFORM #316)

3'-0" X 7'-0" X 1-3/4" HM X HM

LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3

BACKING PLATES & CRUSH RINGS BY CUSD

1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21

Hardware 308:

1 DOOR (EXTERIOR FROM MULTI-PURPOSE #301)

3'-0" X 7'-0" X 1-3/4" HM X HM

LHRB ACTIVE 110

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3

BACKING PLATES & CRUSH RINGS BY CUSD

1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21

Hardware 309:

1 DOOR (EXTERIOR FROM PLATFORM #316)

3'-0" X 7'-0" X 1-3/4" HM X HM

LHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3

BACKING PLATES & CRUSH RINGS BY CUSD

1	Closer	4111 X Sex Bolt	689	9
1	Door Sweep	345 AV 36"		5

1 set	Weatherstrip	297AV		11
1	Threshold	272A 36"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 34"	630	21

Hardware 310:

1 DOOR (EXTERIOR FROM MERCH #308) DUTCH DOOR
 3'-0" X 7'-0" X 1-3/4" HM X HM LHRB ACTIVE 180

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND95PD RHO XN12-035-626 rose	626	6
1	Closer	4111 HO X Sex Bolt	689	9
1	Door Sweep	345 AV 48"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 48"		15
1	Door Stops	1209	TRIMCO	13
1	Kick Plate	190S 10" x 46"	630	21
1	Flush Bolt	3922	626	16

Hardware 311:

1 PAIR DOORS (EXTERIOR FROM WASHROOM #321) LHRB ACTIVE 110
 6'-0" X 7'-0" X 1-3/4" HM X HM RHRB ACTIVE 180

6	Hinges	BB1279 5 x 5 NRP	600	1
2	Cylinder	Schlage 20-079 x 628 core by CUSD	626	8
2	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
2	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
2	Door Sweep	345 AV 36"		5
1 set	Weatherstrip	297AV		11
1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13
2	Kick Plate	190S 10" x 34"	630	21

Hardware 312:

1 PAIR DOORS (EXTERIOR FROM MULTI-PURPOSE #301) RHRB ACTIVE 180
 6'-0" X 7'-0" X 1-3/4" ALUM X ALUM

2	Continuous Hinges	780-053HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)				
WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)				
1	Threshold	272A 72"		15

2	Door Stops	1209	TRIMCO	13
---	------------	------	--------	----

Hardware 313:

1 PAIR DOORS (EXTERIOR FROM MULTI-PURPOSE #301)

6'-0" X 7'-0" X 1-3/4" ALUM X ALUM RHRB ACTIVE 180

2	Continuous Hinges	780-C53HD 83	CLEAR	1
1	Cylinder	Schlage 20-079 x 626 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
1	Exit Device	3828F x 28K D-GTB x SEX BOLT	PEN	2, 4
1	Shim Kit	558		3
BACKING PLATES & CRUSH RINGS BY CUSD				
1	Removable Mullion	M200	600	10
2	Closer	4111 X Sex Bolt	689	9
DOOR SWEEPS BY DOOR SUPPLIER (see Section 08 11 13)				
WEATHERSTRIP BY DOOR SUPPLIER (see Section 08 11 13)				
1	Threshold	272A 72"		15
2	Door Stops	1209	TRIMCO	13

Hardware 314:

1 SINGLE DOOR (STAFF LOUNGE #302 FROM MULTI-PURPOSE #301)

6'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 315:

1 DOOR (STAFF LOUNGE #302 FROM HALL #304)

3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 316:

1 DOOR (IDF #306 TO EXTERIOR)

3'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND85PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 317:

1 DOOR (RESTROOM #305 FROM HALL #304)

3'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND85PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		
	RESTROOM SIGN	BY OTHERS		

Hardware 318:

1 DOOR (HALL #308 TO DRY GOODS #309)

3'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 319:

1 DOOR (HALL #308 FROM COOL)

REFRIGERATION DOOR

1	Cylinder	As required		2
---	----------	-------------	--	---

Hardware 320:

1 DOOR (HALL #308 FROM FREEZE)

REFRIGERATION DOOR

1	Cylinder	As required		2
---	----------	-------------	--	---

Hardware 321:

1 DOOR (HALL #308 TO STORAGE #312)

3'-0" X 7'-0" X 1-3/4" WD X HM RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND95PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 322:

1 DOOR (MULTI-PURPOSE #301 TO SERVICE #307)

COILING DOOR

1	Cylinder	As required		2
---	----------	-------------	--	---

Hardware 323:

1 DOOR (MULTI-PURPOSE #301 TO SERVICE #307)

4'-0" X 7'-0" X 1-3/4" WD X HM RH ACTIVE 90

4	Hinges	BB1279 5 x 5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 324:

1 DOOR (MULTI-PURPOSE #301 FROM STOR. #312)

3'-0" X 7'-0" X 1-3/4" WD X HM

RHRB ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND95PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 325:

1 PAIR DOOR (PLATFORM #316 TO STORAGE #315)

6'-0" X 7'-0" X 1-3/4" WD X HM

45 MIN

RH ACTIVE 120

6	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND80PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Removable Mullion	KR4954B X SP28 Less strike w/ MT54 storage kit		
1	Flush Bolt	3913	626	15
1	Smoke Seal	PK55D		

Hardware 326:

1 DOOR (MULTI-PURPOSE #301 TO HALL #317)

3'-0" X 7'-0" X 1-3/4" WD X HM

RH ACTIVE 120

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND10S RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 327:

1 DOOR (HALL #317 TO MERCH #318)

3'-0" X 7'-0" X 1-3/4" WD X HM

DUTCH DOOR

RH ACTIVE 90

4	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND53PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Flush Bolt	3922		
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		

Hardware 328:

1 DOOR (WASHROOM #321 TO GIRLS #319)

3'-0" X 7'-0" X 1-3/4" WD X HM

LH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		
	RESTROOM SIGN	BY OTHERS		

Hardware 329:

1 DOOR (WASHROOM #321 TO BOYS #320)

3'-0" X 7'-0" X 1-3/4" WD X HM

RH ACTIVE 90

3	Hinges	BB1279 4.5 x 4.5 NRP	600	1
1	Lockset	Schlage ND75PD RHO XN12-035-626 rose	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1 set	Silencer	1229A		
	RESTROOM SIGN	BY OTHERS		

Hardware 330:

1 DOOR (MULTI-PURPOSE #301 FROM WASHROOM #321)

4'-0" X 7'-0" X 1-3/4" WD X HM

RHRB ACTIVE 90

4	Hinges	BB1279 5 x 5 NRP	600	1
1	Lockset	Schlage ND72PD RHO	626	6
1	Closer	4111 X Sex Bolt	689	9
1	Door Stop	1209	TRIMCO	13
1	Kick Plate	190S 10" x 46"	630	21
1 set	Silencer	1229A		

Hardware 331:

1 PAIR DOOR (MULTI-PURPOSE #301 FROM UNDER STAGE))

3'-0" X 2'-6" X 1-3/8" WD X WD

4	Hinges	Markar HG-311	CLEAR	1
2	Catch	803	606	6
2	Pull	7060	626	6

Hardware 332:

1 PAIR DOOR (MULTI-PURPOSE #301 FROM UNDER STAGE))

2'-4" X 2'-6" X 1-3/8" WD X WD

4	Hinges	Markar HG-311	CLEAR	1
2	Catch	803	606	6
2	Pull	7060	626	6

Hardware 333:

1 PAIR DOOR (MULTI-PURPOSE #301 FROM UNDER STAGE))
2'-4" X 2'-6" X 1-3/8" WD X WD

4	Hinges	Markar HG-311	CLEAR	1
2	Catch	803	606	6
2	Pull	7060	626	6

Hardware 334:

1 PAIR DOOR (MULTI-PURPOSE #301 FROM UNDER STAGE))
2'-4" X 2'-6" X 1-3/8" WD X WD

4	Hinges	Markar HG-311	CLEAR	1
2	Catch	803	606	6
2	Pull	7060	626	6

Hardware 335:

1 PAIR DOOR (MULTI-PURPOSE #301 FROM UNDER STAGE))
3'-0" X 2'-6" X 1-3/8" WD X WD

4	Hinges	Markar HG-311	CLEAR	1
2	Catch	803	606	6
2	Pull	7060	626	6

Hardware 336:

1 DOOR (MULTI-PURPOSE #301 TO SERVICE #307)
COILING DOOR

SEE ROLL UP DOOR MANUFACTURER FOR HARDWARE

Hardware 337:

1 DOOR (EXTERIOR FROM RELOCATABLE #P36)
3'-0" X 7'-0" X 1-3/4" HM X HM

LHRB ACTIVE 180

N/A

Hardware 338:

1 DOOR (EXTERIOR FROM RELOCATABLE #P38)
3'-0" X 7'-0" X 1-3/4" HM X HM

LHRB ACTIVE 180

N/A

Hardware 339:

1 DOOR (EXTERIOR FROM RELOCATABLE #P39)
3'-0" X 7'-0" X 1-3/4" HM X HM

RHRB ACTIVE 180

N/A

MISCELLANEOUS ITEMS**M1:**

1	WALL SAFE	WES 1310		9
---	-----------	----------	--	---

M2:

1	KEY CABINET	J1100		10
---	-------------	-------	--	----

GATES:

1	WROUGHT IRON GATE 16	
---	----------------------	--

1	Cylinder	Schlage 20-079 x 628 core by CUSD	626	8
1	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
	BALANCE OF HARDWARE BY GATE SUPPLIER			

1	WROUGHT IRON GATE 19	
---	----------------------	--

1	Lockset	Schlage ND66PD RHO	626	6
	BALANCE OF HARDWARE BY GATE SUPPLIER			

6	CHAIN LINK GATE	
---	-----------------	--

6	Cylinder	Schlage 20-079 x 628 core by CUSD	626	8
6	Exit Device	3828F x 28K HTB LC x SEX BOLT	PEN	2, 4
	BALANCE OF HARDWARE BY GATE SUPPLIER			

SEE DRAWING SHEET A8.3 FOR ADDITIONAL HARDWARE

PART 4 - PROPERTY SECURITY

4.01 SAFE

A. Safe is to be AMSEC, Model UL1812 with optional electronic lock ESL20XL. District to select color.

1. Safe shall be securely anchored to the wall framing as located on the drawings per manufacturer's recommendations.

END OF SECTION

SECTION 08 80 00
GLASS AND GLAZING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all glass and glazing, complete, in place, as shown on the Drawings, specified herein, or needed for a complete and proper installation.

1.02 QUALITY ASSURANCE

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Product Data: Per the General Conditions - Submittals Procedures:
1. Complete materials list showing all items proposed to be furnished and installed under this Section.
 2. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the review by the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General:
1. Conform to Codes, and additional requirements stated herein.
 2. Glazing:
 - a. Title 24, Chapter 24.
 - b. Glazing; Glass: Title 24, Section 2403 of CBC 2016, which is based on Federal Specifications DD-G-00451 b.

- c. Safety Glazing: Title 24, Section 2406, of 2013 CBC (which is based on ANSI Z97.1-1975, and CPSC 16CFR Part 1201).

B. Glass:

1. Acceptable Manufacturers: ASG Industries Company, Ford Glass Division, Globe-Amerada Glass Company, Libby-Owens-Ford and PPG Industries. Interior glazing is single glazed, exterior glazing is dual glazed insulating units. Thickness (unless otherwise noted): 3/16" thick for openings to 12 SF maximum, 7/32" thick for openings to 30 SF maximum, 1/4" for larger openings.
2. Types: Named manufacturer and product shall be a standard of quality:
 - a. Interior Glazing: Clear, transparent tempered or non-tempered glass.
 - b. Exterior Glazing: PPG Solarban 60 (2) Optigray tempered or non-tempered outside, clear tempered or non-tempered inside. (VLT = 50%, SHGC = 0.30, Summer U-Value 0.27)
 - c. 45 minute glazing, Superlite 1 XL glazing by Safti-First
 - d. 60 minute interior glazing, Superlite 2 XL 60 glazing by Safti-First
 - e. Refer to Spec Section 08 87 13 – Solar Control Films

C. Glazing Accessories:

1. Conform to FGMA "Glazing Sealing Systems Manual" and/or printed recommendations by glass or plastic glazing materials manufacturer, whichever is most stringent, for:
 - a. Setting blocks
 - b. Spacers
 - c. Glazing Points
 - d. Glazing Compound
 - e. Sealant
 - f. Glazing Tape

D. Aluminum Glazing Accessories: U.S. Aluminum products as a standard of quality.

1. Glazing Stops and H-Bars:
 - a. General:
 - 1) Material: Extruded aluminum, 6063-T5 alloy.
 - 2) Finish: Satin, anodized finish of specified color.
 - b. Glazing Stops: Arcadia No. 22-103, unless otherwise noted.
 - 1) Glazing Beads: Roll-in, non-stretch, high-shore vinyl with a 60# test fiberglass cord concealed-in and bonded to the vinyl.
 - 2) No exposed screws in stop system.

E. Oversized Mirrors:

1. Mirrors: 1/4" tempered, clear, transparent flat glass of mirror quality (Type I, Class 1, quality q2), silvered with nitrate-of-silver, electro-plated with copper to completely seal silver from contact with air, painted with black hard composition paint. Grind and polish exposed edges.
2. Ledge Molding: Extruded anodized aluminum J-molding with "1/2" short and 1" long legs.

F. Acoustical Glazing

1. See section 08 56 70 Sound Control Windows.

2.02 FACTORY FABRICATION OF GLASS**A. General:**

1. Factory fabricate to exact sizes required for each opening for all tempered glass.
2. Fabricate per Code, FGMA, SIGMA and manufacturer's printed recommendations.
 - a. Provide Code required edge clearances.
 - b. Tinted glass to have clean-cut edges.

B. Labeling: Label glazing per Title 24, Section 2402. Tempered glass to have permanently etched label. Labeling of safety glazers to be per 2013 CBC Section 2406.3.**PART 3 - EXECUTION****3.01 INSPECTION**

- A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Selection of Glass: Where plate glass is indicated or specified, float glass may be used.
- B. Distortion: Cut and install glass with the visible lines or waves running with the horizontal direction.
- C. Fix movable items securely, or in a closed and locked position, until glazing compound has thoroughly set.
- D. Glass Setting:

1. Items to be glazed shall be shop-glazed or field-glazed with glass of the quality and thickness specified.
2. Prepare surrounds and glass, unless otherwise directed, in conformance with the details and general conditions governing glazing in the FGMA Glazing Manual.
3. Aluminum windows and wood doors may be glazed in conformance with one of the glazing methods described in the standards under which they are produced, except the face puttying method illustrated and described in CS 163 will not be permitted.
4. Use beads or stops furnished with the items to be glazed to secure the glass in place.

3.03 CLEANING

- A. Prior to acceptance of the work, thoroughly clean all glass and remove all labels, paint spots, putty, and other defacements.

END OF SECTION

SECTION 09 22 36.23**METAL LATH****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Metal lath for portland cement and gypsum plaster.
- B. Furring for metal lath.
- C. Metal ceiling framing.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Sheathing on exterior walls.
- B. Section 08 31 00 - Access Doors and Panels: Product requirements for metal access panels integral with metal lath.
- C. Section 09 24 00 - Cement Plastering.

1.03 REFERENCE STANDARDS

- A. ASTM C 847 - Standard Specification for Metal Lath; 2006.
- B. 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; 2004.
- C. ASTM C 1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2006.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on furring and lathing components, structural characteristics, material limitations, and finish.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of each installation standard referenced in PART 3 on site throughout the duration of lathing and plastering work.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

1.06 COORDINATION

- A. Coordinate work with installation of access panels specified in Section 08 31 00 - Access Doors and Panels.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Metal Lath:
1. Inryco/Milcor
 2. Alabama Metal Industries Corporation: www.amico-online.com.
 3. Clark Western Building Systems: www.clarkwestern.com.
 4. Dietrich Metal Framing: www.dietrichindustries.com.
 5. Substitutions: See Section 01 25 00 - Product Requirements.

2.02 FRAMING AND LATH ASSEMBLIES

- A. Provide completed assemblies with the following characteristics:
1. Maximum Deflection of Vertical Assemblies: 1:360 under lateral point load of 100 lbs.
 2. Maximum Deflection of Horizontal Assemblies: 1:240 deflection under dead loads and wind uplift.

2.03 FRAMING MATERIALS

- A. Furring Channels: Formed steel, minimum 0.020 inch thick, 3/8 inch deep x 7/8 inch high, splicing permitted; galvanized.
- B. Main Ceiling Channels: Formed steel, asphalt coated, minimum 0.05 inch thick, 3/4 inch deep x 1-1/2 inch high, single piece, no splicing; galvanized.
- C. Hangers: Steel wire, of size and type to suit application, to support ceiling components in place to deflection limits as indicated.
- D. Ceiling Hangers: Rolled steel sections, of size and type to suit application, to rigidly support ceiling components in place to deflection limits as indicated; galvanized.
- E. Lateral Bracing: Formed steel, minimum 0.060 inch thick, size and length as required; galvanized.

2.04 LATH

- A. Diamond Mesh Metal Lath: ASTM C 847, galvanized; self-furring.
1. Weight: To suit application, comply with deflection criteria, and as specified in ASTM C 841 for framing spacing.
 2. Weight: 2.5 lb/sq yd.
- B. Ribbed Metal Lath: ASTM C 847, galvanized; 3/8 inch thick.
1. Weight: To suit application, comply with deflection criteria, and as specified in ASTM C 841 for framing spacing.
 2. Weight: 3.4 lb/sq yd.
- C. Corner Mesh: Formed sheet steel, minimum 0.018 inch thick, perforated flanges shaped to permit complete embedding in plaster, minimum 2 inch size; same finish as lath.
- D. Strip Mesh: Expanded metal lath, same weight as lath, 2 inch wide x 24 inch long; same finish as lath.

- E. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, maximum possible lengths.

2.05 ACCESSORIES

- A. Access Panels: As specified in Section Section 08 31 00 - Access Doors and Panels.
- B. Anchorage: Tie wire, nails, and other metal supports, of type and size to suit application; to rigidly secure materials in place, galvanized.
- C. Fasteners: ASTM C 1002 self-piercing tapping screws.
- D. Tie Wire: Annealed galvanized steel.E.
- E. Water Barrier (at framed walls):
 - 1. Underlayment: 2 layers "Fortifiber" Jumbo Tex HD 30 minute.
 - 2. Penetration Flashing: "Fortifiber" Moistrop EZSeal

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that substrates are ready to receive work and conditions are suitable for application.
- C. For exterior plaster and stucco on stud walls, verify that water-resistive barrier has been installed over sheathing substrate completely and correctly.
- D. Do not begin until unacceptable conditions have been corrected.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION - GENERAL

- A. Install interior lath and furring in accordance with ASTM C 841.

3.03 WALL FURRING

- A. Install furring channels horizontally; secure with fasteners on alternate channel flanges at maximum 24 inches on center.
- B. Space furring channels maximum 16 inches on center, and not more than 4 inches away from floor and ceiling lines.

3.04 CEILING AND SOFFIT FRAMING

- A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- B. Install furring independent of walls, columns, and above-ceiling work.
- C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.

- D. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.
- E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- F. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.
- G. Reinforce openings in suspension system that interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.
- H. Laterally brace suspension system.

3.05 CONTROL AND EXPANSION JOINTS

- A. Locate joints as indicated on drawings.
- B. Install control and expansion joints.

3.06 ACCESS PANELS

- A. Install access panels and rigidly secure in place.
- B. Install frames plumb and level in opening. Secure rigidly in place.
- C. Position to provide convenient access to concealed work requiring access.

3.07 LATH INSTALLATION

- A. Apply metal lath taut, with long dimension perpendicular to supports.
- B. Lap ends minimum 1 inch. Secure end laps with tie wire where they occur between supports.
- C. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches from corner to form the angle reinforcement; fasten at perimeter edges only.
- D. Place corner bead at external wall corners; fasten at outer edges of lath only.
- E. Place base screeds at termination of plaster areas; secure rigidly in place.
- F. Place 4 inch wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.
- G. Place lath vertically above each top corner and each side of door frames to 6 inches above ceiling line.
- H. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.
- I. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

3.08 ERECTION TOLERANCES

- A. Maximum Variation from True Lines and Levels: 1/8 inch in 10 feet.
- B. Maximum Variation from True Position: 1/8 inch.

END OF SECTION

SECTION 09 24 00
CEMENT PLASTERING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Exterior Glass-Mat Sheathing
 - 2. Exterior Insulation boards
 - 3. Exterior Paper and Lath
 - 4. Exterior Cement Plasterwork on metal lath.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.
- C. Samples: For each type of factory-prepared finish coat indicated.

1.03 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Sound-Transmission Characteristics: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.
- C. Mockups: Before plastering, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1.04 PROJECT CONDITIONS

- A. Comply with ASTM C 926 requirements.
- B. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS**2.01 METAL LATH**

- A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
1. General: Per Federal Specifications QQ-L-101, expanded copper bearing steel sheets. Coat lath with rust-inhibitive paint after fabrication typical; except where galvanized lath is specified.
 2. Standard Expanded Metal Lath: Flat, diamond mesh, 3.4 lbs. per square yard.
 3. 3/8" Rib Lath: Similar to "Standard Expanded Metal Lath", but having a herringbone pattern with longitudinal ribs, 3.4 lbs. per square yard.
 4. Self-Furring (Hump) Lath: Similar to "Standard Expanded Metal Lath," but having staggered 1/4" indentations 3 1/2" apart horizontally and 2" apart vertically to hold the body of the lath away from backing material.
 5. Structalath Twin Trac self furring welded wire lath. 17 ga. Galvanized steel wire precision welded to form 1 1/2" x 1 1/2" openings.
 6. Structa Rib Lath VTruss Walls & Ceilings self furring welded wire lath. 0.7" x 1 1/2" rectangular opening.
- B. Paper Backing: FS UU-B-790, Type I, Grade D, Style 2 vapor-permeable paper
1. Provide paper-backed lath at exterior locations and in locations indicated on Drawings.

2.02 EXTERIOR SHEATHING FOR WALLS AND SOFFITS

- A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges. Fiberglass-Mat Faced Gypsum Sheathing: ASTM C1177:
1. Thickness: 1/2 inch.
 2. Width: 4 feet.
 3. Length: [8 feet] [9 feet] [10 feet].
 4. Weight: 1.9 lb/sq. ft.
 5. Edges: Square.
 6. Surfacing: Fiberglass mat on face, back, and long edges.
 7. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 540 pounds per square foot, dry.
 8. Flexural Strength, Parallel (ASTM C473): 80 lbf, parallel.
 9. Humidified Deflection (ASTM C1177): Not more than 2/8 inch.
 10. Permeance (ASTM E96): Not less than 23 perms.
 11. R-Value (ASTM C518): 0.56.
 12. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
 13. Microbial Resistance (ASTM D6329, UL Environmental GREENGUARD 3-week protocol): Will not support microbial growth.
 14. Acceptable Products Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:

- a. CertainTeed Corp.; GlasRoc Sheathing.
- b. Georgia-Pacific Gypsum LLC; Dens-Glass Gold.
- c. National Gypsum Company; Gold Bond, e(2)XP.
- d. USG Corporation; Securock Glass Mat Sheathing.
- e. Pabco Glass Sheathing

2.03 EXTERIOR INSULATION:

- A. Where called out in drawings, install 1" thick rigid board insulation (R-4 per inch minimum). See drawings for exact R-Value.

2.04 ACCESSORIES

- A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 zinc coating.
2. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
3. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
4. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.
 - a. Small-nose style; use unless otherwise indicated.
5. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
6. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
7. Expansion Joints: Fabricated from zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
8. Two-Piece Expansion Joints: Fabricated from zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch wide; with perforated flanges.
9. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
10. Expansion Joints: Two-piece type, formed to produce slip-joint and square-edged 1-inch- wide reveal; with perforated concealed flanges.

2.05 MISCELLANEOUS MATERIALS

- A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in portland cement plaster.
- C. Bonding Compound: ASTM C 932.
- D. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.
- E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.
- F. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter, unless otherwise indicated.

2.06 PLASTER MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II.
 - 1. Color for Finish Coats: Gray.
- B. Masonry Cement: ASTM C 91, Type N.
 - 1. Color for Finish Coats: Gray.
- C. Plastic Cement: ASTM C 1328.
- D. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color (architect to select)
- E. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- F. Sand Aggregate: ASTM C 897.
 - 1. Color for Job-Mixed Finish Coats: In color matching Architect's sample.
- G. Perlite Aggregate: ASTM C 35.
- H. Acrylic-Based Finish Coatings: Factory-mixed acrylic-emulsion coating systems, formulated with colorfast mineral pigments and fine aggregates; for use over portland cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic-based finishes.
 - 1. Color: As selected by Architect from manufacturer's full range.
 - 2. Texture: As selected by Architect

2.07 PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
 - 1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written

instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. of cementitious materials.

- B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:
1. Portland Cement Mixes:
 - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - b. Brown Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
 2. Masonry Cement Mixes:
 - a. Scratch Coat: 1 part masonry cement and 2-1/2 to 4 parts aggregate.
 - b. Brown Coat: 1 part masonry cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.
 3. Portland and Masonry Cement Mixes:
 - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - b. Brown Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
 4. Plastic Cement Mixes:
 - a. Scratch Coat: 1 part plastic cement and 2-1/2 to 4 parts aggregate.
 - b. Brown Coat: 1 part plastic cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.
 5. Portland and Plastic Cement Mixes:
 - a. Scratch Coat: For cementitious material, mix 1 part plastic cement and 1 part portland cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - b. Brown Coat: For cementitious material, mix 1 part plastic cement and 1 part portland cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

- C. **Factory-Prepared Finish-Coat Mixes:** For acrylic-based finish coatings, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.01 PREPARATION

- A. **Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.**
- B. **Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.**

3.02 INSTALLATION, GENERAL

- A. **Fire-Resistance-Rated Assemblies:** Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- B. **Sound Attenuation Blankets:** Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.
- C. **Acoustical Sealant:** Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.03 INSTALLING GLASS MAT GYPSUM SHEATHING

A. EXAMINATION

1. **Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.**
2. **Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.**
3. **Proceed with installation only after unsatisfactory conditions have been corrected.**

B. APPLYING AND FINISHING PANELS, GENERAL

1. **Comply with ASTM C 840.**
2. **Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.**
3. **Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.**
4. **Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends.**

Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

5. Form control and expansion joints with space between edges of adjoining gypsum panels.
6. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - a. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - b. Fit gypsum panels around ducts, pipes, and conduits.
 - c. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
7. Detail perimeter isolation on Drawings. See "Crack Control" Article in the Evaluations.
8. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
9. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
10. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

3.04 INSTALLING METAL LATH

A. Lathing:

1. General: Apply lath with long dimensions at right angles to supports, stagger ends of sheets, lap at supports. Lap sides 1/2" minimum, ends 1" minimum; nest outside ribs at rib-lath. Tie side laps between supports, 18 gauge wire. On vertical surfaces, start at top and lath downward. Do not carry lath through intersections of horizontal and vertical surfaces.
2. Corners:
 - a. At internal corners, butt lath and reinforce with cornerite wire tied at 12" maximum on center.
 - b. At building exteriors, use specified corner reinforcement at outside corners.
3. Attachment to Steel Tubes: Tack weld lath to tubes.
4. Typical Attachment: Screw to each support, at 6" maximum spacing.

5. Seismic Attachment to Horizontal Framing: In addition to typical attachment, provide additional attachment by the following method:
 - a. Tying Method, to Alternate Supports: Secure lath to alternate supports by a double-strand of tie wire, located 3" maximum from sheet edge, looped over one of the following:
 - 1) Stripping.
 - 2) 8d common nails driven into each side joist, 2" above bottom.
 - 3) 16d common nail driven horizontally through joist, 2" above bottom. Pull lath up tight; tie-twist wire ends together with three twists minimum.
 6. Where plaster or tile finish continues onto abutting concrete surfaces, lap lath 6" onto such surfaces and fasten securely.
- B. Sheathing Paper:
1. Required Locations: All areas on exterior vertical and sloping surfaces.
 2. Prior to lathing, install weatherboard fashion, starting from bottom. Lap sides 2" minimum, lap ends and corners 6" minimum, secure to supports.

3.05 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- B. Reinforcement for External Corners:
1. Install lath-type, external-corner reinforcement at exterior locations.
 2. Install cornerbead at interior and exterior locations.
- C. Control Joints: Install control joints at locations indicated on Drawings and in specific locations approved by Architect for visual effect as follows:
1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft..
 - b. Horizontal and other Nonvertical Surfaces: 100 sq. ft.
 2. At distances between control joints of not greater than 18 feet o.c.
 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 4. Where control joints occur in surface of construction directly behind plaster.
 5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.06 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
- B. Bonding Compound: Apply on unit masonry and concrete plaster bases.
- C. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork; 3/4-inch thickness.
 - 1. Portland cement mixes.
 - 2. Masonry cement mixes.
 - 3. Portland and masonry cement mixes.
 - 4. Plastic cement mixes.
 - 5. Portland and plastic cement mixes.
- D. Ceilings; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork.
 - 1. Portland cement mixes.
 - 2. Masonry cement mixes.
 - 3. Portland and masonry cement mixes.
 - 4. Plastic cement mixes.
 - 5. Portland and plastic cement mixes.
- E. Acrylic-Based Finish Coatings: Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.
- F. Concealed Exterior Plasterwork: Where plaster application will be used as a base for adhered finishes, omit finish coat.
- G. Concealed Interior Plasterwork:
 - 1. Where plaster application will be concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
 - 2. Where plaster application will be concealed above suspended ceilings and in similar locations, finish coat may be omitted.
 - 3. Where plaster application will be used as a base for adhesive application of tile and similar finishes, omit finish coat.

3.07 PLASTER REPAIRS

- 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.

END OF SECTION

SECTION 09 29 00**GYPSUM BOARD****PART 1 - GENERAL**

1.01 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - 2. Tile backing panels.
 - 3. Texture finishes.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples:
 - 1. Textured Finishes: for each textured finish indicated and on same backing indicated for Work.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Low Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.02 GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. American Gypsum.

2. CertainTeed Corp.
 3. Georgia-Pacific Gypsum LLC.
 4. USG Corporation.
 5. Pabco Gypsum
- B. Gypsum Wallboard: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch.
 2. Long Edges: Tapered
 3. To be used at most walls.
- C. SilentFX Noise-Reducing Gypsum Board by CertainTeed ASTM C 1396/C 1629
1. Thickness: 5/8 inch
 2. Long Edges: Tapered
 3. To be used at common wall sections where any of the following rooms are adjacent to each other: C105, C110, C112, C113, C114, C115, C119 & C120.
- D. Gypsum Board, Type X: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch.
 2. Long Edges: Tapered
 3. At all 1-hour or 45 minute assemblies.
- At contractors option:
Moisture, Mold and Abuse resistant gyp board, Type X (ASTM C 473/ D 3273/ C 1629/ E 84) may be used in lieu of standard Type X gyp board at rated walls as required for sequence of construction w/o altering the UL rating. (5/8" thick w/ tapered long edges)
- E. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
1. Thickness: 1/4 inch.
 2. Long Edges: Tapered.
 3. (2) layers at curved non-rated walls.
- F. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
 3. At ceiling locations
- G. Moisture Resistant Sheathing Board: ASTM E 119.
1. Thickness: 9/16 inch as required for rated-assembly indicated on dwgs.
 2. Long Edges: Tapered.
 3. At 2-hour fire walls

- H. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 3.
1. Core: 5/8 inch, .
 2. Long Edges: Tapered.
 3. At non-rated Gymnasium walls up to 10'
 4. Abrasion Resistance: Level 1
 5. Impact Resistance: Level 3
 6. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- I. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
1. Core: 5/8 inch, Type X at rated walls.
 2. Long Edges: Tapered.
 3. At areas prone to moisture such as food production/service areas, toilet rooms, wet areas around sinks, locker rooms, cooking classrooms,
 4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- J. Gypsum Liner Panels: ASTM C 442/ C 1396/ E136/ E84.
1. Core: 1" Thick
 2. At rated ceilings & walls indicated on plans.

2.03 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc
- B. Exterior Trim: ASTM C 1047.
1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
- C. Aluminum Trim: ASTM B 221, Alloy 6063-T5.

2.04 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
1. Interior Gypsum Board: Paper.
 2. Exterior Gypsum Soffit Board: Paper.
 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 4. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

2.05 AUXILIARY MATERIALS

- A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- C. Acoustical Joint Sealant: ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
 - b. Grabber Construction Products; Acoustical Sealant GSC.
 - c. Pecora Corporation; AC-20 FTR.
 - d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
 - e. USG Corporation; SHEETROCK Acoustical Sealant.

2.06 TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.
- B. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; ProRoc Wall and Ceiling Spray Texture.
 - b. Georgia-Pacific Gypsum LLC; ToughRock Ceiling Textures/Vermiculite.
 - c. USG Corporation; SHEETROCK Wall and Ceiling Spray Texture (Aggregated).
 - 2. Texture:
 - a. General: Light spatter texture
 - b. Restrooms: Orange Peel

PART 3 - EXECUTION

3.01 APPLYING AND FINISHING PANELS

- A. Comply with ASTM C 840.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. Install trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
 - 1. Aluminum Trim: Install in locations indicated on Drawings .
 - 2. Control Joints: Install control joints at locations indicated on Drawings and according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- E. Prefill open joints, beveled edges, and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile, Panels that are substrate for acoustical tile and vinyl tackboard.
 - 3. Level 3: Storage Closets.
 - 4. Level 4: At most locations not specified
 - a. Primer and its application to surfaces are specified in Section 09 91 23 - Painting.
 - 5. Level 5: Lobby areas, Corridors, and any locations with a Vinyl Coated Wallcovering Mural Section 09 72 16.
 - a. Primer and its application to surfaces are specified in Section 09 91 23 - Painting.
- H. Texture Finish Application: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
- I. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

- J. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION

SECTION 09 30 00**TILING****PART 1 - GENERAL**

1.01 SUMMARY

A. Section Includes:

1. Tile.
2. Waterproof membrane.
3. Crack isolation membrane.
4. Tile backing panels.
5. Metal edge strips.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples:

1. Each type and composition of tile and for each color and finish required.
2. Assembled samples, with grouted joints, for each type and composition of tile and for each color and finish required.

1.03 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.01 TILE PRODUCTS

A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. Tile Type: Factory-mounted glazed and unglazed ceramic tile.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings; comparable product by one of the following will be subject to the provisions of 01 25 00 – Substitution Procedures:

- a. American Olean; Division of Dal-Tile International Inc.
 - b. Crossville, Inc.
 - c. Daltile; Division of Dal-Tile International Inc.
 - d. Deutsche Steinzeug America, Inc.
 - e. Emser Tile
 - f. Interceramic.
 - g. Lone Star Ceramics Company.
 - h. Grupo Porcelanite.
 - i. Portobello America, Inc.
 - j. Seneca Tiles, Inc.
2. Module Size: See Finish Drawings
 3. Thickness: See Finish Drawings
 4. Surface: See Finish Drawings.
 5. Tile Color and Pattern: See Finish Drawings
 6. Grout Color: As selected by Architect from manufacturer's full range
 7. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Cove: Cove, module size
 - b. Base Cap: Surface bullnose.
 - c. Wainscot Cap: Surface bullnose
 - d. External Corners: Surface bullnose
 - e. Internal Corners: Cove, module size.

C. Tile Type: Unglazed square-edged quarry tile.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings; other manufacturers are subject to the provisions of 01 25 00 – Substitution Procedures. Some of the following are:
 - a. American Olean; Division of Dal-Tile International Inc.
 - b. Atlas Minerals & Chemicals, Inc.
 - c. Daltile; Division of Dal-Tile International Inc.
 - d. Emser Tile
 - e. Interceramic.
 - f. Quarry Tile Co.
 - g. Seneca Tiles, Inc.
 - h. Summitville Tiles, Inc.
 - i. United States Ceramic Tile Company.
2. Face Size: 6 by 6 inches.
3. Thickness: 3/4 inch
4. Wearing Surface: Natural
5. Finish: See drawings.
6. Tile Color and Pattern: See drawings.
7. Grout to be epoxy.

8. Grout Color: As selected by Architect from manufacturer's full range
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base: Coved with surface bullnose top edge & 3/8" minimum radius, face size 6 by 6 inches.
 - b. Wainscot Cap: Surface bullnose, face size 8 by 8 inches.

D. Tile Type: Porcelain Tile

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings; other manufacturers are subject to the provisions of 01 25 00 – Substitution Procedures. Some of the following are:
 - a. American Olean; Division of Dal-Tile International Inc.
 - b. Daltile; Division of Dal-Tile International Inc.
 - c. Emser Tile
2. Series: see drawings
3. Color: see drawings

2.02 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated.
- B. PVC Sheet: Two layers of PVC sheet heat-fused together and to facings of nonwoven polyester; 0.040-inch nominal thickness.
- C. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Boiardi Products, a QEP company; Elastiment 323 Cement Based Waterproofing, Anti-Fracture/Crack Suppression Membrane.
 - b. C-Cure; UltraCure 971.
 - c. MAPEI Corporation; MapelasticPRP 315).
 - d. Southern Grouts & Mortars, Inc.; Southcrete 1100.
 - e. TEC, a subsidiary of H. B. Fuller Company; Triple Flex Waterproofing, Crack Isolation Membrane & Mortar.

2.03 CLEAVAGE MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated.
- B. Chlorinated-Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch nominal thickness.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. The Noble Company; Nobleseal CIS.

2.04 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; GlasRoc Tile Backer.
 - b. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.
 - 2. Core: As indicated on Drawings
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- B. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. C-Cure; C-Cure Board 990.
 - b. CertainTeed Corp.; FiberCement BackerBoard.
 - c. Custom Building Products; Wonderboard.
 - d. James Hardie Building Products, Inc.; Hardiebacker 500.
 - e. National Gypsum Company, Permabase Cement Board.
 - f. USG Corporation; DUROCK Cement Board.
 - 2. Thickness: As indicated.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.05 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
- B. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

1. Manufacturers: Subject to compliance with requirements, [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Boiardi Products; a QEP company.
 - b. Bonsal American; an Oldcastle company.
 - c. Bostik, Inc.
 - d. C-Cure.
 - e. Custom Building Products.
 - f. Jamo Inc.
 - g. Laticrete International, Inc.
 - h. MAPEI Corporation.
 - i. Southern Grouts & Mortars, Inc.
 - j. Summitville Tiles, Inc.
 - k. TEC; a subsidiary of H. B. Fuller Company.
2. For wall applications, provide nonsagging mortar.

C. Latex-Portland Cement Mortar Thin Set: ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Boiardi Products; a QEP company.
 - b. Bonsal American; an Oldcastle company.
 - c. Bostik, Inc.
 - d. C-Cure.
 - e. Custom Building Products.
 - f. Jamo Inc.
 - g. Laticrete International, Inc.
 - h. MAPEI Corporation.
 - i. Mer-Kote Products, Inc.
 - j. Southern Grouts & Mortars, Inc.
 - k. Summitville Tiles, Inc.
 - l. TEC; a subsidiary of H. B. Fuller Company.
2. Prepackaged, dry-mortar mix to which only water must be added.
3. Prepackaged, dry-mortar mix combined with liquid-latex additive.
4. For wall applications, provide nonsagging mortar.

2.06 GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10.
- B. Standard Cement Grout: ANSI A118.6.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Boiardi Products; a QEP company.
- b. Bonsal American; an Oldcastle company.
- c. Bostik, Inc.
- d. C-Cure.
- e. Custom Building Products.
- f. Jamo Inc.
- g. Laticrete International, Inc.
- h. MAPEI Corporation.
- i. Southern Grouts & Mortars, Inc.
- j. Summitville Tiles, Inc.
- k. TEC; a subsidiary of H. B. Fuller Company.

C. Polymer-Modified Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Boiardi Products; a QEP company.
 - b. Bonsal American; an Oldcastle company.
 - c. Bostik, Inc.
 - d. C-Cure.
 - e. Custom Building Products.
 - f. Jamo Inc.
 - g. Laticrete International, Inc.
 - h. MAPEI Corporation.
 - i. Southern Grouts & Mortars, Inc.
 - j. Summitville Tiles, Inc.
 - k. TEC; a subsidiary of H. B. Fuller Company.
2. Polymer Type: Dry, redispersible form, prepackaged with other dry ingredients.
3. Polymer Type: Liquid-latex form for addition to prepackaged dry-grout mix.

2.07 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, stainless steel, ASTM A 666, 300 Series exposed-edge material.
- C. Grout Sealer: Manufacturer's silicone product for sealing grout joints and that does not change color or appearance of grout.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Bonsal American, an Oldcastle company; Grout Sealer.
- b. Bostik, Inc.; CeramaSeal Grout & Tile Sealer.
- c. C-Cure; Penetrating Sealer 978.
- d. Custom Building Products; Grout Sealer.
- e. Jamo Inc.; Penetrating Sealer.
- f. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.
- g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
- h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
- i. TEC, a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.

PART 3 - EXECUTION

3.01 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 installed tile.
 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.

3.02 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.
- D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.03 INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are

referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors in laundries.
 - c. Tile floors composed of tiles 8 by 8 inches or larger.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 1. Ceramic Mosaic Tile: 1/16 inch.
 2. Quarry Tile: 1/4 inch.
 3. Paver Tile: 1/4 inch.
 4. Glazed Wall Tile: 1/16 inch.
 5. Decorative Thin Wall Tile: 1/16 inch.
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 - Joint Sealants.

- I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- J. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- K. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- L. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

3.04 EXTERIOR TILE INSTALLATION SCHEDULE

- A. Exterior Wall Installations, Masonry or Cement Plaster:
 - 1. Tile Installation W201: Cement mortar bed thickset on metal lath over waterproof membrane; TCA W201.
 - a. Tile Type: Ceramic Glazed
 - b. Bond Coat /Thin-Set Mortar: Latex-portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.
 - 2. Tile Installation W202: Thin-set mortar; TCA W202.
 - a. Tile Type: Ceramic Glazed
 - b. Bond Coat /Thin-Set Mortar: Latex-portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.

3.05 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Tile Installation F112: Cement mortar bed thickset) bonded to concrete; TCA F112.
 - a. Tile Type: Porcelain and Unglazed Quarry Tile
 - b. Thin-Set Mortar for Cured-Bed Method: Latex-portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.
- B. Interior Wall Installations, Masonry Student Locker Room Restrooms:
 - 1. Tile Installation W211: Cement mortar bed thickset bonded to substrate; TCA W211.
 - a. Tile Type: Porcelain

- b. Bond Coat/Thin-Set Mortar: Latex-portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.
- C. Interior Wall Installations, Metal Studs with solid backing Locker Room Showers:
 - 1. Tile Installation W221: Cement mortar bed thickset over waterproof membrane on solid backing; TCA W221.
 - a. Tile Type: Porcelain
 - b. Bond Coat/Thin-Set Mortar: Latex-portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.
- D. Interior Wall Installations, Metal Studs with solid backing per interior elevations
 - 1. Tile Installation W223: Organic adhesive on solid backing; TCA W223.
 - a. Tile Type: Porcelain
 - b. Grout: Polymer-modified sanded grout.
- E. Shower Receptor and Wall Installations, Concrete or Masonry:
 - 1. Tile Installation B414: Cement mortar bed thickset; TCA B414.
 - a. Tile Type: Porcelain
 - b. Bond Coat/Thin-Set Mortar: Latex-portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.
- F. Shower Receptor and Wall Installations, Metal Studs with solid backing:
 - 1. Tile Installation B414: Cement mortar bed thickset; TCA B414.
 - a. Tile Type: Porcelain
 - b. Bond Coat/Thin-Set Mortar: Latex-portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.

3.06 TILE BACKING PANEL INSTALLATION

- A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.[Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.]
- B. Install glass-mat, water-resistant gypsum panel and treat joints according to current Tile Council of North America (TCNA) "Handbook for Ceramic Tile Installation" and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.07 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.08 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.09 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION

SECTION 09 51 13
ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for ceilings.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

1.03 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Evaluation reports.
- C. Field quality-control reports.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to NVLAP.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 450 or less.

2.02 ACOUSTICAL PANELS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc or comparable product by one of the following:
1. CertainTeed Corp.
 2. Chicago Metallic Corporation.
 3. USG Interiors, Inc.; Subsidiary of USG Corporation.
- C. ACT-1 Ceiling Panels (General):
1. Armstrong, Ultima High-NRC, 1940 & 1943, 15/16" Grid (NRC = .80)
 - a. General; Fire Performance: ASTM E84 and CAN/ULC S102 surface burning characteristics. Flame Spread Index 25 or less. Smoke Developed Index 50 or less. (UL labeled) Fire Class A.
 - b. Color: White (Black at Stage)
 - c. Size: 24" x (24" or 48") x 1"
 - d. Edges: Square.
- D. ACT-2 Ceiling Panels (Kitchen):
1. Armstrong, Clean Room VL Unperforated (Vinyl-faced membrane), 870, 15/16" Co-Extruded Clean Room Grid.
 - a. General; Fire Performance: ASTM E84 and CAN/ULC S102 surface burning characteristics. Flame Spread Index 25 or less. Smoke Developed Index 50 or less. (UL labeled) Fire Class A.
 - b. Color: White
 - c. Size: 24" x (24" or 48" x 5/8"
 - d. Edges: Square Lay-In
 - e. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.55.
 - f. Flame Spread: ASTM E 1264; Class A (UL)

2.03 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries or comparable product by one of the following:
1. Chicago Metallic Corporation.
 2. CertainTeed Corp.
 3. USG Interiors, Inc.; Subsidiary of USG Corporation.
- C. Standards: Grid and connections per Section 3, ASTM C635-69, Heavy Duty 16 lbs. deflection L/360 of span in 48". ICC ESR-1308 for seismic requirements.
- D. Grid System:

1. Types: Prelude XL 15/16" Exposed Tee System, Suprafine XL 9/16" Exposed Tee System and Clean Room Grid System, by Armstrong World Industries, modified as required.
2. Grid Members, Heavy Duty Suspended Acoustical Lay-in Ceiling:
 - a. Main Runners: No. 7301 (Prelude), No. 7501 (Suprafine) and No. ES7901 (Clean Room)
 - b. Cross-Tees: Heavy duty.
 - c. Sub-Tees: Same as Cross-tees.
 - d. Wall Moldings: No. 7800 (Prelude), No. 7804 (Suprafine) and No. EA7801 (Clean Room)
 - e. Finish: Baked polyester paint, factory applied to cleaned and boulderized members, matte finish typical (Prelude & Suprafine). PVC (Clean Room).
3. Color: White for all members. (Black at Stage)

2.04 MATERIALS, MISCELLANEOUS AND ACCESSORIES

A. Screws:

1. Standards; CBC 2016 & ASTM C1002-07
2. Type: Self-drilling, self-tapping, bugle head, No. 6; Type S to metal framing. Lengths to penetrate through metal and 1/4" minimum projection beyond.

B. Seismic Joint Clips:

1. Install Armstrong SJCG or SJCSI concealed seismic joint clips at ceilings exceeding 2500 sq. ft., per manufacturer recommendations.

PART 3 - EXECUTION

A. EXAMINATION

1. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

B. PREPARATION

1. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
2. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
3. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

C. INSTALLATION OF GLUE-ON TILES

1. Adhesive: Subcontractor shall install ceiling tile by glue-up method to drywall using acoustical tile cement.
2. Wall Moldings: Shall be slip-on molding with 15/16" flange as follows:
3. 1/2" thick, Item #7841
4. 5/8" thick, Item #7842
5. 3/4" thick, Item #7843
6. Accessories: To assist in leveling tiles use 1/16" thick fiber spline approximately 3" long at each corner

D. ADJUSTING AND CLEANING

1. Replace damaged and broken panels.
2. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.
3. Ceiling Touch-Up Paint, (Item #5760, 8oz. bottles) (Item #5761, quart size cans), "global white" latex paint should be used to hide minor scratches and nicks in the surface and to cover field tegularized edges that are exposed to view.
4. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

E. INSTALLATION OF SUSPENDED GRID

1. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.
2. Suspend main beam from overhead construction with hanger wires spaced 4'-0" on center along the length of the main runner. Install hanger wires plumb and straight.
3. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
4. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
5. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

F. ADJUSTING AND CLEANING

1. Replace damaged and broken panels.
2. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.
3. Ceiling Touch-Up Paint, (Item #5760, 8oz. bottles) (Item #5761, quart size cans), "global white" latex paint should be used to hide minor scratches

and nicks in the surface and to cover field tegularized edges that are exposed to view.

4. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 64 66**WOOD ATHLETIC FLOORING****PART 1 - GENERAL****1.01 SUMMARY****A. Related Requirements:**

1. Concrete and Concrete Finishing: Section 03 30 00 – Cast-In-Place Concrete.
 - a. Concrete Slab Depression: 1 7/8" using 25/32" flooring and subfloor.
 - b. Surface Finish: steel troweled and finished smooth.
 - c. Concrete Tolerance: +/- 1/8" in radius of 10'.
 - d. Floor Flatness and Floor Levelness (FF and FL) numbers are not recognized.
 - e. Compressive Strength: Concrete shall be a minimum of 3,000 psi (21 MPa) and a maximum of 4000 psi (28MPa) compressive strength after 28 days. Concrete shall be free of washed river gravel, pea gravel, flint or hardener additives. No lightweight concrete.
 - f. High spots shall be ground level and low spots shall be filled in with approved leveling compound by the general contractor to meet the tolerance above.
2. Section 07 26 00 - Concrete Moisture Vapor Emission Control
 - a. Concrete subfloors on or below grade shall be adequately waterproofed beneath the slab and at the perimeter walls and on the earth side of below grade walls by general contractor using suitable type membrane.
 - b. Sand-Poly-Sand slab construction is not an acceptable construction.
3. Thresholds: Section 08 71 00 - Finish Hardware
4. Game Standard Inserts: Section 11 66 00 - Athletic Equipment

1.02 REFERENCES

- A. MFMA - Maple Flooring Manufacturers Association
- B. MFMA PUR – Performance Uniformity Requirements
- C. DIN 108032 (part 2) 2001 - Performance Test
- D. DIN 108032 (part 2) 1991 - Performance Test

- E. ASTM F2772 - Athletic Performance Properties of Indoor Sports Floor Systems
- F. EN 14904 – European Committee for Standardization – Surfaces for Sports areas
- G. ASTM F2772 - Athletic Performance Properties of Indoor Sports Floor Systems
- H. FIBA – International Basketball Federation
- I. FSC – Forest Stewardship Council

1.03 SUBMITTALS

- A. Specification and Drawings per Section 01 33 00 – Submittal Procedures.
 - 1. Submit product data specification sheet.
 - 2. Submit drawings as required.
- B. Sample
 - 1. Submit one (1) sample, if requested by architect
- C. Concrete Guidelines
 - 1. Submit MFMA Recommendations for correct preparation, finishing and testing of concrete subfloor surfaces to receive wood flooring.
- D. Maintenance Guidelines
 - 1. Submit copy of Maintenance Instructions.

1.04 QUALITY ASSURANCE

- A. Floor System Manufacturer Qualifications
 - 1. Manufacturer shall be an established firm experienced in field and have been in business or a minimum of ten (10) years; Robbins, Inc. or an approved equal.
 - 2. Manufacturer will be a member in good standing of the Maple Flooring Manufacturers Association (MFMA).
- B. Floor Contractor/Installer Qualifications and Certifications
 - 1. The flooring contractor shall be a Robbins Accredited Installation with MFMA Accredited Installer(s) on-site for the duration of the wood floor installation; or, a contractor approved by Robbins Sports Surfaces.
 - 2. Flooring contractor shall submit a list of at least three completed projects of similar magnitude and complexity completed under current corporate identity.
- C. Floor System Design
 - 1. System design provides heavy load blocking throughout floor area.

2. The resilient padding provides consistent gradient resiliency. Assures uniform compression deflection transition from light loading to aggressive loading.

D. Floor System Performance

1. Meets or exceeds criteria of the following performance criteria:
 - a. MFMA PUR
 - b. DIN 18032 Part2 2001
 - c. DIN 18032 Part2 1991
 - d. ASTM F2772 Sport Floor Standards
 - e. FIBA International Standards
 - f. EN 14904 Standards
2. Independent testing report showing the system passing all criteria shall be provided as part of the bid qualification process and submittal process.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials

1. Materials shall not be delivered, stored or installed until all masonry, painting, plastering tilework, marble and terrazzo work is complete, and all overhead mechanical work, lighting, backstops, scoreboards are installed. **Room temperature of 55-80 degrees Fahrenheit and relative humidity of 35-50 % are to be maintained.** Ideal installation/storage conditions are the same as those that will prevail when building is occupied
2. Materials shall not be stored at the installation location if the moisture content of the concrete slab exceeds 4% or vapor transmission exceeds 4.5 pounds per 1,000 square feet using a calcium chloride test or the In-Slab relative humidity level for the concrete slab is 80% or lower before installation.

1.06 JOB CONDITIONS-SEQUENCY

- A. Do not install floor system until concrete has been cured 60 days and the requirements in paragraph 1.05 A are obtained.
- B. General Contractor is responsible to ensure slab is clean and free of all dirt and debris prior to floor installation beginning.
- C. Permanent heat, light and ventilation shall be installed and operating during and after installation. Maintain a temperature range of 55 to 80 degrees Fahrenheit (13 to 27 degrees Celsius) and a relative humidity range of 35 to 50%. Consult MFMA guidelines for further information.
- D. After floors are finished, area to be kept locked by general contractor to allow curing time for the finish. If after required curing time general contractor or owner requires use of gym, he shall protect the floor by covering with non-fibered kraft

paper or red rosin paper with taped joints, until acceptance by owner (or owner's agent) of complete gymnasium floor.

1.07 WARRANTY

- A. Guarantee 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 the 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.
- B. Flooring material to be free from manufacturing defects for a period of 1 year. This warranty is in lieu of all other warranties, expressed or implied including but not limited to any warranty of merchantability or fitness for a particular purpose, and of any other obligations on the part of Robbins. In the event of breach of any warranty, the liability of manufacturer shall be limited to repairing or replacing material and system components supplied and proven to be defective in manufacture, and shall not include any other damages, either direct or consequential.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Specification is based on Eclipse-SB by Robbins Sports Surfaces. Other acceptable manufacturers are Connor Sports Flooring or equal. Substitutions are evaluated per Spec Section 01 25 00 – Substitution Procedures.

2.02 MATERIALS

- A. Vapor Barrier
 - 1. 6-mil polyethylene.
- B. Subfloor
 - 1. Robbins Eclipse subfloor panels with factory attached resilient pads.
- C. Maple Flooring Manufacturers Association (MFMA) Wood Flooring. Flooring shall be MFMA grade marked as manufactured by Robbins.
 - 1. Specie: Northern Hard Maple
 - 2. Seasoning: Kiln Dried
 - 3. Matching: Tongue and groove on side-match and end-match.
 - 4. Thickness: 25/32"
 - 5. Width: 2 ¼"
 - 6. Grade: 2nd and Better
 - 7. Factory Finish: Unfinished
 - 8. Treatment: Un-Treated

9. Certified Wood: Non FSC
- D. Fasteners
 1. Flooring - 2" barbed cleats or staples.
 2. Subfloor - 1" coated staple of equivalent.
 3. Sleeper anchors – 2 ½" Powers SPIKE® anchors and sleeves
 - E. Finishing materials
 1. MFMA approved oil-modified Sealer
 2. MFMA approved oil-modified Finish
 - F. Gamelines
 1. Gameline paint(s) shall be recommended by the finishing materials manufacturer, and must be compatible with the finish.
 - G. Perimeter
 1. 3" x 4" ventilating type. black

PART 3 - EXECUTION

3.01 EXAMINATION

1. Inspect concrete slab for proper tolerance and dryness, and report any discrepancies to the general contractor and architect in writing. Slab will be level to within 1/8" in a 10'. Moisture content of the concrete slab shall not exceed 80% in accordance to an In-Slab Relative Humidity test or shall not exceed 4% or 4.5 pounds per 1,000 square feet vapor transmission.
2. All work required to put the concrete subfloors in acceptable condition shall be the responsibility of the general contractor.
3. Subfloor shall be broom cleaned by general contractor.
4. Installer shall document all working conditions provided in General Specifications prior to commencement of installation.

3.02 INSTALLATION

- A. Vapor Barrier
 1. Install polyethylene with joints lapped a minimum of 6" and turned up 4" at the walls.
- B. Subfloor
 1. Position Eclipse-SB subfloor panels per manufacturer's instructions, integrating top layer with adjacent panels. Allow for a ¼" gap at subfloor panel end joints. Provide 1-½" to 2" expansion void at the perimeter and all vertical obstructions.

2. Install solid blocking at doorways, under bleachers in the stacked position, and below portable goals.
3. Install Bleacher Blocking per manufacturer's recommendations.
4. Properly anchor subfloor panels at each factory designated location.

C. Flooring

1. Machine nail maple flooring along each edge of the Eclipse-SB panel's upper layer, driving up all end joints and proper spacing provided for humidity conditions in specific regions. Consult your local Robbins "Certified" contractor. Provide 2" expansion voids at the perimeter and at all vertical obstructions.

3.03 FINISHING

A. Sanding

1. Sand per manufacturer's recommendations.
2. After sanding, buff entire floor using 100 grit screen or equal grit sandpaper, with a heavy-duty buffing machine.
3. Inspect entire area of floor to insure the floor presents a smooth surface without drum stop marks, gouges, streaks or shiners.
4. Vacuum and/or tack floor before first coat of seal.
5. Floor should be clean and completely free of dirt and sanding dust.

B. Gymnasiums

1. Apply specified combination of seal, gameline paint, and finish in accordance with manufacturer's instructions.
2. Buff and vacuum and/or tack between each coat after it dries.
3. Apply game lines accurately after the buffing and vacuuming the coated surfaces. Game lines shall be painted between seal coats and finish coats. Layout in accordance with drawings. For game lines, use current rules of association having jurisdiction. Lines shall be straight with sharp edges in colors selected by architect.

3.04 WALL BASE INSTALLATION

- A. Install vent cove base anchored to walls with base cement or screws. Use pre-molded outside corners and neatly mitered inside corner.

3.05 CLEANING

- A. Clean up all unused materials and debris and remove it from the premises.

END OF SECTION

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Resilient base.
 2. Resilient stair accessories.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

PART 2 - PRODUCTS

2.01 THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Burke Mercer Flooring Products, Division of Burke Industries Inc.
 2. Flexco.
 3. Roppe Corporation, USA.
- B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
1. Style and Location:
 - a. Style B, Cove:
- C. Thickness: 0.125 inch.
- D. Height: As indicated on Drawings.
- E. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.
- F. Outside Corners: Preformed
- G. Inside Corners: Preformed

- H. Colors: As selected by Architect from full range of industry colors

2.02 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 - 1. Adhesives shall have a VOC content of 50 g/L or less except that adhesive for rubber stair treads shall have a VOC content of 60 g/L or less.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

3.02 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. 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.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.03 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

END OF SECTION

SECTION**SAFETY FLOOR COVERING****PART 1 – GENERAL****1-01 SECTION INCLUDES**

- A. This section includes labour, materials and other services to complete resilient sheet flooring, slip resistant sheet vinyl safety flooring systems and accessories.

1-02 RELATED SECTIONS

- A. Section 03300 - Cast-in-Place Concrete: Concrete finishing.

1-03 REFERENCES

- A. American Society for Testing & Materials (ASTM)
- B. ASTM C 501-84, Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
- C. ASTM D 2047, Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine. PART 1 – GENERAL
- D. ASTM E 648/NFPA 253, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
- E. ASTM F 1303, Standard Specification for Sheet Vinyl Floor Covering with backing.
- F. ASTM F710 Standard for Concrete or other monolithic floors.

1-04 SUBMITTALS

- A. Product Data: Submit manufacturer's current printed product literature, specifications, installation instructions, and field reports in accordance with Section 01330 - Submittal Procedures.
- B. Shop Drawings: Submit shop drawings to indicate materials, details, and accessories in accordance with Section 01330 – Submittal Procedures.
- C. Samples: Submit duplicate 300 mm x 300 mm (12" x 12") sample pieces of sheet material, 300 mm (12") long [gully edge] [cap strip] [joint cover strip] [cove former] in accordance with Section 01330 – Submittal Procedures.
- D. Maintenance Data: Submit manufacturer's maintenance data for incorporation into manual specified in accordance with Section 01780 –Closeout Submittals. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

1-05 QUALITY ASSURANCE

- A. Installer: Company or person specializing in resilient sheet flooring with [three] years documented experience and approved by materials manufacturer.

1-06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle resilient flooring materials in accordance with Section 01610 - Basic Material Requirements.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
- D. Store rolls in dry locations, stand rolls on end. Protect and secure rolls from falling.

1-07 WARRANTY

- A. Project Warranty: Refer to CCDC 2 for project warranty provisions.
 Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official in accordance with Section 01780 - Closeout Submittals. Manufacturer's warranty is in addition to and not a limitation of other rights that the Owner may have under the Contract Conditions: Altro Stronghold 30 - 10 years

1-08 EXTRA MATERIALS

- A. Provide extra materials of resilient sheet flooring and adhesives in accordance with Section 01780 - Closeout Submittals.
- B. Provide 20 feet

PART 2 – PRODUCTS

2-01 MANUFACTURERS

- A. WESTERN USA: 467 Forbes Boulevard, South San Francisco CA 94080
 Tel: (650) 941-2961 Fax: (650) 941-2961 Toll-free: (800) 941-1696
 E-mail: info@altrofloors.com Web Site: www.altrofloors.com.

2-02 SAFETY FLOORING

- A. Slip Resistant Sheet Vinyl: To ASTM F 1303, Type 2, Grade 1, sheet vinyl flooring with moisture resistant backing Class A. Static coefficient of slip resistance in excess of 0.6 when tested in accordance with ASTM D2047 bacteriostat, colour selected by Consultant. Acceptable material: The following measurements and product weights given below are approximate.
 - .1 Altro Stronghold 30: Thickness: 3 mm (0.12"); Width: 2 m (6'7"); Length: 15 m (49'); Weight: 105 kg (233 lbs); Slip Resistance (Dry): 0.86. Static Dissipative Slip Resistant Sheet Vinyl: To ASTM F 1303, Type 2, Grade 1, sheet vinyl flooring with moisture resistant backing Class A. Static coefficient of slip resistance in excess of 0.6 when tested in accordance with ASTM D2047 bacteriostat, colour selected by Consultant.

2-03 ACCESSORIES

- A. Vinyl welding rod: type recommended by flooring manufacturer
- B. Cove former: type recommended by flooring manufacturer, sized to suit application.
- C. Acceptable material: Altro Cove former [20R - 24 mm (1") radius] [38R - 45 mm (1.75") radius].
- D. Gulley edge: Vinyl, sized to suit application, type recommended by flooring manufacturer. Acceptable material: Altro Gulley Edge [GE 35/25] [GE 35RE] [GE 25RE].

- E. Cap strip: Sized to suit application, type recommended by flooring manufacturer, [Vinyl] [stainless steel]. Acceptable material: Altro Cap Strip [C4] [C7] [C8] [C11].
- F. Joint cover strip: Vinyl, sized to suit application, type recommended by flooring manufacturer. Acceptable manufacturer: Altro Joint Cover Strip [JCS75/20] [JCS50/20] [EJC75/32].
- G. Acrylic Adhesive: For dry areas with no spillage, use Ecofix, a one-part, water-based, acrylic adhesive as recommended by manufacturer.
- H. Polyurethane Adhesive: For areas subjected to spillage, extreme temperature changes or heavy rolling loads, use Altrofix 30 or 300, a two-part resin-based polyurethane adhesive, as recommended by manufacturer.
- I. Static Dissipative Adhesive: [Altro Walkway 20SD only] For areas where static dissipative adhesive is required, use manufacturer's recommended adhesive.
- J. Subfloor Filler and Leveler: Use only grey Portland cement-based underlayments, and patching compounds. Use for filling cracks, holes or leveling. White gypsum materials are not acceptable. Contact Altro for more information and recommendations.
- K. Metal edge strips: Aluminum extruded, smooth, [mill finish] stainless steel with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

PART 3 – EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions and product packaging instructions for installation.

3.02 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.03 SUB-FLOOR PREPARATION

- A. Remove ridges and bumps.
- B. Apply sub-floor filler to low spots and cracks to achieve floor level to a tolerance of 1:1000, allow to cure
- C. Meet ASTM F710 Standard for Concrete or other monolithic floors
- D. Prepare and seal porous and powdery concrete surfaces in accordance with flooring manufacturer's written instructions.
- E. Ensure concrete slopes to drains and other floor sinks.
- F. Remove dust, old adhesive, paint, dirt, wax, sealer and foreign matter from existing surfaces.

3.04 PREPARATION

- A. Maintain air temperature and structural base temperature at flooring installation area between 14C (57F) and 26C (80F) for 48 hours before, during and 24 hours after installation.
- B. Perform moisture tests on concrete floors regardless of the age or grade level. Verify concrete substrate is dry in accordance with the NFCA/RFCI Industry Standards Slab

Moisture Test Method (Calcium Chloride Method), in strict accordance with instructions

- C. Perform moisture condition test in each major area. A minimum of 1 test per 93 m² (1000 sqft), prior to installation. Moisture emissions from concrete subfloors must not exceed 3 lbs per 1000sf per 24 hours (1.4 kg H₂O/24 hr/93 m²) for acrylic adhesive and 5lbs for polyurethane adhesive via the Calcium Chloride Test Method (ASTM F1869). If subfloor moisture exceeds the allowable maximum for installing Altro safety flooring, please call your local Altro distributor for advice
- D. Conduct moisture tests around room perimeter, at columns and where moisture may be evident.
- E. Perform alkali tests to ensure pH levels of concrete subfloor surface do not exceed pH 10. Concrete must be neutralized if above Ph 10.
- F. Do not proceed with work until results of moisture condition and/or pH tests are acceptable.

3.05 INSTALLATION

- A. Safety Flooring Installation: Install Altro safety flooring in accordance with the current published Altro Installation Guide. Seams shall be heat welded. Failure to install Altro safety flooring in accordance with recommended procedures will void the Altro Limited Product Warranty.
- B. Drains: Fit Altro safety flooring and mechanically fasten to drain outlets to ensure a permanent, watertight installation.
 - 1. New Round Drains: Install round flash clamping ring type drains to accommodate Altro safety flooring. Install drains to fit flush with surrounding floor surface. Acceptable drain manufacturers and drain types include Wade FC-1100.
 - 2. Existing Drains: When existing drains are to be used, provide mechanically fastened stainless steel drain rings over all-round drain outlets. Fit rings over slip resistant sheet vinyl and permit inside diameter that will allow clean-out plate to be removed after installation. Drill into concrete to accommodate lead or plastic anchors. Screw drain rings to create a tight seal with beveled head stainless steel screws.
 - 3. Square and Rectangular Drains and Floor Sinks: Install Altro Gully Edge GE25RE or GE35RE around perimeter of drain which has been set in concrete in accordance with Altro Installation Guide. Do not use Altro Gully Edge around drains set in wood floors. Provide stainless steel strips, mechanically fastened with stainless steel screws. Use stainless steel strips in other areas where it is not practical to use Altro Gully Edge. .3 Coved Installation: Where Altro safety flooring is coved up wall surfaces and other abutments, installation shall be in accordance with Altro safety flooring Installation Guide using the following accessories:
 - i. At standard wall finishes: Use Altro C7 vinyl cap strip to accommodate sheet vinyl to a height as indicated; adhere with contact adhesive.
 - ii. At ceramic tile, Altro Whiterock semi-rigid wall cladding or FRP paneling: Use Altro C8 Vinyl Captile Strip.
 - iii. At 19 mm (3/4") radius coving at juncture of vertical and horizontal surfaces: Use Altro Vinyl Cove Former 20R: install with contact adhesive.

- iv. At 38 mm (1-1/2") radius coving at juncture of vertical and horizontal surfaces: Use Altro Vinyl Cove Former 38R: install with contact adhesive.
- v. Top set cove base: Install in accordance with manufacturer s instructions.
- vi. Reducer strip: Reducer strip GE25RE/GE35RE where Altro safety flooring will not adjoin other materials and surfaces.

3.06 FIELD QUALITY REQUIREMENTS

- A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation procedures.
- B. Cleaning: Remove temporary coverings and protection of adjacent work areas.
- C. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.
- D. Remove construction debris from project site and legally dispose of debris.

3.07 PROTECTION

- A. Cover and protect finished installation from damage from other trades using plywood or non-staining temporary floor protection system, such as textured plastic sheeting.
- B. Protection: Protect installed product and finish surfaces from damage during construction in accordance with section 01760 – Protecting Installed Construction.

END OF SECTION

SECTION 09 68 18**TILE CARPETING****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section includes modular, tufted carpet tile.

1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Type of subfloor.
 - 3. Type of installation.
 - 4. Pattern of installation.
 - 5. Pattern type, location, and direction.
 - 6. Pile direction.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Sustainability: Provide the statement of the achievement level the carpet has attained for platinum. Based on specific sustainable attribute performance for all product stages according to ANSI/NSF 140.

1.04 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranty.

1.05 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

- B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.

1.08 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

1.09 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.
 3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 CARPET TILE

- A. Patcraft
- B. Color: As selected by Architect from manufacturer's full range.
- C. Pattern: Match Architect's samples.
- D. Fiber Content: 100 percent nylon 6.
- E. Fiber Type: Colorstrand Nylon.
- F. Pile Characteristic: Level-loop pile.
- G. Yarn Count: 11 stitches per inch.
- H. Density: 6,000 oz./cu. yd.
- I. Pile Thickness: 2.4mm for finished carpet tile.
- J. Stitches: 10.7mm.
- K. Gage: 1/10mm.

- L. Surface Pile Weight: 16 oz./sq. yd..
- M. Primary Backing/Backcoating: Manufacturer's standard composite materials.
- N. Secondary Backing: Manufacturer's standard material.
- O. Backing System: Ecoflex ICT.
- P. Size: 24 by 24 inches.
- Q. Applied Soil-Resistance Treatment: Manufacturer's standard material.
- R. Antimicrobial Treatment: Sentry Plus.
- S. Performance Characteristics: As follows:
 - 1. Appearance Retention Rating: Severe traffic, 3.5 minimum according to ASTM D 7330.
 - 2. Critical Radiant Flux Classification: Not less than .54 w/cm².
 - 3. Tuft Bind: Not less than 6.2 lbf according to ASTM D 1335.
 - 4. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
 - 5. Colorfastness to Crocking: Not less than 5, wet and dry, according to AATCC 165.
 - 6. Colorfastness to Light: Not less than 4 after 5 days AFU (AATCC fading units) according to AATCC 16, Option E.
 - 7. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
 - 8. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.
 - 9. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program.
 - 10. Emissions: Provide carpet tile that complies with the product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.02 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
 - 1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the

Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Preparation: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- E. Installation: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- F. Installation Method: As recommended in writing by carpet tile manufacturer.
- G. Maintain dye lot integrity. Do not mix dye lots in same area.
- H. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- I. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- J. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- K. Install pattern parallel to walls and borders.
- L. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- M. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

END OF SECTION

SECTION 09 72 00
PROTECTIVE WALL PANELS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes the following types of wall protection systems:
 - 1. Wall Panels
- B. Related sections: The following sections contain requirements related to this section:
 - 1. Handrails, Bumper Guards, Crash Rails, Corner Guards, Accent Rails, Wall Covering, Door Protection; refer to section 10 26 00 "Wall and Door Protection"

1.02 REFERENCES

- A. National codes (CBC and Life Safety)
- B. American Society for Testing and Materials (ASTM)
- C. Underwriters Laboratories (UL)
- D. California 01350 specification

1.03 SUBMITTALS

- A. General: Submit the following in accordance with conditions of contract and Division 1 specification section 01 33 00 "Submittal Procedures".
- B. Product data and detailed specifications for each system component and installation accessory required, including installation methods for each type of substrate.
- C. Shop drawings showing locations, extent and installation details of wall panel products.
- D. Samples for verification purposes: Submit the following samples, as proposed for this work, for verification of color, texture, pattern and thickness:
 - 1. Sample of each product specified.
- E. Product test reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated.

- F. Maintenance data for wall protection system components for inclusion in the operating and maintenance manuals specified in Division 1.

1.04 QUALITY ASSURANCE

- A. Installer qualifications: Engage an installer who has no less than 3 years experience in installation of wall panels similar in complexity to those required for this project.
- B. Manufacturer's qualifications: Not less than 5 years experience in the production of specified products and a record of successful performance.
- C. Code compliance: Assemblies should conform to all applicable codes including IBC, Life Safety and CA 01350.
- D. Fire performance characteristics: Provide engineered PETG wall panels identical to those tested in accordance with ASTM E84 for Class B characteristics listed below:
 - 1. Flame spread 75 or less
 - 2. Smoke developed: 450 or less
- E. Impact Strength: Provide assembled wall protection units that have been tested in accordance with the applicable provisions of ASTM F476.
- F. Chemical and stain resistance: Provide wall panels with chemical and stain resistance in accordance with ASTM D543.
- G. Color Match: Provide wall panels that are color matched in accordance with the following:
 - 1. Delta Ecmc of no greater than 1.0 using CIELab color space. Components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.
- H. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site in unopened packaging clearly labeled to show manufacturer.
- B. Store materials in original, undamaged packaging in a clean, dry place out of direct sunlight and exposure to the elements. A room temperature of 40-100°F (4-38°C) should be maintained.
- C. Materials must be stored flat.

1.06 PROJECT CONDITIONS

- A. Materials must be acclimated in an environment of 65-75°F (18-24°C) for at least 24 hours prior to beginning the installation.
- B. Installation areas must be enclosed and weatherproofed before installation commences.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Interior surface protection products specified herein and installed on the submittal drawings shall be manufactured by Construction Specialties, Inc.

2.02 MATERIALS

- A. Engineered PETG Wall Panels to be Acrovyn 4000 by Construction Specialties Inc: Wall panels to be manufactured of .040" (1.02mm) thick Acrovyn 4000 sheet factory bonded to the face side of a 3/8" (9.53mm) thick particle board core with no added urea formaldehyde. The backside of the panel to be laminated with a moisture resistant sheet.
 - 1. C/S Acrovyn 4000 Square Edge Pebblette Texture Wall Panel available in (64)* Acrovyn solid colors. All joint caulk and PVC-free trim members supplied in color to coordinate with panel color. Standard texture shall be 4' x 8' or 4' x 10'. Acrovyn sheet material is MBDC Cradle to Cradle® Certified Silver in all (64) colors.
 - 2. CRASH RAILS (Model 5CR-5CN) 5" x 1 1/16". Installation at 29" (verify with Architect) from floor to bottom of bumper.

2.03 WALL PANEL MOUNTING OPTIONS

- A. Mount Option to be construction grade adhesive supplied by manufacturer. Panel edges to be butt joint or trim options as per manufacturers.

2.04 FABRICATION

- A. General: Fabricate wall panels to comply with requirements indicated for design, dimensions, detail, finish and sizes. All based upon required field verified dimensions.

2.05 ACCESSORIES

- A. Acrovyn Wall Panels shall be furnished as a complete packaged system.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.
- B. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3.03 INSTALLATION

- A. Install the work of this section in strict accordance with the manufacturer's recommendations and the required field verified dimensions.
- B. Temperature at the time of installation must be between 65-75°F (18-24°C) and be maintained for at least 48 hours after the installation to allow for proper adhesive set up.
- C. Relative humidity shall not exceed 80%.
- D. Do not expose wall panels to direct sunlight during or after installation. This will cause the surface temperature to rise, which in turn will cause bubbles and delamination.

3.04 CLEANING

- A. General: Immediately upon completion of installation, clean wall panels and accessories in accordance with manufacturer's recommended cleaning method.
- B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

3.05 PROTECTION

- A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION

SECTION 09 77 20**DECORATIVE FIBERGLASS REINFORCED WALL PANELS****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section includes: Prefinished polyester glass reinforced plastic sheets and adhered to unfinished gypsum wallboard.
 - 1. PVC trim.
- B. Products Not Furnished or Installed under This Section:
 - 1. Gypsum substrate board
 - 2. Resilient Base

1.02 RELATED SECTIONS

- A. Section 09 29 00 – Gypsum Board
- B. Section 05 40 00 – Cold-formed Metal Framing
- C. Section 09 91 23 – Painting
- D. Section 09 65 13 – Resilient Base and Accessories

1.03 REFERENCES

- A. American Society for Testing and Materials: Standard Specifications (ASTM)
 - 1. ASTM D 256 – Izod Impact Strengths (ft#/in)
 - 2. ASTM D 570 - Water Absorption (%)
 - 3. ASTM D 638 - Tensile Strengths (psi) & Tensile Modulus (psi)
 - 4. ASTM D 790 - Flexural Strengths (psi) & Flexural Modulus (psi)
 - 5. ASTM D 2583- Barcol Hardness
 - 6. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
 - 7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specification, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.

- B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.
- C. Selection Samples: Submit manufacturer's standard color pattern selection samples representing manufacturer's full range of available colors and patterns.
- D. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture and pattern required.
 - 1. Submit complete with specified applied finish.
 - 2. For selected patterns show complete pattern repeat.
 - 3. Exposed Molding and Trim: Provide samples of each type, finish, and color.
- E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives and sealants prior to their delivery to the site.

1.05 QUALITY ASSURANCE

- A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
 - 1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)
 - a. Wall Required Rating – Class A.
- B. Sanitary Standards: System components and finishes to comply with:
 - 1. United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.
 - 2. Food and Drug Administration (FDA) 1999 Food Code 6-101.11.
 - 3. Canadian Food Inspection Agency (CFIA) requirements.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials factory packaged on strong pallets.
- B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (70°) for 48 hours prior to installation.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work
- B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.

1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

1.08 WARRANTY

- A. Furnish one year guarantee against defects in material and workmanship.

PART 2 - PRODUCTS

2.01 BASIS OF DESIGN

- A. Manufacturers: Marlite; 202 Harger Street, Dover, OH 44622. 800-377-1221
FAX (330) 343-4668 Email: info@marlite.com www.marlite.com.

2.02 PANELS

- A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
 1. Coating: Multi-layer print, primer and finish coats or applied over-layer.
 2. Dimensions:
 - a. Thickness – 0.090 inch nominal
 - b. Width - 4'-0" nominal
 - c. Length –As indicated on the drawings nominal
 3. Tolerance:
 - a. Length and Width: +/-1/8 inch
 - b. Square - Not to exceed 1/8 inch for 8 foot panels or 5/32 inch for 10 foot panels
- B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.
 1. Flexural Strength - 1.0×10^4 psi per ASTM D 790. (7.0 kilogram-force/square millimeter)
 2. Flexural Modulus - 3.1×10^5 psi per ASTM D 790. (217.9 kilogram-force/square millimeter)
 3. Tensile Strength - 7.0×10^3 psi per ASTM D 638. (4.9 kilogram-force/square millimeter)
 4. Tensile Modulus - 1.6×10^5 psi per ASTM D 638. (112.5 kilogram-force/square millimeter)
 5. Water Absorption - 0.72% per ASTM D 570.
 6. Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.
 7. Izod Impact Strength of 72 ft. lbs./in ASTM D 256.
- C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.
- D. Color and Texture: As Indicated on the Drawings:

1. Fire Rating: Class A (I)

2.03 BASE

- A. Marlite Base Molding for 0.090 inch thick FRP Panels.

1. Color: to match panel
2. Profiles:
 - a. M 612 FRP Base Molding
 - b. M 651 Inside Corner
 - c. M 660 Outside Corner
 - d. M 620 LH End Cap
 - e. M 625 RH End Cap

2.04 MOLDING

- A. PVC: Extruded PVC Trim Profiles for .090 inch thick panels.

1. M 350 Inside Corner
2. M 360 Outside Corner
3. M 365 Division
4. M 370 Edge
5. Color: to match panel

2.05 ACCESSORIES

- A. Adhesive: Either of the following construction adhesives complying with ASTM C 557.

1. Marlite C-551 FRP Adhesive - Water-resistant, non-flammable adhesive
2. Marlite C-375 Construction adhesive flexible, water-resistant, solvent based adhesive formulated for fast, easy application.

- B. Sealant:

1. Marlite Brand MS-250 Clear Silicone Sealant
2. Marlite Brand MS-251 White Silicone Sealant
3. Marlite Brand - Color Match Sealant.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.

1. Verify that stud spacing does not exceed 24 inch on-center.

- B. Repair defects prior to installation.

1. Level wall surfaces to panel manufacturer's requirements. Remove protrusions and fill indentations.

3.02 INSTALLATION

- A. Comply with manufacturer's recommended procedures and installation sequence.
- B. Cut sheets to meet supports allowing 1/8" inch clearance for every 8 foot of panel.
 1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
 2. Pre-drill fastener holes 1/8 inch oversize with high speed drill bit.
 - a. Space at 8 inches maximum on center at perimeter, approximately 1 inch from panel edge.
 - b. Space at in field in rows 16 inches on center, with fasteners spaced at 12 inches maximum on center.
- C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.
 1. Install panels with manufacturer's recommended gap for panel field and corner joints.
 - a. Adhesive trowel and application method to conform to adhesive manufacturer's recommendations.
 - b. Drive fasteners for snug fit. Do not over-tighten.
- D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.
 1. All moldings must provide for a minimum 1/8 inch of panel expansion at joints and edges, to insure proper installation.
- E. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.03 CLEANING

- A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.
- B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

END OF SECTION

SECTION 09 91 23**PAINTING****PART 1 - GENERAL****1.01 SECTION INCLUDEES**

- A. Interior paint and coatings systems including: paint and opaque finishes.
- B. Related Requirements:
 - 1. Section 09 29 00 - Gypsum Board

1.02 REFERENCES

- A. SSPC-SP 1 - Solvent Cleaning
- B. SSPC-SP 2 - Hand Tool Cleaning
- C. SSPC-SP 3 - Power Tool Cleaning
- D. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete
- E. EPA-Method 24
- F. SCAQMD Rule1113 -7/01/2007

1.03 SUBMITTALS

- A. Submit under provisions of the General Conditions - Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each paint and coating product should include:
 - 1. Product characteristics
 - 2. Surface preparation instructions and recommendations
 - 3. Primer requirements and finish specification
 - 4. Storage and handling requirements and recommendations
 - 5. Application methods
 - 6. Cautions
- C. Selection Samples: Submit a complete set of color chips that represent the full range of manufactures color samples available.
- D. Verification Samples: For each finish product specified, submit samples that represent actual product, color, and sheen.
- E. Submit Zero VOC and / or SCAQMD compliant products only.

1.04 MOCK-UP

- A. Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of painting on the project
1. Finish surfaces for verification of products, colors, & sheens
 2. Finish area designated by Architect
 3. Provide samples that designate prime & finish coats
 4. Do not proceed with remaining work until the Architect approves the mock-up samples

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information:
1. Product name, and type (description)
 2. Application & use instructions
 3. Surface preparation
 4. VOC content
 5. Environmental issues
 6. Batch date
 7. Color number
- B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.
- C. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

1.06 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not apply coatings under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: Products of the Sherwin-Williams Company are the basis of design products specified to establish the level of quality.
1. Sherwin Williams
101 Prospect Avenue NW
Cleveland, OH 44115
Tel: (800) 321-8194

Fax: (216) 566-1392
www.sherwin-williams.com

- B. Substitutions: Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 – Substitution Procedures. When submitting request for substitution, provide complete product data specified above under Submittals, for each substitute product.

2.02 APPLICATION/SCOPE

- A. Use this article to define the scope of painting if not fully defined in a Finish Schedule or on the drawings. This article must be carefully edited to reflect the surfaces actually found on the project. In some cases, it may be enough to use the first paragraph that says, in effect, "paint everything" along with a list of items not to paint, without exhaustively defining all the different surfaces and items that must be painted.
- B. If the project involves repainting some but not all existing painted surfaces, be sure to indicate the extent of the repainting.
- C. The descriptions of each system can also be used to further refine the definition of what is to be painted, stained, or clear finished.
- D. Industrial Maintenance Coatings are coatings, including primers, sealers, undercoaters, intermediate coatings and topcoats, formulated for or applied to substrates, including floors that are exposed to one or more of the following extreme environmental conditions:
1. Immersion in water, wastewater, or chemical solutions (aqueous and non-aqueous solutions), or chronic exposure of interior surfaces to moisture condensation;
 2. Acute or chronic exposure to corrosive, caustic or acidic agents, or similar chemicals, chemical fumes, chemical mixtures, or solutions;
 3. Repeated exposure to temperatures in excess of 250 degrees Fahrenheit;
 4. Repeated heavy abrasion, including mechanical wear and repeated scrubbing with industrial solvents, cleaners, or scouring agents; or
 5. Exterior exposure of metal structures.
- E. Surfaces To Be Coated Include:
1. Cement - Poured, Precast, Tilt-Up, Cast-In-Place, Cement Board
 2. Masonry - (CMU - Concrete, Split Face, Scored, Smooth, etc.)
 3. Metal – Ferrous and Non-Ferrous
 4. Metal - Galvanized
 5. Metal - (Ceilings-Structural Steel, Joists, Trusses, Beams, Partitions, Cabinets, Lockers, etc.)
 6. Wood - Walls, Doors, Trim, Cabinet Work, etc.
 7. Drywall
 8. Plaster / Gypsum Board - Walls, Ceilings

2.03 MATERIALS

A. Paints and Coatings - General.

1. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
2. For opaque finishes, tint each coat including primers and finishes with Zero VOC colorants (Zero VOC, less exempt solvents).
3. All ultra deep and vivid accent colors are to be tinted in Zero VOC finishes

B. Primers:

1. Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

2.04 ACCESSORIES

A. Coating Application Accessories:

1. Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.

2.05 SPECIAL APPLICATIONS

A. Theater Audience Chamber

1. Apply Two-coat Envirometal Brushed Scuffmaster paint system per manufacturer's complete specifications. Provide all required accessories, primers and sealers for proper application.
2. Contractor to provide an in-field sample (9'x9' section) for Architects approval prior to complete application.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin application of coatings until substrates have been properly prepared. Notify Architect of unsatisfactory conditions before proceeding.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.

3.02 PREPARATION

- A. The surface must be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
- B. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry 48 hours before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
- C. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50°F unless the specified product is designed for the marginal conditions.
- D. Methods
 1. Aluminum:
 - a. Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP1, Solvent Cleaning.
 2. Block (Cinder and Concrete):
 - a. Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75°F. The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.
 3. Concrete, SSPC-SP13 or NACE 6:
 - a. This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.
 4. Cement Composition Siding/Panels:
 - a. Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or

checked paint should be scraped and sanded to a sound surface. Pressure clean, if needed, with a minimum of 2100 psi pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments.

5. Copper and Stainless Steel:
 - a. Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP 2, Hand Tool Cleaning.
6. Drywall—Interior:
 - a. Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting.
7. Galvanized Metal
 - a. Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP7 is necessary to remove these treatments.
8. Plaster
 - a. Must be allowed to dry thoroughly for at least 30 days before painting, unless the products are designed to be used in high pH environments. Room must be ventilated while drying; in cold, damp weather, rooms must be heated. Damaged areas must be repaired with an appropriate patching material. Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the surface is hard, rinse with clear water and allow to dry.
9. Steel: Structural, Plate, etc.
 - a. Should be cleaned by one or more of the surface preparations described below. These methods are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Society of Protective Coatings. A brief description of these standards together with numbers by which they can be specified follow.
10. Solvent Cleaning, SSPC-SP1

- a. Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
11. Hand Tool Cleaning, SSPC-SP2
 - a. Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
 12. Power Tool Cleaning, SSPC-SP3
 - a. Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
 13. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4
 - a. A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
 14. Water Blasting, NACE Standard RP-01-72
 - a. Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.
 15. Vinyl Siding, Architectural Plastics, and Fiberglass
 - a. Clean thoroughly by scrubbing with a warm, soapy water solution. Rinse thoroughly. Do not paint vinyl siding with any color darker than the original color unless the product and colors are designed for such use. Painting with darker colors may cause siding to warp.
 16. Wood
 - a. Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot

primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

17. **WARNING!** Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority.

3.03 INSTALLATION

- A. Apply all coatings and materials with manufacture specifications in mind. Mix all coatings according to manufacture recommendation. Do not thin paints and coatings unless directed according to manufacturer's instructions.
- B. Do not apply to wet or damp surfaces.
 1. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days.
 2. Test new concrete for moisture content.
- C. Apply coatings using methods recommended by manufacturer.
- D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.
- E. Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.
- F. Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.
- G. Inspection: The coated surface must be inspected and approved by the Architect or Engineer just prior to each coat.

3.04 PROTECTION

- A. A Protect finished coatings from damage until completion of project.
- B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

3.05 SCHEDULE – INTERIOR

A. CONCRETE - (Walls & Ceilings, Poured Concrete, Precast Concrete, Unglazed Brick, Cement Board, Tilt-Up, Cast-In-Place)

1. Latex Systems

a. Semi-Gloss Finish

- 1) 1st Coat: S-W Loxon Primer, A24W300
- 2) 2nd Coat: S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600
- 3) 3rd Coat: S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600

b. Eggshell Finish

- 1) 1st Coat: S-W Loxon Primer, A24W300
- 2) 2nd Coat: S-W ProMar 200 Zero VOC Eggshell, B20-2600
- 3) 3rd Coat: S-W ProMar 200 Zero VOC Eggshell, B20-2600

c. Flat Finish

- 1) 1st Coat: S-W Loxon Primer, A24W300
- 2) 2nd Coat: S-W ProMar 200 Zero VOC Flat, B30-2600
- 3) 3rd Coat: S-W ProMar 200 Zero VOC Flat, B30-2600

2. High Performance Latex System (for greater abrasion resistance)

a. Semi-Gloss Finish

- 1) 1st Coat: S-W Loxon Primer, A24W300
- 2) 2nd Coat: S-W Pro Industrial Zero VOC Semi-Gloss Acrylic, B66-650 Series
- 3) 3rd Coat: S-W Pro Industrial Zero VOC Semi-Gloss Acrylic, B66-650 Series

3. High Performance Epoxy System (for greater chemical and abrasion resistance)

a. Gloss Finish

- 1) 1st Coat: S-W Loxon Primer, A24W300
- 2) 2nd Coat: S-W Pro Industrial Zero VOC WB Epoxy Gloss, B73 Series
- 3) 3rd Coat: S-W Pro Industrial Zero VOC WB Epoxy Gloss, B73 Series

b. Eggshell Finish

- 1) 1st Coat: S-W Loxon Primer, A24W300

- 2) 2nd Coat: S-W Pro Industrial Zero VOC WB Epoxy Eggshell, B73 Series
 - 3) 3rd Coat: S-W Pro Industrial Zero VOC WB Epoxy Eggshell, B73 Series
- B. MASONRY - (CMU - Concrete, Split Face, Scored, Smooth, High Density, Low Density, Fluted)
1. Latex Systems
 - a. Semi-Gloss Finish
 - 1) 1st Coat: S-W PrepRite Block Filler, B25W25
 - 2) 2nd Coat: S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600
 - 3) 3rd Coat: S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600
 - b. Eggshell Finish
 - 1) 1st Coat: S-W PrepRite Block Filler, B25W25
 - 2) 2nd Coat: S-W ProMar 200 Zero VOC Eggshell, B20-2600
 - 3) 3rd Coat: S-W ProMar 200 Zero VOC Eggshell, B20-2600
 - c. Flat Finish
 - 1) 1st Coat: S-W PrepRite Block Filler, B25W25
 - 2) 2nd Coat: S-W ProMar 200 Zero VOC Flat, B30-2600
 - 3) 3rd Coat: S-W ProMar 200 Zero VOC Flat, B30-2600
 2. High Performance Latex System (for greater abrasion resistance)
 - a. Semi-Gloss Finish
 - 1) 1st Coat: S-W PrepRite Block Filler, B25W25
 - 2) 2nd Coat: S-W Pro Industrial Zero VOC Semi-Gloss Acrylic, B66-650 Series
 - 3) 3rd Coat: S-W Pro Industrial Zero VOC Semi-Gloss Acrylic, B66-650 Series
 3. High Performance Epoxy System (for greater chemical and abrasion resistance)
 - a. Gloss Finish
 - 1) 1st Coat: S-W PrepRite Block Filler, B25W25
 - 2) 2nd Coat: S-W Pro Industrial Zero VOC WB Epoxy Gloss, B73 Series
 - 3) 3rd Coat: S-W Pro Industrial Zero VOC WB Epoxy Gloss, B73 Series

- b. Eggshell Finish
 - 1) 1st Coat: S-W PrepRite Block Filler, B25W25
 - 2) 2nd Coat: S-W Pro Industrial Zero VOC WB Epoxy Eggshell, B73 Series
 - 3) 3rd Coat: S-W Pro Industrial Zero VOC WB Epoxy Eggshell, B73 Series

- C. FERROUS and Non-Ferrous METAL - (Structural Steel Columns, Joists, Trusses, Beams, Miscellaneous & Ornamental Iron, Structural Iron, Ferrous Metal)
 - 1. Latex Systems
 - a. Semi-Gloss Finish
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series
 - 2) 2nd Coat: S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600
 - 3) 3rd Coat: S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600

 - b. Eggshell Finish
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series
 - 2) 2nd Coat: S-W ProMar 200 Zero VOC Eggshell, B20-2600
 - 3) 3rd Coat: S-W ProMar 200 Zero VOC Eggshell, B20-2600

 - c. Flat Finish
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series
 - 2) 2nd Coat: S-W ProMar 200 Zero VOC Flat, B30-2600
 - 3) 3rd Coat: S-W ProMar 200 Zero VOC Flat, B30-2600

 - 2. High Performance Latex System (for greater abrasion resistance)
 - a. Semi-Gloss Finish
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series
 - 2) 2nd Coat: S-W Pro Industrial Zero VOC Semi-Gloss Acrylic, B66-650 Series
 - 3) 3rd Coat: S-W Pro Industrial Zero VOC Semi-Gloss Acrylic, B66-650 Series

 - 3. High Performance Epoxy System (for greater chemical and abrasion resistance)

- a. Gloss Finish
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series
 - 2) 2nd Coat: S-W Pro Industrial Zero VOC WB Epoxy Gloss, B73 Series
 - 3) 3rd Coat: S-W Pro Industrial Zero VOC WB Epoxy Gloss, B73 Series

- b. Eggshell Finish
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series
 - 2) 2nd Coat: S-W Pro Industrial Zero VOC WB Epoxy Eggshell, B73 Series
 - 3) 3rd Coat: S-W Pro Industrial Zero VOC WB Epoxy Eggshell, B73 Series

D. WOOD- (Doors, Trim, Cabinet Work, Partitions, Frames)

- 1. Latex Systems
 - a. Semi-Gloss Finish
 - 1) LOW ODOR/ZERO VOC
 - 2) 1st Coat: S-W PrepRite ProBlock Latex Primer, B51 Series
 - 3) 2nd Coat: S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600
 - 4) 3rd Coat: S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600

 - b. Eggshell Finish
 - 1) LOW ODOR/ZERO VOC
 - 2) 1st Coat: S-W PrepRite ProBlock Latex Primer, B51 Series
 - 3) 2nd Coat: S-W ProMar 200 Zero VOC Eggshell, B20-2600
 - 4) 3rd Coat: S-W ProMar 200 Zero VOC Eggshell, B20-2600

- 2. High Performance Latex System (for greater abrasion resistance)
 - a. Semi-Gloss Finish
 - 1) 1st Coat: S-W PrepRite ProBlock Latex Primer, B51 Series
 - 2) 2nd Coat: S-W Pro Industrial Zero VOC Semi-Gloss Acrylic, B66-650 Series
 - 3) 3rd Coat: S-W Pro Industrial Zero VOC Semi-Gloss Acrylic, B66-650 Series

E. DRYWALL (Walls, Ceilings, Gypsum Board, Wood Pulp Board, Plaster Board, etc.)

1. Latex Systems

a. Semi-Gloss Finish

- 1) 1st Coat: S-W ProMar 200 Zero VOC Primer B28 Series
- 2) 2nd Coat: S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600
- 3) 3rd Coat: S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600

b. Eggshell Finish

- 1) 1st Coat: S-W ProMar 200 Zero VOC Primer B28 Series
- 2) 2nd Coat: S-W ProMar 200 Zero VOC Eggshell, B20-2600
- 3) 3rd Coat: S-W ProMar 200 Zero VOC Eggshell, B20-2600

c. Flat Finish

- 1) 1st Coat: S-W ProMar 200 Zero VOC Primer B28 Series
- 2) 2nd Coat: S-W ProMar 200 Zero VOC Flat, B30-2600
- 3) 3rd Coat: S-W ProMar 200 Zero VOC Flat, B30-2600

2. High Performance Latex System (for greater abrasion resistance)

a. Semi-Gloss Finish

- 1) 1st Coat: S-W ProMar 200 Zero VOC Primer B28 Series
- 2) 2nd Coat: S-W Pro Industrial Zero VOC Semi-Gloss Acrylic, B66-650 Series
- 3) 3rd Coat: S-W Pro Industrial Zero VOC Semi-Gloss Acrylic, B66-650 Series

3. High Performance Epoxy System (for greater chemical and abrasion resistance)

a. Gloss Finish

- 1) 1st Coat: S-W ProMar 200 Zero VOC Primer B28 Series
- 2) 2nd Coat: S-W Pro Industrial Zero VOC WB Epoxy Gloss, B73 Series
- 3) 3rd Coat: S-W Pro Industrial Zero VOC WB Epoxy Gloss, B73 Series

b. Eggshell Finish

- 1) 1st Coat: S-W ProMar 200 Zero VOC Primer B28 Series
- 2) 2nd Coat: S-W Pro Industrial Zero VOC WB Epoxy Eggshell, B73 Series
- 3) 3rd Coat: S-W Pro Industrial Zero VOC WB Epoxy Eggshell, B73 Series

3.06 EXTERIOR

A. CONCRETE - (Cementitious Siding, Flexboard, Transite Board, Shingles (Non-Roof), Common Brick, Stucco, Tilt-up, Precast, and Poured-in-place Cement)

1. Latex Systems

a. Gloss Finish

- 1) 1st Coat: S-W Loxon® Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 mils dry)
- 2) 2nd Coat: S-W A-100® Exterior Latex Gloss, A8 Series
- 3) 3rd Coat: S-W A-100® Exterior Latex Gloss, A8 Series (4 mils wet, 1.3 mils dry per coat)

b. Semi-Gloss

- 1) 1st Coat: S-W Loxon® Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 mils dry)
- 2) 2nd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series
- 3) 3rd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series (4 mils wet, 1.5 mils dry per coat)

c. Satin Finish

- 1) 1st Coat: S-W Loxon® Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 mils dry)
- 2) 2nd Coat: S-W A-100® Exterior Latex Satin, A82 Series
- 3) 3rd Coat: S-W A-100® Exterior Latex Satin, A82 Series
- 4) (4 mils wet, 1.4 mils dry per coat)

d. Flat Finish

- 1) 1st Coat: S-W Loxon® Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 mils dry)
- 2) 2nd Coat: S-W A-100® Exterior Latex Flat, A6 Series
- 3) 3rd Coat: S-W A-100® Exterior Latex Flat, A6 Series (4 mils wet, 1.4 mils dry per coat)
- 4) 1st Coat: S-W Sher-Crete® Flexible Concrete Waterproofer, A5 Series
- 5) 2nd Coat: S-W Sher-Crete® Flexible Concrete Waterproofer, A5 Series (14-18 mils wet per coat)

B. CONCRETE - (Cementitious Siding, Flexboard, Transite Board, Shingles (Non-Roof), Common Brick, Stucco, Tilt-up, Precast, and Poured-in-place Cement)

1. Elastomeric System (not including; cementitious siding, Flexboard, Transite board, shingles)

a. Flat Finish

- 1) Low VOC Topcoat
- 2) 1st Coat: S-W Loxon® Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 mils dry)
- 3) 2nd Coat: S-W ConFlex XL Elastomeric High Build Coating, A5-400 Series
- 4) 3rd Coat: S-W ConFlex XL Elastomeric High Build Coating, A5-400 Series (16 mils wet, 7.5 mils dry per coat)

2. Textured Elastomeric System

a. Flat Finish

- 1) 1st Coat: S-W Loxon® Acrylic Masonry Primer, A24W8300 (8 mils wet, 3.2 mils dry)
- 2) 2nd Coat: S-W ConFlex XL Elastomeric High Build Coating, A5-400 Series (16 mils wet, 7.5 mils dry per coat)
- 3) 3rd Coat: S-W ConFlex XL Textured Elastomeric High Build Coating, A5-800 (Fine, Medium, Extra Coarse) (20 mils wet, 9.4 mils dry per coat)

3. Textured & Smooth Systems

a. Textured Water Based Finish

- 1) Low VOC Topcoat
- 2) 1st Coat: S-W Loxon® XP Smooth, A24W400 Series (14-18 mils wet; 6.4-8.3 mils dry)
- 3) 2nd Coat: S-W Loxon® XP Fine Textured Waterproofing System, A24-750 Series (14-18 mils wet)

b. Smooth Water Based Finish

- 1) 1st Coat: S-W Loxon® XP, A24W400 Series (14-18 mils wet; 6.4-8.3 mils dry)
- 2) 2nd Coat: S-W Loxon® XP, A24W400 Series (14-18 mils wet; 6.4-8.3 mils dry) optional

C. CONCRETE - (Cementitious Siding, Flexboard, Transite Board, Shingles (Non-Roof), Common Brick, Stucco, Tilt-up, Precast, and Poured-in-place Cement)

1. Stain System

a. Solid Color Waterborne Finish

- 1) 1st Coat: S-W Vertical Concrete Stain, A31 Series
 - 2) 2nd Coat: S-W Vertical Concrete Stain, A31 Series (50-250 sq ft/ gal)
2. Clear Water Repellant
- a. Clear
- 1) 1st Coat: S-W Loxon® 7% Siloxane Water Repellant, A10T7
 - 2) 2nd Coat: S-W Loxon® 7% Siloxane Water Repellant, A10T7 (50-200 sq ft/ gal)
- D. MASONRY - (Concrete Masonry Units [CMU]- Cinder or Concrete Block)
1. Latex Systems
- a. Gloss Finish
- 1) 1st Coat: S-W PrepRite® Block Filler, B25W25(75-100 sq ft/gal)
 - 2) 2nd Coat: S-W A-100® Exterior Latex Gloss, A8 Series
 - 3) 3rd Coat: S-W A-100® Exterior Latex Gloss, A8 Series (4 mils wet, 1.3 mils dry per coat)
- b. Semi-Gloss Finish
- 1) 1st Coat: S-W PrepRite® Block Filler, B25W25 (75-100 sq ft/gal)
 - 2) 2nd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series
 - 3) 3rd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series (4 mils wet, 1.5 mils dry per coat)
- c. Satin Finish
- 1) 1st Coat: S-W PrepRite® Block Filler, B25W25 (75-100 sq ft/gal)
 - 2) 2nd Coat: S-W A-100® Exterior Latex Satin, A82 Series
 - 3) 3rd Coat: S-W A-100® Exterior Latex Satin, A82 Series (4 mils wet, 1.4 mils dry per coat)
- d. Flat Finish
- 1) 1st Coat: S-W PrepRite® Block Filler, B25W25 (75-100 sq ft/gal)
 - 2) 2nd Coat: S-W A-100® Exterior Latex Flat, A6 Series
 - 3) 3rd Coat: S-W A-100® Exterior Latex Flat, A6 Series (4 mils wet, 1.4 mils dry per coat)

- 4) 1st Coat: S-W Sher-Crete® Flexible Concrete
Waterproofer, A5 Series
- 5) 2nd Coat: S-W Sher-Crete® Flexible Concrete
Waterproofer, A5 Series (14-18 mils wet per coat)

E. MASONRY - (Concrete Masonry Units [CMU]- Cinder or Concrete Block)

1. Elastomeric System

a. Flat Finish

- 1) 1st Coat: S-W Loxon® Block Surfacer, A24W200 (50-100
sq ft/gal)
- 2) 2nd Coat: S-W ConFlex XL Elastomeric High Build
Coating, A5-400 Series
- 3) 3rd Coat: S-W ConFlex XL Elastomeric High Build
Coating, A5-400 Series (16 mils wet, 7.5 mils dry per coat)

b. Alternate

- 1) 1st Coat: S-W Loxon® Block Surfacer, A24W200 (50-100
sq ft/gal)
- 2) 2nd Coat: S-W Sherlastic Elastomeric Coating, A5-Series
- 3) 3rd Coat: S-W Sherlastic Elastomeric Coating, A5-Series
(14 mils wet, 6 mils dry per coat)

2. Textured Elastomeric System

a. Flat Finish

- 1) 1st Coat: S-W Loxon® Block Surfacer, A24W200 (50-100
sq ft/gal)
- 2) 2nd Coat: S-W ConFlex XL Elastomeric High Build
Coating, A5-400 Series (16 mils wet, 7.5 mils dry per coat)
- 3) 3rd Coat: S-W ConFlex XL Textured Elastomeric High
Build Coating, A5-800 (Fine, Medium, Extra Coarse) (20
mils wet, 9.4 mils dry per coat)

3. Textured & Smooth Masonry Systems

a. Textured Water Based Finish b

- 1) 1st Coat: S-W Loxon® XP Smooth, A24W400 Series
(14-18 mils wet; 6.4-8.3 mils dry)
- 2) 2nd Coat: S-W Loxon® XP Fine Textured Waterproofing
System, A24-750 Series (14-18 mils wet)

b. Smooth Water Based Finish

- 1) 1st Coat: S-W Loxon® XP, A24W400 Series (14-18 mils wet; 6.4-8.3 mils dry)
- 2) 2nd Coat: S-W Loxon® XP, A24W400 Series (14-18 mils wet; 6.4-8.3 mils dry) optional

F. MASONRY - (Concrete Masonry Units [CMU]- Cinder or Concrete Block)

1. Stain System

a. Solid Color Waterborne Finish

- 1) 1st Coat: S-W Vertical Concrete Stain, A31 Series
- 2) 2nd Coat: S-W Vertical Concrete Stain, A31 Series (50-250 sq ft/ gal)

2. Clear Water Repellant

a. Clear

- 1) 1st Coat: S-W Loxon® 7% Siloxane Water Repellant, A10T7
- 2) 2nd Coat: S-W Loxon® 7% Siloxane Water Repellant, A10T7 (50-200 sq ft/ gal)

G. CONCRETE- (Concrete Floors, Patios, Porches, Steps & Platforms)

1. Acrylic Water-Based Floor System

a. Satin Finish

- 1) 1st Coat: S-W Porch & Floor Enamel, A32-200 Series
- 2) 2nd Coat: S-W Porch & Floor Enamel, A32-200 Series (4mils wet; 1.4 mils dry per coat)

b. Low Luster Finish

- 1) 1st Coat: S-W Sher-Crete® Flexible Concrete Waterproofer, A5 Series (14-18 mils wet)
- 2) 2nd Coat: S-W H&C Concrete Stain Water Based Clear
- 3) 3rd Coat: S-W H&C Concrete Stain Water Based Clear (50-250 sq ft/ gal)

c. Flat Finish

- 1) 1st Coat: S-W Sher-Crete® Flexible Concrete Waterproofer, A5 Series
- 2) 2nd Coat: S-W Sher-Crete® Flexible Concrete Waterproofer, A5 Series (14-18 mils wet per coat)

2. Solid Stain Finish

a. Low Luster Finish

- 1) 1st Coat: S-W H&C Concrete Stain Solid Color Water Based
- 2) 2nd Coat: S-W H&C Concrete Stain Solid Color Water Based (50-250 sq ft/ gal)

H. METAL - (Aluminum, Galvanizing)

1. Latex Systems

a. Gloss Finish

- 1) 1st Coat: S-W A-100® Exterior Latex Gloss, A8 Series
- 2) 2nd Coat: S-W A-100® Exterior Latex Gloss, A8 Series (4 mils wet, 1.3 mils dry per coat)

b. Semi-Gloss Finish

- 1) 1st Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series
- 2) 2nd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series (4 mils wet, 1.5 mils dry per coat)

c. Satin Finish

- 1) 1st Coat: S-W A-100® Exterior Latex Satin, A82 Series
- 2) 2nd Coat: S-W A-100® Exterior Latex Satin, A82 Series (4 mils wet, 1.4 mils dry per coat)

d. Flat Finish

- 1) 1st Coat: S-W A-100® Exterior Latex Flat, A6 Series
- 2) 2nd Coat: S-W A-100® Exterior Latex Flat, A6 Series (4 mils wet, 1.4 mils dry per coat)

I. METAL - Ferrous (Structural Iron & Steel, Tanks, Water Towers, Sashes, Trim, Conductors, Doors, Ducts, Vents, (Non-Galvanized))

1. Latex Systems

a. Gloss Finish

- 1) 1st Coat: S-W Pro Industrial® Pro-Cryl® Primer, B66-310 Series (2-4 mils dry)
- 2) 2nd Coat: S-W A-100® Exterior Latex Gloss, A8 Series
- 3) 3rd Coat: S-W A-100® Exterior Latex Gloss, A8 Series (4 mils wet, 1.3 mils dry per coat)

b. Semi-Gloss Finish

- 1) 1st Coat: S-W Pro Industrial® Pro-Cryl® Primer, B66-310 Series (2-4 mils dry)
- 2) 2nd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series
- 3) 3rd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series (4 mils wet, 1.5 mils dry per coat)

**** NOTE TO SPECIFIER** For Higher Performance Systems refer to 09 96 00**

J. WOOD(Siding, Trim, Shutters, Sashes, Hardboard-Bare/Primed)

1. Latex Systems

a. Gloss Finish

- 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
- 2) 2nd Coat: S-W A-100® Exterior Latex Gloss, A8 Series
- 3) 3rd Coat: S-W A-100® Exterior Latex Gloss, A8 Series (4 mils wet, 1.3 mils dry per coat)

b. Semi-Gloss

- 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
- 2) 2nd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series
- 3) 3rd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series (4 mils wet, 1.5 mils dry per coat)

c. Satin Finish

- 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
- 2) 2nd Coat: S-W A-100® Exterior Latex Satin, A82 Series
- 3) 3rd Coat: S-W A-100® Exterior Latex Satin, A82 Series (4 mils wet, 1.4 mils dry per coat)

d. Flat Finish

- 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
- 2) 2nd Coat: S-W A-100® Exterior Latex Flat, A6 Series
- 3) 3rd Coat: S-W A-100® Exterior Latex Flat, A6 Series (4 mils wet, 1.4 mils dry per coat)

K. WOOD (Siding, Trim, Shutters, Sashes, Hardboard-Bare/Primed)

1. Latex Systems

- a. Gloss Finish
 - 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
 - 2) 2nd Coat: S-W A-100® Exterior Latex Gloss, A8 Series
 - 3) 3rd Coat: S-W A-100® Exterior Latex Gloss, A8 Series (4 mils wet, 1.3 mils dry per coat)
- b. Semi-Gloss
 - 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
 - 2) 2nd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series
 - 3) 3rd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series (4 mils wet, 1.5 mils dry per coat)
- c. Satin Finish
 - 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
 - 2) 2nd Coat: S-W A-100® Exterior Latex Satin, A82 Series
 - 3) 3rd Coat: S-W A-100® Exterior Latex Satin, A82 Series (4 mils wet, 1.4 mils dry per coat)
- d. Flat Finish
 - 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
 - 2) 2nd Coat: S-W A-100® Exterior Latex Flat, A6 Series
 - 3) 3rd Coat: S-W A-100® Exterior Latex Flat, A6 Series (4 mils wet, 1.4 mils dry per coat)

L. WOOD (Siding, Trim, Shutters, Sashes, Hardboard-Bare/Primed)

- 1. Stain - Water Reducible Systems
 - a. Solid Color
 - 1) 1st Coat: S-W WoodScapes® Solid Color Stain, A15 Series
 - 2) 2nd Coat: S-W WoodScapes® Solid Color Stain, A15 Series (200-400 sq ft/gal)
 - b. Semi-Transparent
 - 1) 1st Coat: S-W WoodScapes® Semi-Transparent Stain, A15T5
 - 2) 2nd Coat: S-W WoodScapes® Semi-Transparent Stain, A15T5 (200-350 sq ft/gal)

- M. Wood Decks, Exterior (including pressure treated lumber)
1. Stain - Solid Color Acrylic Latex
 - a. Satin Finish
 - 1) 1st Coat: S-W DeckScapes® Acrylic Solid Color Deck Stain, A15-150 Series
 - 2) 2nd Coat: S-W DeckScapes® Acrylic Solid Color Deck Stain, A15-150 Series (300-500 sq ft/gal)
 2. Semi-Transparent-Waterborne Alkyd/Acrylic
 - a. Flat Finish
 - 1) 1st Coat: S-W DeckScapes® Ext. Waterborne Deck Stain, A15T15 Series
 - 2) 2nd Coat: S-W DeckScapes® Ext. Waterborne Deck Stain, A15T15 Series
 - 3) (100-300 sq ft/ per gal)
 3. Toner Sealer System
 - a. Semi-Transparent Stain
 - 1) 1st Coat: S-W DeckScapes® Ext. Waterborne Toner, A15T452
 - 2) 2nd Coat: S-W DeckScapes® Ext. Waterborne Toner, A15T452 (150-300 sq ft/gal)

N. ARCHITECTURAL PVC, PLASTIC, FIBERGLASS (due to the variety of substrate, check for compatibility)

 1. Latex Systems
 - a. Gloss Finish
 - 1) 1st Coat: S-W PrepRite® ProBlock® Latex Primer, B51 Series (4 mils wet, 1.4 mils dry)
 - 2) 2nd Coat: S-W A-100® Exterior Latex Gloss, A8 Series
 - 3) 3rd Coat: S-W A-100® Exterior Latex Gloss, A8 Series (4 mils wet, 1.3 mils dry per coat)
 - b. Semi-Gloss
 - 1) 1st Coat: S-W PrepRite® ProBlock® Latex Primer, B51 Series (4 mils wet, 1.4 mils dry)
 - 2) 2nd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series

- 3) 3rd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series (4 mils wet, 1.5 mils dry per coat)
- c. Satin Finish
 - 1) 1st Coat: S-W PrepRite® ProBlock® Latex Primer, B51 Series (4 mils wet, 1.4 mils dry)
 - 2) 2nd Coat: S-W A-100® Exterior Latex Satin, A82 Series
 - 3) 3rd Coat: S-W A-100® Exterior Latex Satin, A82 Series (4 mils wet, 1.4 mils dry per coat)
 - d. Flat Finish
 - 1) 1st Coat: S-W PrepRite® ProBlock® Latex Primer, B51 Series (4 mils wet, 1.4 mils dry)
 - 2) 2nd Coat: S-W A-100® Exterior Latex Flat, A6 Series
 - 3) 3rd Coat: S-W A-100® Exterior Latex Flat, A6 Series (4 mils wet, 1.4 mils dry per coat)
- O. DRYWALL (Gypsum Board, Exterior Drywall)
1. Latex Systems
 - a. Gloss Finish
 - 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
 - 2) 2nd Coat: S-W A-100® Exterior Latex Gloss, A8 Series
 - 3) 3rd Coat: S-W A-100® Exterior Latex Gloss, A8 Series (4 mils wet, 1.3 mils dry per coat)
 - b. Semi-Gloss
 - 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
 - 2) 2nd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series
 - 3) 3rd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series (4 mils wet, 1.5 mils dry per coat)
 - c. Satin Finish
 - 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
 - 2) 2nd Coat: S-W A-100® Exterior Latex Satin, A82 Series
 - 3) 3rd Coat: S-W A-100® Exterior Latex Satin, A82 Series (4 mils wet, 1.4 mils dry per coat)
 - d. Flat Finish

- 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4 mils wet, 1.4 mils dry)
- 2) 2nd Coat: S-W A-100® Exterior Latex Flat, A6 Series
- 3) 3rd Coat: S-W A-100® Exterior Latex Flat, A6 Series (4 mils wet, 1.4 mils dry per coat)

P. VINYL SIDING*, EIFS, SYNTHETIC STUCCO

1. Latex Systems

a. Gloss Finish

- 1) 1st Coat: S-W A-100® Exterior Latex Gloss, A8 Series
- 2) 2nd Coat: S-W A-100® Exterior Latex Gloss, A8 Series (4 mils wet, 1.3 mils dry per coat)

b. Semi-Gloss

- 1) 1st Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series
- 2) 2nd Coat: S-W Sonoran Int/Ext Acrylic Latex Semi-Gloss, B40WJ9850 Series (4 mils wet, 1.5 mils dry per coat)

c. Satin Finish

- 1) 1st Coat: S-W A-100® Exterior Latex Satin, A82 Series
- 2) 2nd Coat: S-W A-100® Exterior Latex Satin, A82 Series (4 mils wet, 1.4 mils dry per coat)

d. Flat Finish

- 1) 1st Coat: S-W A-100® Exterior Latex Flat, A6 Series
- 2) 2nd Coat: S-W A-100® Exterior Latex Flat, A6 Series (4 mils wet, 1.4 mils dry per coat)

END OF SECTION

EPOXY FLOOR COATING**SECTION 09 96 56****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. This section specifies epoxy floor coating (EPXY) for floors and wall bases.

1.02 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Submit manufacturer's technical data and application instructions.
- C. Samples: Prior to beginning work submit 3 samples for review of color and texture.

1.03 QUALITY ASSURANCE:

- A. Applicator Qualifications: Engage an experienced applicator trained and approved by the manufacturer.

1.04 PROJECT CONDITIONS:

- A. Application Temperature: Do not apply material when wither the substrate or the material is outside the temperature limits required by the manufacturer.

PART 2 - PRODUCTS**2.01 MANUFACTURER:**

- A. Subject to compliance with requirements, provide products of the following, or approved equal:
 - 1. Stonhard, Richmond, CA (510) 231-8930.

2.02 MATERIALS:

- A. System:
 - 1. Restrooms: Stonshield HRI
 - 2. Kitchen: Stonclad UT
- B. Color: As selected by Architect.

2.03 PERFORMANCE REQUIREMENTS:

A. Performance Properties – Stonshield UTS & Stonclad UT:

CHARACTERISTIC	PERFORMANCE	TEST METHODS
Compression	7,700 psi	ASTM C-579
Tensile Strength	1,000 psi	ASTM C-307
Flexural Strength	2,400 psi	ASTM C-580
Hardness	80-84	ASTM D2240
Bond Strength	>400 (100%) (Concrete failure)	ASTM D-4541
Abrasion Resistance	0.05 grams	ASTM D4060
Flammability (UT only)	Self Extinguishing	ASTM D-635
Thermal Coefficient of Linear Expansion	1.1 x 10 ⁻⁵ in.	ASTM E-831
Water Absorption	0.056%	ASTM C-413
Heat Resistance	200° F continuous 250° F intermittent	

B. Performance Properties – Stonshield HR1:

CHARACTERISTIC	PERFORMANCE	TEST METHODS
Compression	10,000	ASTM C-579
Tensile Strength	2,000 psi	ASTM C-307
Flexural Strength	4,300 psi	ASTM C-580
Hardness	85-90	ASTM D2240
Indentation	None	MIL-D-3134
Bond Strength	>400 (100%) (Concrete failure)	ACI 503/PP
Abrasion Resistance	0.06 grams	ASTM D 4060
Water Absorption	0.1%	ASTM C-413
Flammability	Self Extinguishing	ASTM D-635
Heat Resistance	140° F continuous 200° F intermittent	
Coefficient of Friction	0.96	ASTM F-1679

PART 3 - EXECUTION

3.01 PREPARATION:

- A. Prepare concrete by mechanical means including use of scabblers, scarifiers or shot blast machine for surface removal.
- B. All surfaces shall be surface dry and free of dirt, dust, grease, oil, wax, paints, or other foreign material which could cause loss of adhesion.

3.02 APPLICATION:

- A. Surface Priming: Prime all properly prepared substrates using appropriate manufacturer's penetrating primers with strict adherence to installation instructions.
- B. Install epoxy floor coatings following manufacturer's written instructions and directions.
- C. Where epoxy floor coatings occur under kitchen equipment, provide a smooth finish. All other areas exposed to foot traffic, provide slip-resistant finish.
- D. Chasing: All areas where the installed coating does not abut against a vertical surface shall be chased. Cut chase 1-1/2-inch wide chiseled to a straight saw-cut 1/2 -inch depth.
- E. Cove Bases: Where scheduled, install cove integral with the floor in height indicated or a minimum of 6" high & 3/8" minimum radius cove. All coves with manufacturer's specially design cove strip.
- F. Expansion and Control Joints: Where indicated saw-cut joints after floor installation and fill with manufacturer's flexible epoxy or urethane sealant. Flooring joint locations to match joints in concrete.

3.03 CLEANING:

- A. Clean-up: At the end of each work day, remove rubbish, empty cans, rags and other discarded materials from the site.

3.04 PROTECTION:

- A. Protect work of other trades against damage from coating application. Correct damage by cleaning, repairing, and replacing, as acceptable to the Architect. Leave in an undamaged condition.
- B. Protect newly-applied coating with 2-layers of non-staining protection paper taped in place with duct tape. Tape first layer of Fortifiber Corp. "Seekure" floor protection sheet or similar heavy duty kraft paper. Tape a second layer of regular kraft paper over first layer. Tape all seams.

END OF SECTION

SECTION 10 11 16**MARKERBOARDS****PART 1 - GENERAL**

1.01 SECTION INCLUDES

- A. Dry-wipe markerboards and edge trim.

1.02 RELATED SECTIONS

- A. None.

1.03 SUBMITTALS

- A. Manufacturer's product data.
- B. Sample of markerboard with chalk tray and map rail. Sample shall show edge treatment.
- C. Installation and maintenance instructions.

PART 2 - PRODUCTS

2.01 MARKERBOARD

- A. Liquid chalk dry-wipe Markerboards by Claridge
 1. LCS Deluxe, 5/8" face trim with map rail, 24 gauge LCS face with 1/2" Duracore core, and .015 Aluminum Sheet backing, or equal.
 2. Horizontal Sliding Units as shown on the drawings.
- B. Sizes per the drawings. Color shall be as selected by the Architect from manufacturer's standards.
- C. Edges to be trimmed with aluminum ends & casings.
- D. Substitutions will be evaluated per Spec Section 01 25 00 – Substitution Procedures.

2.02 ACCESSORIES

- A. Chalk/Marker tray with RL closures: No. 262 already included
- B. Flag Holder
- C. Metal Map Hooks already included

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that vinyl tackboard installation is complete prior to application of markerboard.

3.02 INSTALLATION

- A. Apply markerboard over vinyl tackboard in strict compliance with manufacturer's instructions if tackboard is present or part of this project.

3.03 CLEAN UP

- A. Remove any visible adhesive from tackboard and adjacent surfaces. Clean all markerboards surfaces.

END OF SECTION

SECTION 10 11 23**TACKBOARD****PART 1 - GENERAL**

1.01 SECTION INCLUDES

- A. Vinyl covered tackboard and edge trim.

1.02 SUBMITTALS

- A. Manufacturer's product data.
- B. Sample of tackboard with selected vinyl covering in color and pattern selected. Sample shall show wrapped beveled edge.
- C. Installation and maintenance instructions.

PART 2 - PRODUCTS

2.01 TACKBOARD

- A. Vinyl covered fiberboard tackboard, 1/2 inch thick with wrapped beveled edges in long (vertical) dimensions, Domtar Gypsum, or equal. Vinyl shall be Koroseal RCV School Collection and Highlander, Type II, 18 oz. or equal. Color and pattern shall be as selected by the Architect.
- B. Cellulose fiber insulating base boards shall meet or exceed the physical requirements of ASTM C208 and FS LLL-I-53B, Class A.
- C. Finished vinyl surface shall have a Class III Flame Spread Index when tested in accordance with ASTM E84 and California Building Code Chapter 8. Smoke density shall be no greater than 450 when tested in accordance with CBC 2013 in the way intended for use.

2.02 ACCESSORIES

- A. Trim Moulding: Extruded plastic, covered on exposed surfaces with standard vinyl to match tackboard. Trim shall include top, bottom and end caps, inside and outside corners where required.
- B. Adhesive shall be as recommended by tackboard manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that gypsum wallboard substrate has been completed with all joints taped and fastener depressions filled.

3.02 INSTALLATION

- A. Apply tackboard to substrate with adhesive in strict compliance with manufacturer's instructions.
- B. Vertical joints in the field shall have wrapped beveled edges but tightly with joints plumb.

3.03 CLEAN UP

- A. Remove any visible adhesive from tackboard and adjacent surfaces. Clean all tackboard surfaces.

END OF SECTION

SECTION 10 12 00
TROPHY AND POSTER CASES

PART 1 - GENERAL

1.01 REFERENCE

- A. Requirements of Addenda, Alternates, Conditions, and Division 01 collectively apply to this work.

1.02 DESCRIPTION

- A. Principal Work Items Are:
 - 1. Section 09 29 00 - Gypsum Wallboard.
 - 2. Division 26 - Electrical.

1.03 SUBSTITUTIONS

- A. Only written approval of the Owner will permit substitutions for materials specified. Refer to Section 01 25 00, Substitutions paragraph, for procedure.

1.04 SUBMITTALS

- A. Shop Drawings: Submit Drawings indicating size and sections of members, dimensions and installation conditions.
- B. Samples In Duplicate: Submit for finish of Frame and Background field color.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver with protective wrapping intact. Store inside building in a clean, dry area. Handle in a manner to prevent damage.

1.06 JOB CONDITIONS

- A. Environmental Conditions.
 - 1. Cold weather: Maintain temperature in space at 60° F or above for 24 hours before and after, and all during installation.
 - 2. Sequencing, Scheduling: Coordinate installation with substrate installation and other related work.

PART 2 - PRODUCTS

2.01 DISPLAY CASE AND POSTER CASE

- A. Specifications are based on cases from Poblocki and Sons. Acceptable manufacturers are Claridge or equal. Substitutions will be considered per Spec Section 01 25 00 – Substitution Procedures:
1. Size: See interior elevations.
- B. Materials:
1. Display case shall be Recess mount, Model "G" with 24" Recess depth (back to match poster case).
 2. Poster case shall be Recess mount, Model "C" with full flat back.
 3. Case lighting shall be fluorescent built in within frame.
 4. Finish: Clear anodized.
 5. Case Trim of all units shall align.
 6. Doors shall be Regular sliding heavy duty tempered glass with manufacturers' standard lock.
 7. Shelving shall be 3/8" tempered polished plate glass (14" deep) supported by Standards and Brackets of satin Zincro finish (overlapping the background [tee] and regular brackets).

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be in accordance with the manufacturer's standard recommendations and the following.
1. All parts shall be erected in a substantial manner, straight, level and plumb.
 2. No evidence of drilling, cutting or patching shall be visible in the finishes of work.
 3. Finished surfaces shall be cleaned after installation and left free of imperfections.

3.02 ADJUSTMENT AND CLEANING

- A. Clean all components.
- B. Adjust and lubricate moving parts so all function properly.

END OF SECTION

SECTION 10 14 00**SIGNAGE****PART 1 - GENERAL**

1.01 MANUFACTURER

- A. Basis of Design: Inpro Corporation (or approved equal)

1.02 REFERENCES

- A. Requirements in Addenda, Alternates, Conditions and Division 01 collectively apply to this work.

1.03 DESCRIPTION

- A. Principal Work Items Are:

1. Acrylic Signs:
 - a. Room identification signs
 - b. Door signs
 - c. Accessible symbol signs
 - d. Exit signs, unlighted
 - e. Directional signs
 - f. Room capacity
2. Dimensional Letters:
 - a. Building identification

- B. Related Work Specified Elsewhere:

1. Supporting construction: Respective Sections
2. Installation of finish hardware and room identification signs: Section 06 10 00 – Rough Carpentry
3. Section 09 91 23 - Painting

1.04 SUBSTITUTION

- A. Only written approval of the District will permit substitutions for materials specified. Refer to Section 01 25 00 – Substitution Procedures for procedures.

1.05 QUALITY ASSURANCE

- A. Uniformity of Manufacturer: For each separate type of sign required, obtain signs from one source from a single manufacturer.
- B. Requirements of Regulatory Agencies; Codes:

1. Division of the State Architect.
2. California Building Code (CBC) and Standards.
3. Conform to State Disability Requirements for standard Accessibility sign.

1.06 SUBMITTALS

- A. Comply with the General Conditions – Submittal Procedures
- B. Product Data: Submit manufacturer's technical data and installation instructions for each type of sign required.
- C. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.
 1. Samples for initial selection of color, pattern and texture.
 - a. Plastic Laminate: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.
 2. Samples for verification of color, pattern and texture selected and compliance with requirements indicated:
 - a. Plastic Laminate: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.
 - b. Dimensional Letters: Provide full size representative samples of each dimensional letter type required, showing letter style, color and material finish and method of attachment.
- D. Shop Drawings: Submit shop drawings for fabrication and erection of signs. Include plans, elevations and large scale details of sign wording and lettering layout. Show anchorages and accessory items. Furnish location template drawings for items supported or anchored to permanent construction.
- E. Furnish full size spacing templates for individually mounted letters.

1.07 JOB CONDITIONS

- A. Sequencing Scheduling
 1. General: Verify type of supporting construction; provide suitable attachments.
 2. Room Identification Signs: Coordinate with Finish Hardware as follows:
 - a. Verify available types of finish hardware for doors.
 - b. Obtain templates.

PART 2 - PRODUCTS**2.01 PLASTIC SIGNS – Refer to Exiting/Signage Plans and Door schedules for signs and locations:**

- A. Type Imagery
 - 1. Type style: Helvetica Medium, all upper case.
 - a. Raised Letter Size: Typical: 1" high, 1/8" thick.
 - b. Raised Number Size: Typical: 1-1/2" high, 1/8" thick.
 - c. All signage shall have raised text and grade II Braille, 1/16" stainless steel beads.
 - d. Other Sizes: As specifically indicated.
 - 2. Arrangement: Use standard spacing between letters, words, numbers and lines; center text typically.
- B. Symbol Style; General: Recognized standard "International Symbols of Accessibility", such as those developed by the American Institute of Graphics for the U.S. Department of Transportation.
- C. Materials:
 - 1. Sign Material:
 - a. Type: Cast acrylic, abrasion resistant, non-reflective face.
 - b. Thickness: 1/4".
 - c. If sign is adhered to glass, an equal sized acrylic backing plate shall be adhered to the back side of the glass opposite of the sign
 - 2. Adhesive: Pressure sensitive, hi-tack transfer tape with peel-back paper backing.
 - 3. Mounting Screws: Non-corrosive, tamper proof screws. Match finishes to the door hardware for the door where the signs are mounted.
 - 4. Integral colors selected by Architect.

2.02 TOILET ROOM SIGNS

- A. Symbols:
 - 1. Accessible Symbols:
 - a. Symbols: to be selected.
 - b. Background: to be selected.
 - 2. Male and Female Symbols:
 - a. Symbols: to be selected.
 - b. Background: to be selected.
 - 3. Boys and Girls Symbols.

- a. Symbols: to be selected.
- b. Background: to be selected

2.03 PLASTIC ACCESSIBLE SYMBOL SIGNS:

- A. General: Conform to Paragraph 2.01 (except as indicated) and to the State Accessibility Code.
- B. Figure Symbols:
 1. Building Entrance Signs, at all entrances to every building:
 - a. Size: 6" x 6", typically.
 - b. Refer to drawings for locations.
- C. Geometric Symbols:
 1. Toilet Rooms:
 - a. For Men/Boys: An equilateral triangle, 12" on a side; 1/4" thick.
 - b. For Women/Girls: A 12" diameter circle; 1/4" thick.
 - c. For Both Sexes: An equilateral triangle, 12", 1/4" thick, on a side, superimposed over a 12" diameter circle; 1/4" thick.

2.04 DIMENSIONAL LETTERS AND NUMBERS

- A. Cast Letters and Numbers: Form individual letters and numbers by casting. Produce characters with smooth, flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, or other defects. Cast lugs into the back of characters and tap to receive threaded mounting studs. Comply with requirements indicated for finish, style, and size.
 1. Metal: Aluminum.
 2. Letter Style: Impact (case & size as indicated on drawings).
- B. Paint Finish: Factory applied polyester powder coating system. Color to match Construction Manager's sample.
- C. Manufacturer: One of the following or approved equal:
LaHaye Bronze
Matthews International Corp.
Metal Arts
Metalic Arts, Inc.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Layout: Accurately lay out work to maintain proper lines, levels and spacing.

3.02 INSTALLATION; PLASTIC SIGNS

- A. General: Press tape firmly to mounting surface, and secure each plaque or sign with two screws.
- B. Signs Mounted on Doors:
 - 1. Mount following signs or plaques on room doors.
 - a. Toilet Rooms: Accessible geometric symbol signs.
 - 2. Accessible Geometric Symbol Signs at Toilet Rooms: Mount with center line of sign 60" above finished floor.
- C. Signs Adjacent to Doors: Mount on wall adjacent to door per the Drawings. Mount with expansion screws.
- D. Signs Mounted on glass:
 - 1. A similar, backing plate of the exact size, color and shape of the sign shall be used on the same side of glass directly behind where the sign is mounted. Sign to be adhered with adhesive strips per manufacturer recommendations.

3.03 INSTALLATION, DIMENSIONAL LETTERS AND NUMBERS

- A. Dimensional Letters and Numbers: Mount letters and numbers using standard fastening methods recommended by the manufacturer for letter form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.

3.04 CLEANING AND PROTECTION

- A. At completion of installation, clean soiled sign surfaces in accordance with manufacturer's instructions. Protect units from damage until acceptance by Owner.

END OF SECTION

SECTION 10 14 16**PLAQUES****PART 1 - GENERAL**

1.01 SUMMARY

- A. Section includes plaques.

1.02 SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For plaques.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show plaque mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, typestyles, graphic elements, and layout for each plaque full scale.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Plaque Schedule: Use same designations specified or indicated on Drawings or in a plaque or sign schedule.
- E. Sample warranty.
- F. Maintenance data.

1.03 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: **Five** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PLAQUES, GENERAL

- A. Regional Materials: Plaques shall be manufactured within 500 miles of Project site.

2.02 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs.

2.03 PLAQUES

- A. Cast Plaque: Plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or to be supplied by the Architect at a later date during construction:
 2. Provide and install, where shown on the Drawings, one (1) cast bronze building plaque as manufactured by W-N-ART BRONZE COMPANY, 4325 N. Harrison Avenue, Fresno, California 93704. phone (559 269-4867) Building plaque shall be cast of pre-alloyed bronze ingot. Casting shall be dimensionally correct within normal tolerances and free from weakening defects of any character. Border and letters shall be raised and hand chased straight and true.
 3. Building plaque shall be 24" x 18" with Helvetica Medium letter style in capitals and lower case. Border shall be single line and background shall be stipple (pebble) texture. Mounting shall be by bosses and studs. Building plaque shall be chrome plated to provide mirror polish finish on border and letters. Sides of letters and borders shall be hand finished with background texture prior to plating process to ensure contrast.
 4. Coordinate related work, materials and mounting locations. Submit full size drawings incorporating copy provided by the Architect for approval. Submit rubbings of plaque patterns to the Architect for approval of layout and verification of copy prior to castings.

2.04 MATERIALS

- A. Bronze Castings: Lead-free alloy

2.05 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:
1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

4. Plaque Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque, unless otherwise indicated.
 - b. Through Fasteners: Exposed metal fasteners matching plaque finish, with type of head indicated, installed in predrilled holes.

2.06 FABRICATION

- A. General: Provide manufacturer's standard plaques according to requirements indicated.
 1. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 2. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 3. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match plaque finish.
 4. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.
- B. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into panel surface indicated to produce precisely formed copy, incised to uniform depth.
 1. Engraved Metal: Fill engraved graphics with manufacturer's standard baked enamel.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.
 1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
 2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
 3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.

4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place plaque in position and push until flush to surface, embedding studs in holes. Temporarily support plaque in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place plaque in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 2. Through Fasteners: Drill holes in substrate using predrilled holes in plaque as template. Countersink holes in plaque if required. Place plaque in position and flush to surface. Install through fasteners and tighten.
- C. Remove temporary protective coverings and strippable films as plaques are installed.

END OF SECTION

SECTION 10 17 00**TOILET PARTITIONS - SOLID COLOR REINFORCED COMPOSITE****PART 1 - GENERAL****1.01 DESCRIPTION**

- A. Work Included: Provide all toilet partitions and urinal screens, complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.
- B. Related Work Included in Other Sections:
 - 1. Toilet Accessories (Section 10 80 00)

1.02 QUALITY ASSURANCE

- A. Qualifications of Manufacturers: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.
- B. Qualifications of Installers: use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

- A. Product Data: Within 30 calendar days after award of the Contract, submit:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
 - 3. Shop Drawings and sufficient dimensional data to enable proper coordination of installation of concealed items of support.
 - 4. Manufacturer's recommended installation procedures.

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the review of the Architect and at no additional cost to the Owner.

1.05 PERFORMANCE REQUIREMENTS

- A. Graffiti Resistance: Partition material shall have the following graffiti removal characteristics when tested in accordance with ASTM D6578-00 Standard Practice for Determination of Graffiti Resistance in accordance with Section 9, "Graffiti Removal Procedure Using Manual Solvent Rubs":
1. Cleanability: Five (5) required staining agents shall be cleaned off material.
- B. Scratch Resistance: Partition material shall have the following characteristics when tested in accordance with ASTM D2197-98(2002) Standard Test Method for Adhesion of Organic Coating by Scrape Adhesion, using Gardner Stock #PA-2197/ST pointed stylus attachment on scrape tester:
1. Scratch Resistance: Maximum Load Value shall exceed 10 kilograms.
- C. Impact Resistance: Partition material shall have the following characteristics when tested in accordance with ASTM D2794-93(1999)e1 Standard Test Method for Resistance of Organic Coating to the Effects of Rapid Deformation (Impact), using .625" hemispherical indenter with 2-lb impact weight:
1. Impact Resistance: Maximum Impact Force value shall exceed 30 inch-lbs.
- D. Fire Resistance: Partition material shall comply with the following requirements, when tested in accordance with ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
1. Smoke Developed Index: Not to exceed 450.
 2. Flame Spread Index: Not to exceed 75.
 3. Material Fire Ratings:
 - a. National Fire Protection Association (NFPA): Class B.
 - b. International Code Council (ICC): Class B.GUARANTEE:

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Model numbers for toilet partitions manufactured by Bobrick Washroom Equipment, Inc., Sierra Series, are listed to establish a standard of quality for design, function, materials, workmanship, and appearance. Other manufacturers may be submitted for evaluation by the architect by following the conditions of the substitutions clause. Unless approval is obtained ten days prior to the bid date, all bids shall be based on the standard of quality. The architect shall be the sole judge as to the acceptability of all products submitted for substitution.
- B. Toilet partitions shall be the product(s) of a single manufacturer.

2.02 MOUNTING CONFIGURATIONS

TOILET PARTITIONS – SOLID COLOR REINFORCED COMPOSITE

A. Toilet Partitions/Shower Dividers/Dressing Compartments shall be:

1. Overhead-Braced (1092 Sierra™ Series)
2. Approved Equal
3. Toe Clearance of 12"

B. Urinal Screens shall be:

1. Post to Ceiling (1093 Sierra Series):
2. Approved Equal

C. Toe clearance requirement of 12" per CBC 11B-604.8.1.4" / 2.03.

2.03 COMPONENTS/MATERIALS

A. Stiles, Panels, Doors, and Screens

1. Stiles, Panels, Doors, and Screens shall be all be manufactured from Solid Color Reinforced Composite material.

B. Toilet Partition Material

1. Toilet partitions shall be constructed of Solid Color Reinforced Composite material, which is composed of dyes, organic fibrous material, and polycarbonate/phenolic resins. Material shall have a non-ghosting, graffiti-resistant surface integrally bonded to core through a series of manufacturing steps requiring thermal and mechanical pressure. Edges of material shall be the same color as the surface.

C. Finish Thickness

1. Stiles and doors shall be 3/4" (19 mm).
2. Panels and benches shall be 1/2" (13 mm).

D. Hardware

1. All hardware to be 18-8, type-304 stainless steel with satin finish.
2. Hardware of chrome-plated "Zamak", aluminum, or extruded plastic is unacceptable.
3. Door pulls on each side at accessible compartments to be "U-shaped" and shall comply with CBC 11B-604.8.1.2

E. Latch

1. Sliding door latch shall be 14 gauge (2 mm) and shall slide on nylon track.
2. Sliding door latch shall require less than 5-lb force to operate. Twisting latch operation will not be acceptable.
3. Latch track shall be attached to door by machine screws into factory-installed threaded brass inserts.

4. Threaded brass inserts shall be factory installed for door hinge and latch connections and shall withstand a direct pull exceeding 1,500 lbs. per insert.
5. Through bolted, stainless steel, pin-in-head Torx sex bolt fasteners shall be used at latch keeper-to-stile connections and shall withstand direct pull force exceeding 1,500 lbs. per fastener.

F. Hinges

1. Cam shall be adjustable in the field to permit door to be fully closed or partially open when compartment is unoccupied.
2. Hinges shall be attached to door and stile by theft-resistant, pin-in-head Torx stainless steel machine screws into factory-installed, threaded brass inserts.
3. Fasteners secured directly into the core are not acceptable.
4. Door shall be furnished with two 11-gauge (3-mm) stainless steel door stop plates with attached rubber bumpers to resist door from being kicked in/out beyond stile.
5. Door stops and hinges shall be secured with stainless steel, pin-in-head Torx machine screws into threaded brass inserts.
6. Threaded brass inserts shall withstand a direct pull force exceeding 1,500 lbs per insert.

G. Coat Hook

1. Coat Hook shall be constructed of stainless steel and shall project no more than 1-1/8" (29 mm) from face of door.
2. Coat hook shall be secured by to door by through-bolted, theft-resistant, pin-in-head Torx stainless steel screws. Through-bolted fasteners shall withstand a direct pull force exceeding 1,500 lbs. per fastener.

H. Mounting Brackets

1. Mounting Brackets shall be constructed of stainless steel and shall be mounted inside compartment.
2. Fasteners at locations connecting panels-to-stiles shall utilize through bolted, stainless steel, pin-in-head Torx sex bolt fasteners. Through-bolted fasteners shall withstand direct pull force exceeding 1,500 lbs. per fastener.
3. Wall mounted urinal screen brackets shall be 11 gauge (3 mm) double thickness.

I. Leveling Device shall be 7-gauge, 3/16" (5-mm) hot rolled steel bar; chromate-treated and zinc-plated; through-bolted to base of solid color reinforced composite stile.

J. Stile Shoe shall be one-piece, 4" (102-mm) high, type-304, 22-gauge (0.8-mm) stainless steel with satin finish. Top shall have 90° return to stile. Shoe will be composed of one-piece of stainless steel and capable of being fastened (by clip) to stiles starting at wall line.

K. Headrail (Overhead Braced) shall be satin finish, extruded anodized aluminum (.125" / 3-mm thick) with anti-grip profile.

PART 3 - EXECUTION**3.01 INSPECTION**

- A. Check area schedules to receive partitions for correct dimensions, plumbness of walls and soundness of surfaces that would affect installation of holding brackets.
- B. Verify spacing of plumbing fixtures to assure compatibility with installation of partitions.
- C. Do not begin installation of partitions until conditions are satisfactory.

3.02 ERECTION

- A. General:
 - 1. Install partition rigidly, straight, plumb, and level.
 - 2. Installation methods shall conform to manufacturer's recommendations for backing and proper support.
 - 3. Conceal evidence of drilling, cutting, and fitting to room finish.
- B. Overhead Braced partitions:
 - 1. Attach stile to supporting floor, anchored with minimum 2 in. (50mm) penetration into supporting floor system.
 - 2. Level, plumb, and tighten installation.
 - 3. Secure stile shoes in position.
 - 4. Set tops of doors parallel with over head brace when doors are in closed position.

3.03 ADJUST AND CLEAN

- A. Adjust hardware for proper operation after installation.
- B. Set hinges on inward swing doors to hold doors open approximately 15 degrees from closed position when unlatched.
- C. Set hinges on outward swing doors for physically handicapped compartments to hold doors in closed position when unlatched.
- D. Clean exposed surfaces of partitions, hardware, fittings, and accessories.

END OF SECTION

SECTION 10 21 23**CUBICLE CURTAINS AND TRACK****PART 1 - GENERAL****1.01 SUBMITTALS**

- A. Comply with pertinent provisions of the General Conditions – Submittal Procedures.
- B. Product Data: Submit manufacturer's specifications and installation instructions. Include methods of installation for supporting structure.
- C. Shop Drawings: Submit shop drawings for special components and application conditions of units which are not fully dimensioned or detailed in manufacturer's product data. Show relationships to adjoining work.
- D. Certification: Provide written certification that fabric has been flameproofed or is of fire resistant materials in accordance with requirements of State Fire Marshall, Title 19, Section 3.08.
- E. Samples:
 - 1. For verification purposes, submit samples of each component, material and finish. Prepare samples from same materials to be used for the work.

1.02 DELIVERY

- A. Do not deliver units until building is enclosed and ready for their installation. Protect from damage during delivery, handling, storage and installation.

PART 2 - PRODUCTS**2.01 CUBICLE TRACK SYSTEM**

- A. Track: 6063 T-5 extruded anodized aluminum, channel type.
- B. Carrier Guides: Button type, permanently self-lubricating slick slides with .093 nickel plated wire hook designed for readily attaching or removing grometed cubicle curtain.
- C. Chain Drop: Nickel plated beaded type with hook at one end and eye at top to attach to carrier hook.
- D. Manufacturer: One of the following, subject to compliance with requirements.

Arc-Com Fabrics, inc. 845/365-1100

General Cubicle Co., 213/256-8666
OB/MASCO, 714/990-6356
Salbury Industries, 213/232-6181

2.02 CURTAINS

- A. Fabric: 52% Post Consumer Recycled FR Polyester, 48% FR Polyester. Specification based on 74 inch Med Arc eco-tex Collection by Arc-Com Fabrics, inc., Orangeburg, New York. Color as selected by Architect. Fullness shall be 1-1/4 times length to be covered. Heading shall be triple turned with grommets at 6 inch, washable type and properly shirred. Hems shall be blind stitched fully underturned. Provide weights in weight pockets at every seam and at corners.
1. All seams vertical with material fed straight to machine, equally lapped and stretched and finished free from wrinkles and sags. Properly clip selvedge edges and finish square and true.
 2. Cross seams will not be allowed or accepted.

2.03 ACCESSORIES

- A. Provide all end stops, splicers, supports, installation anchorages, and other required accessories as recommended by the track system manufacturer.

2.04 FINISHES

- A. Aluminum Finish: Provide the following finish for exposed aluminum surfaces of track. Provide matching finishes on exposed brackets.
1. Clear Anodized Finish: AA-C22A21 (medium matt etched finish with 0.1 mil thick anodic coating).

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install units in manner indicated to comply with manufacturer's instructions. Position units level, plumb, secure, at proper location relative to other related work. Securely anchor units with proper anchorages, suited to type of mounting indicated.
- B. Test units for proper traversing operation. Adjust as required for smooth operation.
- C. Protect installed units to ensure their being in operating condition, without damage, blemishes, or indication of use at completion of project. Repair or replace damaged units as directed by Architect.

END OF SECTION

SECTION 10 26 13**CORNER GUARDS****PART 1 - GENERAL**

1.01 SECTION INCLUDES

- A. Stainless Steel Corner Guards.

1.02 SUBMITTALS

- A. Submit in accordance with the General Conditions – Submittal Procedures.
- B. Product Data: Submit manufacturer's product data.
- C. Samples: Submit for approval 12" long sample of each color specified.
- D. Test Reports: Submit manufacturer's test reports and certification indicating compliance with applicable building code requirements.

1.03 QUALITY ASSURANCE

- A. Comply with specified project requirements regarding fit and finish.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in a clean, dry location protected against damage of any kind.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Koroseal Wall Protection Systems or approved equal.

2.02 CORNER GUARDS

- A. Koroseal "Korogard" Series GS20: 48" long x 16-gauge Stainless Steel Corner Guard adhered or screwed to substrate corner. Exposed surfaces shall be free of discoloration or other imperfections or approved equal.

- 1. Dimensions

- a. Leg length: 2" - GS20
- b. Angle: 90° (Custom Angle Available).

2. Material: Stainless Steel, type 304.
3. Finish: #4 Satin.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify by examination that wall surfaces are acceptable to receive the specified guard systems. Notify the Architect in writing if wall surfaces are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

- A. Install corner guards to wall securely using mastic construction adhesive or appropriate screws, as specified.
- B. Install corner guards accurately in location, alignment, and elevation.

END OF SECTION

SECTION 10 28 13.13
ELECTRIC HAND DRYERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Warm air, high speed, and energy efficient self-contained electric hand dryers.
- B. STAFF RESTROOMS ONLY

1.02 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry.
- B. Division 26 - Electrical.

1.03 REFERENCES

- A. ICC/ANSI A117.1 - American National Standard for Accessible and Useable Buildings and Facilities; 1998.

1.04 SUBMITTALS

- A. Submit under provisions of the General Conditions – Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Operating instructions and performance.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
- C. Shop Drawings showing dimensions, method of attachment, and required supports.
- D. Electrical wiring diagrams for connection of hand dryers.
- E. Warranty for review by Architect.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing electric hand dryers with 10 years minimum experience.
- B. Equipment certified by Underwriters Laboratory, Inc., with UL and ULC labels.

- C. Comply with ICC/ANSI A117.1.

1.06 WARRANTY

- A. Provide manufacturer's standard limited warranty for period specified.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Excel Dryer Inc., which is located at: 357 Chestnut St. P. O. Box 365; East Longmeadow, MA 01028; Tel: 413-525-4531; Email: [request info \(sales@exceldryer.com\)](mailto:requestinfo@exceldryer.com); Web: www.exceldryer.com.
- B. Substitutions: Dyson or equal.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 – Substitution Procedures.

2.02 ELECTRIC HAND DRYERS

- A. Hand Dryer: Warm air, rapid drying, energy efficient electric hand dryer; XLERATOR; surface mounted; entire dryer internally grounded.
 - 1. Warranty Period: 5 years; limited warranty.
 - 2. Made in the USA.
 - 3. Controls: Automatic, activated by infrared optical sensor. Operates while hands are under blower. Shut-off within 2 seconds when hands removed, or in 35 seconds if hands not removed. Control assembly completely sealed for protection against moisture, lint-dust and vandalism.
 - 4. Cover: One piece, vandal resistant, reinforced white thermoplastic (Bulk Molding Compound).
 - 5. Air Intake: Inlet openings on bottom of cover.
 - 6. Air Outlet: Delivers focused air stream of 18,000 LFM at nozzle and 16,000 LFM at average hand position of 4 inches (102 mm) below air outlet.
 - 7. Noise Reduction Nozzle: Reduces air deflection noise level by 9 db.
 - 8. Recess Kit: ADA compliant recess kit is fabricated of 22 GA 18-8 type 304 stainless steel with #4 satin finish with 16 GA18-8 type 304 stainless steel dryer mounting plate. All welded construction. 16-3/8 inches (416 mm) wide by 26 inches (660 mm) high by 3-3/8 inches (86 mm) deep.
 - 9. Nominal Size: 11-3/4 inches (298 mm) wide by 12-11/16 inches (322 mm) high by 6-11/16 inches (170 mm) deep.
 - 10. Weight:
 - a. 17 pounds die cast cover.
 - b. 15 pounds stainless cover.
 - c. 13 pounds bulk mold compound.
 - 11. Power Source: 110/120 volt, 12.5 amp, 60 Hz.

12. Combination Motor and Blower: Series commutated, through-flow discharge, vacuum type; 5/8 HP, 20,000 RPM. Air flow rate: 19,000 linear feet per minute (97 meters per second) at air outlet, 16,000 linear feet per minute (81 meters per second) at average hand position of 4 inches (102 mm) below air outlet.
13. Heater: Nichrome wire element, mounted inside blower housing to be vandal proof.
14. Heater Safeguard: Automatic resetting thermostat to open when airflow is restricted and close when air flow is resumed.
15. Air Temperature: 135 degrees F measured at average hand position of 4 inches (102 mm) below air outlet. Air Heater Output: 900 watts.
16. All metal parts coated according to Underwriters Laboratories, Inc. requirements.
17. Mount dryers at heights indicated on Drawings.
18. Mount at the following heights above floor surface:
 - a. Men's Toilets: 36 inches.
 - b. Women's Toilets: 36 inches.
 - c. Toilets for Persons with Physical Disabilities: 36 inches.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Coordinate requirements for blocking to ensure adequate means for support and installation of hand dryers.
- D. Coordinate requirements for power supply, conduit, disconnect switches and wiring.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install dryers at specified heights.

- C. Install dryers securely to supporting substrate so that fixtures are level and aligned with each other. Use type and length of fastener as recommended by manufacturer for type of substrate.

3.04 PROTECTION

- A. Inspect installation to verify secure and proper mounting. Test each dryer to verify operation, control functions, and performance. Correct deficiencies.
- B. Protect installed driers until completion of project.
- C. Replace damaged products before Substantial Completion.

END OF SECTION

SECTION 10 44 13**FIRE EXTINGUISHER AND CABINETS****PART 1 - GENERAL**

1.01 REFERENCE

- A. Requirements in Addenda, Alternates, Conditions, and Division 1 collectively apply to this work.

1.02 DESCRIPTION

- A. Principal Work Items Are:
 - 1. Fire extinguishers
- B. Related Work Specified Elsewhere:
 - 1. Section 06 10 00 - Rough Carpentry.

1.03 SUBSTITUTIONS

- A. Only written approval of District will permit substitutions for materials specified. Refer to Section 01 25 00 – Substitution Procedures, for procedure.

1.04 SUBMITTALS

- A. Product Data: Four copies of manufacturer's printed data illustrating item and fully describing all features.

PART 2 - PRODUCTS

2.01 FIRE EXTINGUISHERS

- A. Portable fire extinguishers:
 - 1. All classrooms, except as noted below, are: Amerex Model 500, Classification 2A:10BC steel tank dry chemical.
 - 2. Computer lab, electrical, data and telephone rooms: Amerex Model 398 Classification 2A:10BC steel tank, Halotron.
 - 3. Kitchen: Amerex Model B262 Classification 2A:K steel tank, wet chemical.
 - 4. All labs & lab prep rooms: Amerex Model 592, Classification 4A:80BC steel tank, high hazard

2.02 CABINETS

- A. JL Industries Ambassador Series

1. Semi-Recessed, 1-hour rated at framed walls
2. Surface Mount at block walls
3. Tempered Glass

PART 3 - EXECUTION

3.01 GENERAL

- A. In addition to the number shown on the drawings, provide two extinguishers of each type to be located as directed by District, all in accordance with California Fire Codes.

3.02 INSTALLATION

- A. Install on wall brackets typical at each location shown.
- B. Extinguishers to be filled and tagged by a licensed serviceman; ready for use.

END OF SECTION

SECTION 10 51 00**HEAVY DUTY VENTILATED LOCKERS****PART 1- GENERAL**

1.01 RELATED DOCUMENTS

- A. We suggest use of your standard office reference to drawing, general and special conditions, etc.

1.02 SCOPE

- A. Furnish and install new steel lockers, accessories and finish metal trim as shown or indicated on approved drawings. Concrete or masonry bases, wood furring, blocking or trim, as may be required by drawings are included in other sections of this specification.

1.03 SUBMITTALS

- A. Shop Drawings: Submit drawings showing locker types, sizes and quantities, including all necessary details relating to anchoring, trim installation and relationship to adjacent surfaces.
- B. Numbering: The locker numbering sequence shall be provided by the approving authority and noted on approved drawings returned to the locker contractor.
- C. Color Charts: Provide color charts showing manufacturer's available colors. If required by normal office procedures or in the event of non-standard color selection, request samples of paint on metal.
- D. Lock Combination Listings and Master Keys: Use only when combination locks are specified. Delivered directly to the owner's representative.

1.04 QUALITY ASSURANCE

- A. UNIFORMITY: Provide each type of metal locker as produced by a single manufacturer, including necessary accessories, fittings and fasteners.
- B. JOB CONDITIONS: Do not deliver metal lockers until building is enclosed and ready for locker installation. Protect from damage during delivery, handling, storage and installation.

PART 2 – PRODUCTS

2.01 MANUFACTURER

- A. **Republic Storage Systems, LLC.** Products by other manufacturers may be approved provided they meet the detailed specifications written below. Approval

procedure shall be as specified in the General Conditions of these locker specifications.

2.02 LOCKERS

- A. Refer to drawings

2.03 FABRICATION

- A. **MATERIAL:** All major steel parts shall be made of mild cold rolled steel, free from imperfections and capable of taking a high grade enamel or powder coat finish.

-ALTERNATE: Specified locker components shall be manufactured from Galvannealed steel and finished by manufacturer's standard process.

- B. **FINISH:** Surfaces of the steel shall be thoroughly cleaned, phosphatized and prepared for baked enamel or powder coat finish in accordance with paint manufacturer's instructions.

- C. **CONSTRUCTION:** Lockers shall be built on the unit principle - each locker shall have an individual door and frame, an individual top, bottom, back and shelves with common intermediate uprights separating units.

Lockers shall be pre-assembled of welded construction in multiple groups, conforming to job requirements. All welds shall be smooth and without burrs. No nuts, bolts or rivets shall be allowed in assembly of main locker groups.

- D. **DOOR FRAMES:** Door frames shall be 16 gauge formed into 1" wide face channel shapes with a continuous vertical door strike, integral with the frame on both sides of the door opening. Cross frame members of 16 gauge channel shapes, including intermediate cross frame on double, triple or four tier lockers shall be securely welded to vertical framing members to ensure a square and rigid assembly. Intermediate cross frame members are not required on box lockers.

- E. **DOORS:** Single, double and triple tier doors shall be formed from one piece 14 gauge cold rolled sheet steel. Formations shall consist of a full channel shape on the lock side of adequate depth to fully conceal the lock bar, channel formation on the hinge side and right angle formations across the top and bottom. Doors shall have diamond shaped perforations 3/4" wide by 1-1/2" high to provide free airflow while leaving sufficient metal for rigidity and strength.

Doors for box lockers 4 openings high to be 14 gauge formed steel with right angle flanges on all four sides. Box locker doors are perforated for free airflow using small diamond perforations 7/16" wide by 15/16" high. Box locker doors are punched to accept optional strike plate.

Reinforced Door: On doors 15" and wider, tiered athletic doors shall be reinforced with a 16 gauge channel welded to the inside side of the door. Channel shall be 7/8" wide and shall be placed vertically in the center of the door to provide maximum stiffness. The diamond pattern shall be shifted to be a

vertical band on the hinge side of the door. On doors with louvers, the channel shall be located near the hinge side of the door, so that the louvers are unobstructed.

- F. **PRE-LOCKING DEVICE:** All "tiered" lockers, except lockers with a turn handle, shall be equipped with a positive automatic pre-locking device whereby the locker may be locked while door is open and then closed without unlocking and without damaging locking mechanism.
- G. **LATCHING:** Latching shall be a one-piece, pre-lubricated spring steel latch, completely contained within the lock bar under tension to provide rattle-free operation. The lock bar shall be of pre-coated, double-channel steel construction. The lock bar shall be securely contained in the door channel by self-lubricating polyethylene guides that isolate the lock bar from metal-to-metal contact with the door. There shall be three latching points for lockers over 42" in height and two latching points for all tiered lockers 42" and under in height. The lock bar travel is limited by contacting resilient high-quality elastomeric cushioning devices concealed inside the lock bar. Frame hooks to accept latching shall be of heavy gauge steel, set close in and welded to the door frame. Continuous vertical door strike shall protect frame hooks from door slam damage. A soft rubber silencer shall be securely installed on each frame hook to absorb the impact caused by closing of the door. A Latch Guard steel plate shall be welded on each frame hook on tiered lockers.

ALTERNATE: Box Lockers: Each door shall be provided with a factory installed, welded-on spring latching device. The latch shall consist of a heavy gauge E-coated and painted finger-operated trigger, which is punched to accept a padlock loop. Latching shall be automatic when the door is shut by means of a torsion spring-loaded trigger, which engages a welded-on frame hook.

-OPTION: Turn Handle: Tiered athletic lockers can also be equipped with a three point latching turn handle that provides latching rod engagement at the top and bottom cross frames and a 1" wide center latch engaging the vertical locker jamb.

- H. **RECESSED HANDLES (ADA Compliant) - Tiered Lockers:** A non-protruding 14 gauge "lifting trigger" and slide plate shall transfer the lifting force for actuating the lock bar when opening the door. The exposed portion of the lifting trigger shall be encased in a molded ABS thermoplastic cover that provides isolation from metal-to-metal contact and be contained in a formed 20 gauge stainless steel pocket. This stainless steel pocket shall contain a recessed area for the various lock types available and a mounting area for the number plate. The "lifting trigger" shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching or twisting of the wrist to operate.

-OPTION: Turn Handle: Tiered athletic lockers can also be equipped with an externally mounted turn handle compatible with both padlocks and built-in dead bolt locks.

- I. **HINGES:** Hinges to be 2" high, 5-knuckle, full loop, tight pin style, securely welded to frame and double riveted to the inside of the door flange. Hinges are attached with two rivets. Locker doors 42" high and less shall have two hinges.

Doors over 42" high shall have three hinges. An extra hinge shall be provided on 24" wide Heavy Duty Ventilated single and double tier doors.

- J. **BODY:** Locker body components shall be made of cold rolled steel specially formed for added strength and rigidity and to ensure tight joints at fastening points. 16 gauge side uprights are perforated with diamond-shaped openings 3/4" wide by 1-1/2" high for maximum ventilation. Locker backs shall be 18 gauge steel with right angle flanges on each vertical side for stiffness, ease of assembly, and to provide corner rigidity. Tops, bottoms, shelves and compartment dividers shall be 16 gauge steel, fully flanged on all sides for added stiffness. Shelves shall have an additional return flange on the front edge creating a channel shape to rigidize the impact surface. All body parts are finished in the same color selected for doors and frames.

ALTERNATE: All Welded Ventilated Lockers: Locker back shall be fabricated from 16 gauge cold rolled sheet steel and formed in combination with the 16 gauge upright to provide a one piece uniform structure.

- K. **INTERIOR EQUIPMENT:** Single tier lockers over 42" high shall have one hat/book shelf located 10" below top of locker. Other tiered lockers do not require shelves. All single, double and triple tier lockers shall have one double prong rear hook and two single prong side hooks in each compartment. All hooks shall be made of steel, formed with ball points, zinc-plated and attached with two bolts or rivets. Locker openings under 20" high are not equipped with hooks.

- a. At **ADA Compliant Lockers:** Locate hat/book shelf no more than 48" A.F.F. for maximum reach requirement. Add a lower shelf no lower than 15" A.F.F. for minimum reach requirement. One double prong rear hook and two single prong side hooks shall be located within the above mentioned reach requirements. Locker openings under 20" high are not equipped with hooks.

- L. **NUMBER PLATES:** Each locker shall have a polished aluminum number plate with black numerals not less than 1/2" high. Plates shall be attached with rivets to the lower surface within the recessed handle pocket.
- M. **COLOR:** Lockers shall be finished in colors selected from Republic's collection of twenty-five baked enamel colors.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Lockers must be installed in accordance with manufacturer's approved drawings and assembly instructions. Installation shall be level and plumb with flush surfaces and rigid attachment to anchoring surfaces.
- B. Space fasteners at 24" O.C. or less as recommended by manufacturer. Use fasteners appropriate to load and anchoring substratum. Use reinforcing plates wherever fasteners could distort metal.

- C. Various trim accessories where shown, such as sloping tops, fillers, bases, recess trim, etc., shall be installed using concealed fasteners. Flush, hairline joints shall be provided at all abutting trim parts and at adjoining surfaces.

3.02 ADJUSTMENT

- A. Upon completion of installation, inspect lockers and adjust as necessary for proper door and locking mechanism operation.

3.03 QUALITY ASSURANCE

- A. Republic reserves the right to modify the design and/or change specifications or colors/finish consistent with our policy of product excellence.

Note: For user safety, all Republic lockers must be secured to the wall and/or floor prior to use.

END OF SECTION

SECTION 10 56 13**METAL STORAGE SHELVING****PART 1: GENERAL****1.01 SCOPE:**

- A. Included: Perform all work necessary and required to complete construction as indicated. Such work includes installation and anchorage of the metal shelving units as shown and noted on the drawings and specified herein.

1.02 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01300.
- B. Product Data: Submit manufacturer's specifications and installation instructions. Include methods of installation for supporting structure.
- C. Shop Drawings: Submit shop drawings for special components and application conditions of units which are not fully dimensioned or detailed in manufacturer's product data. Show relationships to adjoining work.

1.03 DELIVERY:

- A. Do not deliver units until building is enclosed and ready for installation. Protect from damage during delivery, handling, storage and installation.

PART 2: PRODUCTS**2.01 MANUFACTURER AND TYPE:**

- A. Subject to compliance with requirements, provide products by one of the following:

- Lyon Metal Products
 - Penco Products
 - Republic Storage Products

- B. Type: Steel, clip-type.

- C. Size:

- 1. Loft Storage (#230): 3' wide x 7' high x 24" deep, 7 shelves.
 - 2. School Supplies Room (#214): 3' wide x 7' high x 18" deep, 7 shelves.

2.02 MATERIALS:

- A. Materials -Roll-formed "T" uprights - hot rolled steel of gauges specified. Other

sheet steel - cold-rolled and hot-rolled and of gauges specified.

- B. "Box Post" Uprights - all post shall be punched on 1-1/2" centers to accept either clip attachment or bolt attachment. Each upright shall consist of two 14-gauge, hot-rolled, formed steel "box posts" 1-3/4" x 1-13/16" with two 4-11/16" x 12-gauge ladder braces on uprights of 96" or less. 120" and 144" uprights require three ladder braces.
- C. Shelf Clips - 12 gauge, hot-rolled, one-piece construction, with the 65160 integration clip. Four shelf clips used with each shelf.
- D. Shelves: 18-gauge with front and rear flanged down not less than 1-11/64" with return flange of not less than 3/8" at approximately 10 degrees, and punched to accommodate label holder and accessories. Ends are to be flanged not less than 1-11/64" with a 90-degree return flange of not less than 5/8". All corners lapped and welded. All shelves punched on 3' centers for divider adjustment. Shelves punch at four corners for bolting to uprights. The front and rear flanges are to be embossed with "18 GA."
- E. Lateral Cross Braces - 1" x 12-gauge band formed and punched at each end to bolt to upright post. One pair of lateral cross braces -used with every three shelving sections with shelf spacing less than 30". Shelving sections with 30" or greater shelf spacings - two pairs of lateral cross braces with every three shelving sections.
- F. Backs - two half panels of heavy gauge steel providing a total of three vertical rows of holes on 1-1/2" centers for attachments to shelves with back to shelf clips optional and with three screws at the top and bottom shelves, tow at midpoint.
- G. Label Holders -24-gauge steel, friction type with 7/8" inside dimension, and attached to shelves with three spring fasteners.
- H. Bases - channel shaped with ends constructed to engage upright "T's" and lock in place with a spring fastener. 3" high base - heavy gauge steel and 6" high bases shall be heavy gauge.

PART 3: EXECUTION

3.01 INSTALLATION:

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.

Anchor each shelving unit to wall and floor with approved fastenings such as lag screws,

or drive-ins, applied through suitable reinforcing plates. Fastening shall not exceed 32 inches on center.

END OF SECTION

SECTION 10 75 00**FLAGPOLES****PART 1 - GENERAL**

1.01 REFERENCE

- A. Requirements in Addenda, Alternates, Conditions and Division 01 collectively apply to this work.

1.02 DESCRIPTION

- A. Principal Work Items Are:
 - a. Flagpole; complete assembly.
- B. Related Work Specified Elsewhere:
 - 1. Concrete Base: Section 03 30 00 – Cast-in-place Concrete.

1.03 SUBSTITUTIONS

- A. Subject to the provisions of Section 01 25 00 – Substitution Procedures.

1.04 QUALITY ASSURANCE

- A. Design Criteria; Wind Loadings: Flagpole, base, foundation and anchoring devices to be designed to resist a 90 mph velocity minimum. Design for high loading where local Code wind charts indicate stronger winds.
- B. General: All parts to conform to Division of State Architect requirements.

1.05 SUBMITTALS

- A. Shop Drawings: Subject to the provisions of the General Conditions – Submittal Procedures.
- B. Calculations; two Copies: Provide when specifically requested by the District.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver in factory protective packaging. Store and handle to prevent damage.

1.07 JOB CONDITIONS

- A. Sequencing, Scheduling: Coordinate with related work of other Sections. Furnish foundation anchors to Concrete Section for setting.

PART 2 - PRODUCTS**2.01 MANUFACTURERS**

- A. General: Provide flagpole as a complete unit, including base, anchor devices and all equipment and accessories.
- B. Flagpole:
1. Type: Cone tapered aluminum.
 2. Material: 6063-T6 alloy, seamless extruded aluminum tubing, satin brushed; 30,000 psi ultimate tensile strength.
 3. Dimensions:
 - a. Exposed Height: 35'.
 - b. Embedment Length Into Foundation Sleeve: As required to resist wind loading and all other forces; but in no case less than 10% of the exposed pole height. See Contractor's option for anchor bolt type mounting.
 - c. Butt Diameter: 7" minimum.
 - d. Top Diameter: 3.5, nominal.
 - e. Wall Thickness: .138" minimum.
 - f. Taper: 1" per 5.5.
 4. Finish: Clear satin anodized, similar to Alcoa 204-R1.
 5. Joints: Poles to be one-piece wherever possible. Any joints must be internal sleeve splice type, self-aligning, with tight hairline joint.
- C. Equipment and Accessories: Provide for each pole.
1. Ball: 6" diameter; aluminum with flush seam, satin anodized gold color finish; mounted on 1/2" minimum diameter threaded rod screwed into truck.
 2. Revolving Double Truck: Cast aluminum, non-fouling; revolving on ball bearings; with two 2 3/8" diameter sheaves.
 3. Halyard: Provide one.
 - a. Cable: Stainless steel wire, with plastic coating.
 - b. Flag Snap Hooks: Chrome-plated bronze swivel type, with nylon covers. Provide four (for two flags.)
 4. Cleat: 9" standard aluminum. Provide one.
 5. Halyard Box (Cleat Cover): Cast aluminum, finish to match pole; tamper proof hinge; with hasp and staple for padlock.
 6. Base Flash Collar: Aluminum; match pole finish; size to cover pole foundation anchorage completely.
- D. Foundation System:
1. Sleeve Type:

- a. Sleeve: 16 gauge galvanized steel, with welded steel base plate and centering wedges; and setting plate.
 - b. Hardwood Wedges: For temporary centering of pole; four required.
 - c. Sand: Clean, fine, and dry.
 - d. Grout, Non-Shrink: Por-Rok, or Masterflow No. 713
 - e. Grounding Provisions: metal spike welded to sleeve; or separate spike and No. 6 bare copper wire connecting spike and sleeve.
2. Anchor Bolt System: Contractor may, at his option and expense, provide a welded base plate on pole and steel anchor bolt system (four bolts minimum), designed to resist all loads.
- E. Acceptable Manufacturers and Products: Standard products by the following manufacturers, conforming to the above Specifications, will be acceptable:
1. Outdoor Products Co., San Jose, California.
 2. Hortie-Van Manufacturer Co., Pasadena, California.
 3. American Flagpole.
 4. Baartol Co., Inc.
 5. Concord Industries, Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Erect complete; install in concrete base, plumb and securely fastened; with all parts; and grounded for electrical discharge.
1. Foundation Sleeve System: Install pole in sleeve; plumb pole using wedges. Fill void between pole and sleeve with sand, placed in layers and tamped or vibrated to compact it thoroughly. Remove wood wedges and fill top 2" with non-shrink grout.
 2. Install base flash collar. Check and adjust all parts for proper operation.

END OF SECTION

SECTION 10 80 00
TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.01 REFERENCE

- A. Requirements in Addenda, Alternates, Conditions, and Division 01 collectively apply to this work.

1.02 DESCRIPTION

- A. Principal Work Items Are.
 - 1. Grab bars.
 - 2. Mirrors.
 - 3. Toilet paper dispensers.
 - 4. Toilet seat cover dispensers.
 - 5. Paper towel dispensers.
 - 6. Soap dispensers.
 - 7. Sanitary napkin-tampon vendors and disposal.
 - 8. Shower seats.
 - 9. Baby changing station
 - 10. Special needs changing table
- B. Related Work Specified Elsewhere:
 - 1. Section 10 28 13.13 – Electric Hand Dryers
 - 2. Section 10 16 00 – Toilet Compartments
 - 3. Division 22 - Plumbing

1.03 SUBSTITUTIONS

- A. Only written approval of the District will permit substitutions for materials specified. Refer to Section 01 25 00 – Substitution Procedures.

1.04 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Conform to State Handicapped Regulations.

1.05 JOB CONDITIONS

- A. Sequencing, Scheduling: Coordinate work with related work of other Sections. Verify types of backing prior to installation of items.

PART 2 - PRODUCTS**2.01 MANUFACTURERS****A. Acceptable Manufacturers and Products:**

1. Bobrick Washroom Equipment, Inc., as a standard of quality.
2. Other Manufacturers:
 - a. American Dispenser Company.
 - b. Accessory Specialties.
 - c. Bradley. D. Hallmack.
 - d. Parker.
 - e. Watrous.
 - f. Georgia Pacific.
 - g. BayWest.

B. Retain "Manufacturers" Paragraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.**C. Items supplied by District need to comply with CBC 11B-307.2****2.02 ITEMS**

1. Soap Dispenser: District Supplied, Contractor to install
2. Paper Towel Dispenser: District Supplied, Contractor to install
3. Toilet Paper Dispenser: District Supplied, Contractor to install
4. Seat Cover Dispenser: District Supplied, Contractor to install
- 5a. Grab bars: Bobrick B-490 x 42" (1 -1 /4" diameter).
- 5b. Grab bars: Bobrick B490 x 36" (1 -1 /4" diameter).
- 5c. Grab bars: Bobrick B-68137 (showers only).
- 6a. Mirrors: Bobrick B-1658 (Staff & Faculty restrooms only).
- 6b. Mirrors: Bobrick B-1556 1830.
- 7a. Recessed sanitary napkin-tampon vendor: Bobrick B-3706.
- 7b. Surface-mounted sanitary napkin-tampon vendor: Bobrick B-2706.
8. Folding shower seat: Bobrick B-5181 or B-5191 (as required).
9. Shower curtain rod: Bobrick B-6047 (length as required).
10. Mop and broom holder: Bobrick B-223 x 36" (four holders).
11. Electric hand dryers, refer to Spec Section 10 28 13.13 for staff
12. Electric hand dryers, student restrooms B-7128 110v
13. Baby changing station: Koala KB200 Horizontal Surface Mounted
14. Special needs changing table: Max-Ability Pressalit Care 3000. 75" length - Model #R8528021 Fixed height w/ safety rail
15. Heavy Duty Soap Dish and Bar: Bobrick B-4290
- 16a. Partition-mounted sanitary napkin disposal: Bobrick B-354.
- 16b. Surface-mounted sanitary napkin disposal: Bobrick B-270.

2.03 PLACEMENT LOCATIONS

- A. At sink locations in the Art & Tech Labs, Science Labs, Prep Rooms, Librarian Office, Staff Lounge, Kitchens, Snack Bars, Laundry Areas and wherever shown on the drawings.
1. Soap dispensers-#1
 2. Paper towel dispensers-#2
- B. Staff Restrooms
1. Men's:
 - a. Grab bars-#5a & #5b.
 - b. Mirrors-#6a.
 - c. Toilet tissue dispenser-#3
 - d. Soap dispensers-#1
 - e. Toilet seat cover dispenser-#4
 - f. Hand dryer-#11
 2. Women's:
 - a. Grab bars-#5a & #5b.
 - b. Mirrors-#6a.
 - c. Toilet tissue dispenser-#3
 - d. Soap dispensers-#1
 - e. Toilet seat cover dispenser-#4
 - f. Hand dryer #11
 - g. Sanitary napkin disposal #16a or 16b (one per stall).
 - h. Sanitary napkin-tampon vendor #7a or 7b.
- C. Student Restrooms
1. Boy's:
 - a. Grab bars-#5a & #5b.
 - b. Mirrors-#6a.
 - c. Paper towel dispenser-#2
 - d. Toilet tissue dispenser-#3
 - e. Soap dispensers-#1
 - f. Toilet seat cover dispenser-#4
 2. Girl's:
 - a. Grab bars-#5a & #5b.
 - b. Mirrors-#6a.
 - c. Paper towel dispenser-#2.
 - d. Toilet tissue dispenser-#3
 - e. Soap dispensers-#1
 - f. Toilet seat cover dispenser-#4
 - g. Sanitary napkin disposal #16a or 16b (one per stall).
 - h. Sanitary napkin-tampon vendor #7a or 7b.

- D. Janitor Rooms
 - 1. Mop and broom holder #10.

- E. Various Locations per drawings
 - 1. Baby changing station #13: Multi-Use C130 & C131, C140 & C141.
 - 2. Special needs changing table #14: Admin A128 & A231

- F. Shower Areas
 - 1. Folding shower seat #8.
 - 2. Grab bars #4c.
 - 3. Shower curtain rod #9.
 - 4. Recessed soap dish #15

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Anchorage: Securely anchor all items into solid backing with manufacturer recommended suitable attachments, Phillips-head typical.
 - 2. Mounting Heights: Conform to handicapped requirements for each particular items installed in areas serving the handicapped. Refer to construction drawing.

- B. Toilet Accessory Schedule (refer to drawings):
 - 1. Install scheduled items at locations indicated on drawings. Use manufacturer recommended anchor plates.
 - 2. At toilet partitions, use Bobrick 258 Series anchor plates for single grab bar installations.

- C. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

- D. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION

SECTION 11 06 20**STAGE CURTAINS****PART 1 - GENERAL****1.01 SECTION INCLUDES:**

- A. Extent of each type of stage curtains is shown on drawings.
- B. Types of stage curtains specified in this section include the following:
 - 1. Valance
 - 2. Stage curtain

1.02 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01 33 00.
- B. Product Data: Submit manufacturer's specifications, installation instructions, and general recommendations, including data which substantiates that materials comply with requirements.
- C. Certification: Submit manufacturer's certification that stage curtains comply with requirements for flame resistance.
- D. Samples: Submit two 12 inch square samples of each fabric and color required.

1.03 QUALITY ASSURANCE:

- A. Fabricator/Installer Qualifications: Firm with not less than five years of successful experience in fabrication and installation of stage curtains similar to those required for this project.
- B. Flame Resistance: Provide stage curtains which are certified to be flame resistant in accordance with requirements of NFPA 701. Permanently attach label to each curtain indicating whether curtain is permanently and inherently flame resistant, or whether it will require retreatment after dry cleaning.

1.04 PROJECT CONDITIONS:

- A. Field Measurements: Verify stage curtain openings and dimensions of other construction by field measurements before fabrication and indicate measurements on Shop 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 opening and construction dimensions and proceed with fabricating stage curtains without field measurements. Coordinate construction to ensure that actual opening and construction

dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.01 CURTAIN FABRICS:

- A. Woven Cotton Velour: Napped fabric of 100 percent cotton; 54 inch width minimum; not less than 40 backing ends per inch, 40 pile ends per inch, and 32 picks per inch; 640 pile tufts per square inch; fully flameproofed, fabricated with nap down; other characteristics as follows:
 - 1. Heavy Weight: Fabric weighing not less than 25 ounces per linear yard before flameproofing, with pile height of approximately 125 mils.
 - 2. Colors: As selected by Architect.
 - 3. Manufacturer: KM Fabrics, Rose Brand, Valley Forge or approved equal.
- B. Lining: Yarn-dyed denim cloth of 100 percent cotton; woven in a warp-faced twill; 54-inch minimum width.

2.02 METAL PRODUCTS

- A. Steel Pipe: ASTM A 53, Grade A, black, standard weight (Schedule 40), 1-1/2 inch nominal diameter, unless otherwise indicated.
- B. Straight Curtain Tracks:
 - 1. Steel Tracks, General: Fabricate of not less than 14 gage galvanized roll-formed steel, with continuous bottom slot and with each half of track in one continuous piece.
 - a. Provide curtain carriers for track spaced at 12 inches o.c.
 - 2. Heavy Duty Track: Equip track with live end double pulley and dead end single pulley, with 4 inch nominal cast iron wheels on ball bearings, enclosed in steel housing. Provide curtain carriers of molded nylon with pair of polyethylene, ball-bearing wheels riveted parallel to body. Equip carriers with neoprene or rubber bumper, heavy duty swivel eye and trim chain for attachment of curtain snap or "S" hook. Provide end stops for track and adjustable floor block designed to maintain proper tension on 3/8 inch stretch-resistant operating line of braided black polypropylene or fiberglass center cord.
 - 3. Products/Manufacturers: Provide one of the following:
 - a. Atlas Silk Model No. 4185 complete; H & H Specialties, Inc., (213) 283-3562.
 - b. Silent Steel Model No. 281 complete; Automatic Devices Company, (818) 503-10596.
 - c. Tru-Roll Products, Model 1000 complete; Tru-Roll, Inc., (818) 240-4835.

- C. Chain: FS RR-C-271, Type II, Class 2 weldless, double-loop steel pattern chain, not less than No. 6/0, 0.192 inch thickness.
- D. Bolts and Fasteners: Manufacturer's standard corrosion resistant units, unless otherwise indicated.

2.03 CURTAIN FABRICATION

- A. General: Affix permanent label, stating compliance with requirements of authorities having jurisdiction, in accessible location on curtain not visible to audience. Provide vertical seams, unless otherwise indicated. Arrange vertical seams so they do not fall on faces of pleats. Do not use fabric cuts less than half width.
 - 1. Vertical Hems: Provide vertical hems not less than 2 inches wide, with not less than a 1-inch tuck, and machine-sewn with no selvage material visible from front of curtain. Sew open ends of hems closed.
 - 2. Leading Edge Turnbacks: Provide turnbacks formed by folding not less than 12 inches of face fabric back, with not less than 1-inch tuck, and secured by sewing turnbacks vertically.
 - 3. Top Hems: Reinforce top hems by double-stitching 3-1/2 inch wide, heavy jute webbing to top edge with not less than 2 inches of face fabric turned under.
 - 4. Pleats: Provide 50 percent fullness in curtains, exclusive of turnbacks and hems, by sewing additional material into 3-inch double-stitched box pleats space at 12 inches o.c. along top hem reinforcement.
 - 5. Grommets: Brass, centered on box pleats and 1 inch from corner of curtain, for S-hooks.
 - 6. Bottom Hems: For curtains that do not hang to the floor, provide hems not less than 3 inches (75 mm) deep with 3/4-inch (19 mm) weight tape. For floor-length curtains, provide hems not less than 6 inches (150 mm) deep with 1-inch (25-mm) weight tape. Sew open ends of hems closed.
- B. Velour Curtains: Fabricate with the fabric nap down.
- C. Lining: Provide lining for each curtain in same fullness as face fabric, and finished 2 inches shorter than face fabric. Attach lining to face fabric along bottom and side seams with 4-inch long strips of heavy woven cotton tape.
- D. S-Hooks: Track manufacturer's heavy-duty plated wire hooks.
- E. Tie Lines: Braided soft cotton, black or white to best match curtain; not less than 5/8 inch wide by 36 inches long.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Installer must examine areas and conditions under which stage curtains are to be installed and must notify Contractor in writing of conditions detrimental to proper

and timely completion of work. Do not proceed with installation until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 PREPARATION

- A. Furnish layouts for clips, or other supports required to be installed by other trades for support of tracks and battens.

3.03 INSTALLATION:

- A. General: Install materials in accordance with manufacturer's printed instructions and recommendations, and to comply with governing regulations.
- B. Ceiling-Mounted Tracks: Drill track at intervals not greater than manufacturer's written instructions for spacing, and fasten directly to structure.
 - 1. Heavy Duty Track: Do not exceed 72 inches between supports.
 - 2. Install track for center-parting curtains with not less than 2'-0" overlap of track sections at center, supported by special lap clamps.
- C. Curtains and Valance:
 - 1. Track-Hung: Secure curtains to track carriers with track manufacturer's special heavy duty "S" hooks or snap hooks.
 - 2. Batten Hung: Secure valance to pipe battens with tie lines.

END OF SECTION

SECTION 11 31 00
RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes appliances for:
1. Nurse's Office
 - a. Undercounter Refrigerator
 2. Staff Lounge
 - a. Dishwasher
 - b. Disposal/Air Switch
 - c. Refrigerator

1.02 SUBMITTALS

- A. Per Spec the General Conditions – Submittal Procedures.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

1.04 WARRANTY

- A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
1. Warranty Period: One year from date of Final Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Basis-of-Design Product is GE Appliances: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
1. Amana; a division of Whirlpool Corporation.
 2. KitchenAid.
 3. Sears Brands LLC (Kenmore).
 4. Whirlpool Corporation.
 5. B. Substitutions will be evaluated per Spec Section 01 25 00 – Substitution Procedures.

2.02 UNDERCOUNTER REFRIGERATOR/FREEZERS

- A. GE Compact Refrigerator Model #GMR04HASC.

2.03 DISHWASHERS

- A. Dishwasher GE Built-In Dishwasher Model # GLDT696DSS.

2.04 REFRIGERATOR/FREEZERS

- A. GE Energy Star 22.1 Cu. Ft. French-Door Refrigerator Model #GNE22GSESS

2.05 GARBAGE DISPOSER

- A. Garbage Disposer GE 1/2 Horsepower Continuous Feed Disposer model no. GFC535V
- B. Air Switch - Sink Top Switch Basis-of-Design Product is InSinkErator model no. STS-00 w/ Satin Nickel finish.

PART 3 - EXECUTION**3.01 INSTALLATION, GENERAL**

- A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- C. Utilities: Comply with plumbing and electrical requirements.

3.02 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.

4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- C. Prepare test and inspection reports.

END OF SECTION

SECTION 11 40 00
FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Foodservice equipment work as indicated on the drawings and by equipment schedule at the end of this section.
- B. Drawings, the provisions of the Agreement, the General Conditions, and the Division 1 specification sections apply to all work of this Section.
- C. Substitutions: Substitute products will be considered only under the terms and conditions of Division 1.
- D. Substitutions: Proposals for alternate products and methods for applications indicated may be considered by the Architect, subject to requirements of Division 1, system performance requirements and applicable PART 1 requirements of this Section.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For fabricated equipment. Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For foodservice facilities.
 - 1. Indicate locations of foodservice equipment and connections to utilities.
 - 2. Key equipment using same designations as indicated on drawings.
 - 3. Include plans and elevations; clearance requirements for equipment access and maintenance; details of equipment supports; and utility service characteristics.
- B. Equipment Spec Books: Submit six spec books in hardcover binder. Insert spec sheets in order of list of kitchen equipment shown in written specifications and labeled with the appropriate item number. Highlight accessories and voltages as appropriate on the spec sheets. If factory spec sheets are not available, indicate relevant information (size, plumbing requirements, and electrical requirements) on white sheet. Gather spec sheets from the Owner for Owner supplied equipment and insert in spec book.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Manuals: Submit three sets in hardcover binders with the project address and "Foodservice Operation & Maintenance Manuals" on the front and edge of binder. Include information from each piece of equipment with electrical or gas connections. Information should include operation instructions, cleaning and maintenance instructions, parts listing if available, list of service agencies (names, addresses and phone numbers) authorized to repair the equipment, voltage, gas type, refrigerant used, serial number and copies of the warranties. List should be sorted alphabetically by manufacturer.

1.5 QUALITY ASSURANCE

- A. 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.
- B. Work and materials must be in full accord and when appropriate, shall be listed with following agencies:
1. Local Health Department
 2. National Sanitation Foundation (N.S.F.)
 3. Underwriters Laboratories (U.L.) and ETL equivalent.
 4. American Gas Association (A.G.A)
 5. N.F.P.A. - latest edition, for exhaust system.
- C. Qualifications
1. Kitchen Equipment Contractor (KEC) and its sub-contractors to have at least five (5) years experience in this type of work. Upon request provide at least three references for jobs of similar size and content.
 2. Commercially manufactured equipment is not acceptable unless evidence is furnished that similar equipment has been operating successfully in a minimum of three (3) installations (excluding testing laboratories, field testing, or prototypes) for at least one (1) year.
 3. Commercially manufactured equipment will be reviewed based on submittal data provide on manufacturer's literature and/or manufacturer's shop drawings for prime alternate or substituted items. Failure of the equipment to meet the capacity, operation, size, utility and production as submitted will result in the rejection of the equipment regardless of disclaimers.
 4. Custom-fabricated equipment shall be manufactured by a foodservice equipment fabricator with a least five (5) years experience in this type of work, who has the plant, personnel, and engineering facilities to properly design, detail and manufacture high quality foodservice equipment.
- D. Regulatory Requirements: Install equipment to comply with the following:
1. ASHAE 15, "Safety Code for Mechanical Refrigeration."
 2. NFPA 54, "National Fuel Gas Code."
 3. NFPA 70, "National Electrical Code."
 4. NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations."

5. Where provided, check-out aisles, sales counters, service counters, food service lines, queues, and waiting lines shall comply with **CBC Sections 11B-227 and 11B-904.**
 6. The top of tray slides shall be 28" minimum and 34" minimum above the finish floor or ground.
 7. Spaces and elements within food service employee work areas shall only be required to comply with **CBC Section 11B-203.9.**
- E. Seismic Restraints: Comply with SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines," Appendix A, "Seismic Restraint Details," unless otherwise indicated.

1.6 WARRANTY

- A. All equipment shall be fully guaranteed against defects in workmanship and material for one (1) year after Owner's final acceptance. Refrigeration Compressors shall be fully guaranteed for five (5) years. All repairs and replacement shall be made without charge to the Owner. Guarantee period shall commence with the first usage of the equipment for the intended purpose after final acceptance.

1.7 START-UP DEMONSTRATION AND MANUALS

- A. Provide factory-trained personnel for start-up and demonstration of equipment. Demonstration shall be done in two stages: One for operation and the second for maintenance personnel.
- B. Return to the job site within 10 days for final adjustment and calibration of equipment.
- C. Furnish service parts manuals as well as maintenance manuals for all equipment provided.
- D. Prepare list of service agencies authorized by the manufacturer to service its equipment. Include the name of the person to contact and a telephone number.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS OF FABRICATION

- A. Fabrication shall conform to general acceptance of the foodservice industry.
- B. Fabrication shall meet or exceed National Sanitation Foundation standards including the latest editions and revisions.

2.2 MATERIALS

- A. Stainless Steel (S/S): Stainless steel shall be of U.S. Standard-gauges as indicated, but not less than 18-gauge or as noted, Type 304 with No. 4 finish.
- B. Galvanized Steel: Galvanized steel shall be of 14-gauge and shall be electro galvanized. Galvanized steel shall be used in non-exposed areas, areas which have not contact with food for food serving items, and in framework, when used in framework, galvanized steel shall be all welded construction.
- C. Plastic Laminate (PL):
 - 1. Shall be Formica, Parkwood, LamiArt, or approved equal.
 - 2. Shall be veneered with approved waterproof and heatproof cement. Rubber base adhesives are not acceptable.
 - 3. Shall be applied directly over 3/4" plywood.
 - 4. Exposed faces and edges shall be faced with 1/16" thick material. Corresponding backs shall be covered with approved backing and balancing sheet material.
- D. Solid Surface Material (SSM):
 - 1. Shall be Granite, Caesarstone, Silestone or approved equal and installed over 3/4" plywood or metal bases. Provide air space, trim, and/or insulation around any heat or cold producing equipment to guard against discoloration and cracking.

2.3 METAL TOP CONSTRUCTION

- A. Metal tops shall be one-piece 14-gauge welded construction, including field joints. Secure to a full perimeter galvanized steel channel frame cross-braced not farther than 30 inches on center. Fasten top with stud bolt or tack welds.

2.4 ENCLOSED CABINET BASES

- A. Bases shall be fabricated from not less than 18-gauge steel reinforced by forming the metal ends and shelves. Partitions shall be all stainless steel. The ends and vertical partitions may be of single wall construction, with a 2-inch face, all partitions and sides shall be welded in the intersection and flush with the bottom.

- B. Unexposed backs and structural members may be constructed of galvanized steel.
- C. Intermediate shelves shall be removable, except the bottom shelf when the cabinet is on legs. When the cabinets is on a masonry base, the bottom shelf shall be removable to all access for cleaning.

2.5 LEG AND CROSS RAILS

- A. Legs and cross railings shall be 1-5/8", 16-gauge stainless steel tubing. All cross rails shall be continuously welded, ground and polished. Tack welds or other methods of connection are not acceptable. Bottoms of legs shall be wedged inward and fitted with a stainless steel bullet type foot with not less than 2" adjustment. Freestanding legs shall be pegged to floor with 1/4" stainless steel rod.
- B. Stainless steel gussets shall be not less than 3" diameter at top and 3-3/4" long. Outer shell 16-gauge stainless steel reinforced with 12-gauge mild steel inserts welded interior shell. Gussets shall be large enough to accommodate 1-5/8" tube with provision for Allen screw fastener.
- C. Low counter legs shall be constructed of stainless steel exterior of 5-3/4" minimum height or 7" maximum height with 3-1/2" inch square plate with four countersunk holes, welded to top for fastening.
- D. Adjustable foot shall be constructed of stainless steel 1-1/2" diameter tapered at the bottom to 1" diameter, fitted with threaded cold rolled rod for minimum 1-1/2" by 3/4" threaded busing plug welded to legs.
- E. When legs are fastened to equipment, the following methods should be used:
 - 1. Sinks: Reinforced with bushing and set screws.
 - 2. Metal Top Table or Dishtable: Welded to galvanized steel frame of 14-gauge or more and secure to the top with screws through slotted holes.
 - 3. Wood or Composition Top: A welded stainless steel channel of not less than 14-gauge, secured to the top with screws through slotted holes.

2.6 SHELVES

- A. When shelves are part of the fixture, the following shall take place:
 - 1. Open base type shelf shall be notched around the leg and continuously welded to the leg.
 - 2. Cabinet base type shelf shall be turned up on the back side a minimum of 1/4" radius and further slightly to insure a tight fit to enclosure panels.
- B. Wall shelves shall be one-piece 16-gauge welded construction, including field joints. Secure to walls with 14-gauge s/s brackets at 36" on-center maximum spacing.
- C. Overshelves shall be one-piece 16-gauge welded construction, including field joints. Secure to 1" s/s tubular supports at 60" on-center maximum spacing attached to counter tops.

2.7 SINKS

- A. When multiple compartments are part of the design, they shall be continuous on the exterior without applied facing strips or panels. Bottom of each compartment shall be creased such as to ensure complete drainage to waste opening.
- B. Partitions between compartments shall be double thickness, continuous, and welded.
- C. Where sink bowls are exposed, the exterior shall be polished to a number 4 finish.
- D. Fabricator shall provide drains, wastes, and faucets as indicated on drawings, or itemized specifications.

2.8 OTHER FABRICATED COMPONENTS

- A. Casters:
 - 1. Shall be heavy-duty type, ball bearing, solid or disc wheel with non-marking greaseproof rubber, neoprene or polyurethane tire.
 - 2. Wheel shall be 5" diameter, minimum width of tread 1-1/2", with a minimum capacity per caster of 250 pounds.
 - 3. Solid material wheels shall be provided with stainless steel rotating wheel guards.
 - 4. Shall be sanitary, have sealed wheel and swivel bearing and polished plate finish.
- B. Doors:
 - 1. Metal doors shall be double cased stainless steel. Outer pans shall be 18-gauge stainless steel with corners welded, ground smooth, and polished. Inner pan shall be 20-gauge stainless steel fitted tightly into outer pan with a sound deadening material such as Celotex or Styrofoam used as a core. The two pans shall be tack welded together and joints solder filled. Doors shall finish approximately 3/4" thick and be fitted with flush recessed type stainless steel door pulls.
 - 2. Sliding doors shall be mounted on large, quiet ball bearing rollers in 14-gauge stainless steel overhead tracks and be removable with the use of tools. Bottom of cabinet shall have stainless steel guide pins and not channel tracks for doors.
 - 3. Wood doors shall be fabricated as detailed. If Formica or other plastic surfaces are used, all sides shall be laminated.
 - 4. Hinged doors shall be mounted on heavy-duty NSF approved hinges, or as noted on plans or specifications.
- C. Hardware:
 - 1. Shall be solid, heavy-duty type.
 - 2. Door hardware shall be locking type, keyed and master keyed.
 - 3. Shall be identified with manufacturer's name and number so that broken or worn parts may be replaced.
 - 4. Submit samples for approval, when requested.
 - 5. Pulls shall be Component Hardware or equal.

D. Drawer Assemblies:

1. Assemblies shall consist of removable drawer body mounted in a ball bearing slide assembly and padlock assembly.
2. Slide assembly consists of one pair of roller bearing extension slides with side and back enclosure panels, front space angle, two drawer carrier angles secured to slides and stainless steel front.
3. Slides shall be 250-pound capacity made by Component Hardware or equal.
4. Drawer bodies for general storage shall be 20" x 20" with Royalite containers.
5. Drawers intended to hold food products shall be removable type with 12" x 20" stainless steel food pan.
6. Drawer fronts are double case 3/4" thick, with 18-gauge stainless steel welded and polished front pan. Steel back pan is tightly fitted and tacked welded. Sound deadened with rigid insulation.
7. All drawers shall be provided with replaceable soft neoprene bumpers or, for refrigerated drawers, a full perimeter soft gasket.

2.9 FABRICATED WORKMANSHIP

- A. Items of specially fabricated equipment shall be fabricated by an acceptable manufacturer, which is NSF approved and fabricated in an approved manner to the complete satisfaction of the Owner.
1. Welding and Soldering:
 - a. Materials 18-gauge or heavier shall be welded.
 - b. Seams and joints shall be shop welded or soldered as the nature of the material may require.
 - c. Welds shall be ground smooth and polished to match original finish.
 - d. Where galvanizing has been burned off, the weld shall be cleaned and touched up with high-grade aluminum paint.
- B. Fasteners and Joints:
1. The following shall not be accepted:
 - a. Exposed screw or bolt heads.
 - b. Rivets.
 - c. Butt joints made by riveting straps under seams and then filled with solder.
- C. Rolled Edges: Rolled edges shall be as detailed, with corners bull nosed, ground and polished.
- D. Coved Corners: All stainless steel foodservice equipment shall have 1/2" or larger radius coves in all horizontal and vertical corners and intersections per NSF standards.
- E. Closures: Where ends of fixtures, backsplashes, shelves, etc. are open, fill by forming the metal, or weld sections, if necessary to close entire opening flush to walls or adjoining fixtures.

2.10 OPERATION REQUIREMENTS

- A. Insure quiet operation of foodservice and related equipment.
- B. Insure that bumper gaskets, stops, and any other needed protection is installed on all fabricated equipment as needed.

2.11 COLD STORAGE ROOMS.

- A. Pre-fabricated, pre-assembled, sectional, size and configuration as shown on plan, and as verified by field dimensions, with largest possible area provided.
- B. Check job site before installation of walk-in cooler/freezer to verify proper dimensions for all trim pieces.
- C. General:
 - 1. The urethane foam core of the panels shall be certified by Underwriter's Laboratories having tested and in accordance with UL Standard 723 (ASTM Standard E-84).
 - 2. The foam core of the panels shall be tested in accordance with ASTM Standard D-1929 to determine the self-ignition temperature.
 - 3. Panels shall be tested in accordance with ASTM Standards E-72, E-455 and E-564 for determination of the structural characteristics of the panel system.
 - 4. The foam insulation shall be tested in accordance with ASTM Standard C-177 to evaluate the insulation performance of the material.
 - 5. The urethane foam core must meet the Montreal Protocol for reduction of chlorofluorocarbons (CFCs).
 - 6. Certification of the above performance specifications must be provided by the indicated independent testing laboratory or by any other independent agency recognized by the major model building code agencies UBC, COCA, or the SBBC.
- D. Construction:
 - 1. Interior and exterior metal skins formed with steel dies and roll-forming equipment. The metal skins shall be placed into steel molds and liquid urethane injected between them. Urethane shall be foamed in place (poured, not frothed) and, when completely heat-cured, shall bond to the metal skins to form a rigid thick insulated panel.

2. Panels shall be equipped with "Cam-Lok" joining devices. The distance between locks shall not exceed 48-inches, or as specified. Press-fit caps shall be provided to close wrench holes.
 3. Exterior and interior finish per itemized specifications.
 4. Perimeter door heater shall be fitted with low-conductor, anti sweat heater wires, fully enclosed in metal, easily replaceable, for freezer compartments.
 5. All interior joints coved ¼-inch minimum radius.
 6. All conduit and switch/alarm J-boxes to be pre-installed in panel sections with recessed splice boxes at exterior ceiling panels.
 7. Doors:
 - a. Door to be 36-inch by 78-inch, hinged flush swing type door, or as specified/shown on plans, with 4-inch insulation same as panels. 14-inch by 24-inch view windows in all doors, heated on freezer doors. Interior and exterior to have 36-inch high diamond tread kick plate.
 - b. Chrome-plated positive door-latch and handle with interior safety release and mortise deadbolt lock assembly.
 - c. Three hinges per door, NSF-approved, chrome-plated, self-closing from a 90-degree open position, cam-action.
 - d. Hydraulic door closure equal to Kason 1094.
 - e. All doors accessing walk-ins are to have locks keyed alike.
 8. A heated relief port shall be provided at freezer to equalize the difference of pressure between the exterior and walk-in.
 9. 12-inch by 12-inch light fixtures with two (2) 100 watt lamps with base-plate and Lexan diffuser controlled by interior/exterior light switch (3-way or 4-way).
 10. Digital temperature alarm system, with constant "LED" read-out display, audio warning buzzer, and remote sensor, with high-low setting and twisted pair data capability, equal to Modular Corp. Model #75.
- E. Provide permanently mounted trim and closure panels (of material to match exterior panel surfaces) between top of compartments and finished ceiling; and closure strips between wall panels and architectural walls or columns.

2.12 REFRIGERATION SYSTEMS

- A. Provide all refrigeration work through licensed refrigeration contractors.
- B. All refrigeration items shall be designed to maintain the following operating temperatures:
- | | |
|-------------------------------|--------------|
| 1. Walk-in refrigerators | 35 degrees F |
| 2. Walk-in freezers | 0 degrees F |
| 3. Reach-in refrigerators | 35 degrees F |
| 4. Reach-in freezers | 0 degrees F |
| 5. Undercounter refrigerators | 35 degrees F |
| 6. Undercounter freezers | 0 degrees F |
| 7. Cold Pans | 0 degrees F |
- C. An evaporator coil defrost system must be provided by the Contractor on all walk-in refrigerators and freezer rooms operating at less than 35 degrees F.
- D. Hang blower coils per manufacturer's specifications with approved hangers at 4 inches from interior walk-in ceiling. Contractor shall provide a 12-gauge galvanized steel plate of suitable size and shape on the exterior roof of the walk-in box above the coil to support and spread the weight of the coil adequately.
- E. Drain line from freezers shall be wrapped with a continuous electrical heater tape and installed per manufacturer's suggested methods.
- F. Refrigeration tubing shall be Type L. ACR hard drawn degreased, sealed copper and shall be installed with horizontal runs sloped 1 inch per 20 feet towards the condensing units. All refrigerant piping shall be properly supported by adjustable hangers spaced and adjusted to the drop required. Where vertical runs of more than 5 feet occur in the suction line, the risers shall be trapped at the bottom. Piping is to be installed so that the refrigerant or oil cannot drain back into the coil from the suction line.

- G. All suction and refrigerant lines shall be insulated with minimum 1/2" Armstrong armafex or equal cellular type insulation. Metal pipe sleeves shall be provided where piping passes through walls, ceilings or floors. Space around the tubing shall be filled with mastic insulating compound. Install a permanent suction line filter in each compressor suction line with pressure fitting ahead of the filter to facilitate checking of the pressure drop through the filter. All penetrations through walk-in or freezer walls shall be fully insulated and sealed to be vapor tight to prevent condensation within any light fixtures, switch boxes, junction boxes, or any other fittings. Refrigeration and drain lines shall be fully sealed and provided with escutcheon plates by the installer per attached standard detail or better.
- H. Furnish and completely install a thermostat to control the refrigeration temperatures for each refrigeration compartment. Provided clear dial thermometers mounted flush with each compartment reading in both Fahrenheit and Centigrade.
- I. Control and thermostat wiring is the responsibility of the Contractor, not the electrical contractor. The electrical contractor will provide inter-wiring between the freezer condensing units and freezer blower coils as well as the main power to all disconnects on condensing units and racks.
- J. All refrigeration parts, equipment and labor are the responsibility of the Contractor whether subcontracted or not. All refrigeration sleeves, lines, placements, hangers, insulators, connections and refrigerants are considered parts and must be made available to complete and deliver a fully installed system in working operation at the required temperatures.

2.13 EXHAUST HOODS

- A. All exhaust hoods shall be construction of stainless steel no less than 18-gauge, type 304. All exposed surfaces shall be a number 4 finish. See plans for size and location of ducts.
- B. All exhaust hoods shall be (UL) Underwriter's Listed under the category "Exhaust Hood with Damper", listed with NSF (National Sanitation Foundation), and in accordance with all recommendations of NFPA's Standard #96.
- C. Provide stainless steel enclosure panels to finished ceiling, adjacent walls, and spaces between hoods.
- D. Light fixtures are to be incandescent unless otherwise specified.
- E. Bottom of hood to be mounted at 80" above finished floor.

2.14 FIRE PROTECTION SYSTEM

- A. The fire protection system shall conform to NFPA 17A latest edition.
- B. Provide all surface appliance, hood, and duct protection nozzles.
- C. All exposed piping to be chrome plated or sleeved. Run unexposed wherever possible.
- D. Include manual pull station, location as shown on drawings.
- E. Provide mechanical fire-fuel gas shut off valve for equipment below hoods. Verify size with plumbing plans.
- F. Upon completion the system must be tested in the presence of the enforcing agency.

2.15 ENCLOSURES

- A. Provide and install enclosure panels secured or removable for any equipment that houses equipment with movable parts for access. Also, cover and provide protection for any exposed steam line or condensate line that may be within reach of operating personnel.

2.16 ELECTRICAL WORK - GENERAL REQUIREMENTS.

- A. Before ordering equipment, confirm with the serving electric utility, all pertinent electrical requirements such as actual voltages available, number of phases, and number of wire in the system. Coordinate also with any electrical service provided by other Divisions.
- B. Components and assemblies shall bear the UL, RU, or ETL label or be approved by the prevailing authority.
- C. Custom fabricated and standard refrigerator units shall be provided with vapor tight receptacles, shatterproof lams, and automatic switches. All wiring shall be concealed when possible.

2.17 INSERT PANS

- A. All cut-outs, openings, drawers, or equipment specified or detailed to hold stainless steel insert pans shall be provided with a full compliment of pans as follows:
 - 1. One stainless steel, 20-gauge minimum, solid insert pan for each space, sized per plans, details, or specifications.
 - 2. Where pan sizes are not indicated in plans, details, or specification, provide on full size pan for each opening.
 - 3. Provide maximum depth pan to suite application and space.
 - 4. Provide 18-gauge removable stainless steel adapter bars where applicable.

2.18 CORDS AND PLUGS

- A. Where cords and plugs are used, they shall comply with National Electrical Manufacturer's Association (N.E.M.A.) requirements.

2.19 WATER FILTERS

- A. Provide water filters on all icemakers, beverage equipment, and steamers.

PART 3 – EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

- A. No provisions are normally made for receipt or storage of any item delivered to the job site before commencement of installation. Contractor is solely responsible for the staging, delivery and safe-keeping of all equipment until turned over to the owner.
- B. Fabricated and commercially manufactured equipment (buy-outs) must be received and accounted for by the Contractor at his warehouse facilities until such time as placement is possible and acceptable by the GC.
- C. Clearly identify all items by item number and area prior to delivery to the job site.
- D. Under no circumstances shall any individual or agent of the owner, architectural, trades, maintenance or security companies be asked to sign for or receive goods, equipment or services on the job site. Items, parts, optional pieces, trim, or any goods provided under this contract are the responsibility of the contractor whether on the owner's property or in transit until the areas shown in these documents are handed over to the owner or owner's agents.

3.2 INSTALLATION

- A. Contractor shall supervise and direct his work using his best skill and attention. During the installation period, the Contractor shall provide a competent superintendent or foreman for such directions regarding connection, installation and coordination of all work under the contract.
- B. Contractor shall be solely responsible for all construction means, methods, techniques, procedures and coordination of all portions of his work under the contract and for coordinating the installations with the General Contractor, so as not to interfere with or delay the overall construction of the project.
- C. Contractor shall verify conditions at the building, particularly door openings, passages, and availability and size of elevators and avoid building any items too large for available openings. Contractor shall provide for the possible necessity of removing and replacing windows or wall panels. Any pieces too bulky for existing facilities shall be hoisted or otherwise handled with apparatus as required. All special handling equipment charges shall be paid by the Contractor.
- D. Floor troughs and drip pans shall be provided by Contractor and installed by the General Contractor. The Contractor shall provide a supervisor for the installation.

- E. Accurately set, scribe, square, level and permanently secure all items in precise position as indicated on drawings and shop drawings. Exercise extreme care to avoid damaging finished surfaces during the handling and erecting of all items. Repair, replace or otherwise make good all damaged surfaces or blemishes arising from installation in a manner approved by the Owner.
- F. Complete installation with required fastenings, clip angles, braces, anchors and other fittings as required to render the work rigid and secure. Secure wood items with screws or anchor to furring strips to permit removal.
- G. Caulk all items resting on concrete pads to eliminate crevices between item and pad.
- H. Shim level items without legs with stainless steel shims. Caulk watertight to eliminate crevices between item and mounting surfaces on floor.
- I. Seal spaces between all units and walls, ceilings, floors or fixed adjoining units against entrance of food particles or vermin by means of trim strips, welding, soldering, or commercial joint material as suited to the nature of the equipment. Seal and smooth, (when not exposed to extreme heat) with General Electric Silicone Construction Sealant Series SE1200 in appropriate color. Width of joints sealed with silicone not to exceed $\frac{1}{4}$ ".
- J. Contractor shall do all cutting and fitting on the equipment required by other contractors for access for their piping, conduit or utility access.
- K. Do not use any exposed bolts, nuts or screws other than those shown on shop drawings. Any additional and approved bolts, nuts or screws must be stainless steel.
- L. Protect equipment that has been delivered to the job site from damage. Counter and table tops to be covered with plywood, flakeboard or hardboard during the installation period.
- M. Upon completion of installation, clean and polish all surfaces of each item with appropriate materials. At this time, prepare to account to the consultant and Owner for quantities, locations and conditions of all items.
- N. Should any repairs be required due to the neglect of the other contractors, the repairs must be approved by owner before the work is performed. All extra charges must be approved and all repairs required must be noted in writing before work is performed, stipulating the price and by whom the extra expense is to be paid. In case the Contractor does not secure such extra order, the expense shall be borne by him. No cutting, notching, drilling or altering of any kind shall be done to the building by the contractor without first obtaining permission from the GC, owner, or architect.
- O. Throughout the progress of the work, the Contractor shall keep the working area free from debris of all types, and remove from premises all rubbish resulting from any work being done by him. At the completion of work, the Contractor shall leave the premises in a clean and finished condition.

3.3 START-UP AND DEMONSTRATION

- A. Provide factory-trained personnel for start-up and demonstration of equipment. Demonstration shall be done in two stages: One for operation and the second for maintenance personnel.
- B. Return to the job site within 10 days for final adjustment and calibration of equipment.

PART 4 – SCHEDULED EQUIPMENT

Furnish and set-in-place all equipment listed in accordance with Part 2 Products, Plans, and Details, and manufacturers' standard specifications with options as listed in each item. Any existing equipment to be picked up by KEC, delivered, and set-in-place. Coordinate with owner.

ITEM 1: CASH REGISTER STAND QTY: 2

Manufacturer: Randell

Model: CA

1. Portable cash register stand with locking cash drawer.
2. Verify color with architect.
3. Provide with RAN FLT30-S flat top tray slide, 10" deep on server side.
4. Provide with RAN FLT30-S flat top tray slide, 10" deep on customer side.
5. Provide with all locking casters.

ITEM 2: MILK COOLER QTY: 1

Manufacturer: True

Model: TMC-58-HC

1. Mobile milk cooler on locking casters.
2. 120 volt.

ITEM 3: SALAD BAR QTY: 1

Manufacturer: Cambro

Model: VBR6110

1. Mobile salad bar on locking casters.
2. Verify color with architect.
3. Provide with (2) VBRR6191 tray rails.
4. Provide with (1) VBRTBL191 end table.
5. Provide with (5) CPB1220159 camchillers.

ITEM 4: S/S SOILED DISHTABLE QTY: 1

Manufacturer: Custom

Model: Custom

1. Size and shape per plan, with splash at walls, with pass-thru section, with prerinse sink with s/s prerinse basket with rack slides, quick drain assembly, s/s legs and rear cross bracing.

ITEM 5: S/S WALL SHELF QTY: 1

Manufacturer: Custom

Model: Custom

1. 48" x 12" with wall mounting brackets.
2. See elevations.

ITEM 6: PRERINSE UNIT QTY: 1
Manufacturer: T&S Brass
Model: B-0113-B

ITEM 7: DISHWASHER - VENTLESS QTY: 1
Manufacturer: Hobart
Model: AM15VLT-2

1. High-temp ventless dishwasher.
2. Tall chamber.
3. Electric tank heat.
4. 208 volt, 3 phase.
5. Provide with seismic feet.
6. Provide single point electrical connection.
7. Provide with (1) RACK-6PAN sheet pan dishwasher rack.

ITEM 8: S/S CLEAN DISHTABLE QTY: 1
Manufacturer: Custom
Model: Custom

1. Size and shape per plan, with splash at rear, s/s legs and undershelf.

ITEM 9: S/S WALL SHELF QTY: 1
Manufacturer: Custom
Model: Custom

1. 54" x 12" with wall mounting brackets.
2. See elevations.

ITEM 10: HAND SINK QTY: 2
Manufacturer: Advance
Model: 7-PS-41

1. Includes soap and towel dispensers.
2. 115 volt.
3. Provide with s/s splash guards both sides.

ITEM 11: SPARE NUMBER

ITEM 12: SPARE NUMBER

ITEM 13: S/S WALL SHELF QTY: 2

Manufacturer: Custom

Model: Custom

1. 24" x 12" with wall mounting brackets.
2. See elevations.

ITEM 14: PRERINSE UNIT QTY: 2

Manufacturer: T&S Brass

Model: B-0133-ADF-14-B

1. Provide with B-0230-K installation kit.

ITEM 15: S/S POT SINK QTY: 1

Manufacturer: Custom

Model: Custom

1. 3-tub pot sink, size and shape per plan, with splash at rear, with (3) 24" x 28" x 12" deep sinks with center drains and lever waste, s/s legs and cross bracing.

ITEM 16: DRY STORAGE SHELVING QTY: 1 Lot

Manufacturer: Metro

Model: Super Erecta

1. Brite Finish
2. See floor plan for quantities. Shelving units to be 74" high and consists of four shelves and four posts with necessary seismic installation accessories, #9993Z foot plates and # BCS wall brackets.

ITEM 17: FOOD WARMING CABINET QTY: 3

Manufacturer: Cres Cor

Model: H-135-SUA-11-R

1. 120 volt.
2. On locking casters.
3. Door hinged left.

ITEM 18: SPARE NUMBER

ITEM 19: SPARE NUMBER

ITEM 20: SERVING COUNTER QTY: 1
Manufacturer: Custom
Model: Custom

1. S/S serving counter, size and shape per plan.
2. Provide with cut-outs for hot food pans.
3. Provide with accommodations for mounting sneeze guards.
4. On 6" s/s legs.
5. Coordinate pass-thru section with roll-up door.
6. See elevations plans for details.

ITEM 21: HOT FOOD WELLS QTY: 1
Manufacturer: Alto-Shaam
Model: 400-HW/D6

1. Drop-in hot food pan.
2. 208/240 volt.

ITEM 22: SNEEZE GUARD QTY: 1
Manufacturer: BSI
Model: ZG9500-3

1. Adjustable sneeze guard with tempered glass top shelf.
2. Provide length per floor plan and to fit the hot food pan.
3. Provide with brushed aluminum stainless steel finish.
4. See elevations plan.

ITEM 23: S/S WORKTABLE QTY: 1
Manufacturer: Custom
Model: Custom

1. Island worktable, size and shape per plan, with s/s legs and undershelf.
2. See elevations.

ITEM 24: S/S EXHAUST HOOD QTY: 1
Manufacturer: Captive Aire
Model: ND-2

1. See sheets K5.0, K5.1 for details.

ITEM 25: COMBI-OVEN – DOUBLE STACKED QTY: 2

Manufacturer: Alto-Shaam

Model: CTC7-20G

1. Consists of two ovens, one stacked on top of the other.
2. Nat. Gas, 120 volt.
3. Provide factory authorized installation for both ovens.
4. Provide with (2) 5021522 installation kits.
5. Provide with (2) CE-36354 cleaning tabs packets.
6. Provide with (2) CE-24750 combitherm spray cleaning liquid – 1 qt.
7. Provide with (2) CE-27889 scale free deliming product – 4 lb. bottle.
8. Provide with (1) 5016707 stacking hardware.
9. Provide with (1) 5017391 mobile stacking base.

ITEM 26: S/S WALL LINER AND END CAPS QTY: 1 Lot

Manufacturer: Custom

Model: Custom

1. Liner to run from bottom of hood to top of coved floor base, full length of wall.
2. Include S/S end caps same height as wall liner.
3. Include s/s tile capping.

ITEM 27: DOUBLE CONVECTION OVEN QTY: 1

Manufacturer: Montague

Model: 2-115A

1. 120 volt.
2. Nat gas, with gas manifold for single point connection.
3. Casters.
4. Provide with Dormont 16100KIT2S36PS gas connector kit.

ITEM 28: 6-BURNER RANGE QTY: 1

Manufacturer: Montague

Model: 136-5

1. Nat Gas.
2. On casters.
3. Provide with Dormont 16100KIT2S36PS gas connector kit.

ITEM 29: POT FILLER FAUCET QTY: 1

Manufacturer: T&S Brass

Model: B-0592

ITEM 30: SPARE NUMBER

ITEM 31: SPARE NUMBER

ITEM 32: FAUCET QTY: 1
Manufacturer: T&S Brass
Model: B-0221
1. Provide with B-0230-K installation kit.

ITEM 33: S/S WALL SHELF QTY: 1
Manufacturer: Custom
Model: Custom
1. 72" x 12" with wall mounting brackets.
2. See elevations.

ITEM 34: S/S WORKTABLE W/SINK QTY: 1
Manufacturer: Custom
Model: Custom
1. S/S worktable, size and shape per plan, with splash at wall, with integral 18" x 18" x 12" deep sink with center drain and lever waste assembly, s/s legs and partial undershelf.
2. See elevations plans.

ITEM 35: FIRE SUPPRESSION SYSTEM QTY: 1
Manufacturer: Ansul
Model: R-102
1. See sheets K5.2 – K5.4 for details

ITEM 36: WATER FILTER ASSEMBLY QTY: 1
Manufacturer: Everpure
Model: EV979722
1. KleenSteam II twin system with standard cartridge filters.
2. Provide with (2) EV961811 extra filter cartridges.

ITEM 37: SPARE NUMBER

ITEM 38: SPARE NUMBER

ITEM 39 WALK-IN COOLER/FREEZER QTY: 1
 Manufacturer: Duracold
 Model: Custom
 1. See sheet K7.0, K7.1, K7.2 for details.

ITEM 40: WALK-IN STORAGE SHELVING QTY: 1 Lot
 Manufacturer: Metro
 Model: Metroseal3
 1. Brite Finish
 2. See floor plan for quantities. Shelving units to be 74" high and consists of four shelves and four posts with necessary seismic installation accessories, #9993Z foot plates and # BCS wall brackets.

ITEM 41 EVAPORATIVE COIL QTY: 1
 Manufacturer: Larkin
 Model: LCE6160BEB
 1. For walk-in freezer.

ITEM 42: EVAPORATIVE COIL QTY: 1
 Manufacturer: Larkin
 Model: LCA6135AEB
 1. For walk-in cooler.

ITEM 43: CONDENSING UNIT – FREEZER QTY: 1
 Manufacturer: Heatcraft
 Model: MOZ045L63
 1. For walk-in freezer.

ITEM 44: CONDENSING UNIT – COOLER QTY: 1
 Manufacturer: Heatcraft
 Model: MOH015X63
 1. For walk-in cooler.

ITEM 45: AIR CURTAIN QTY: 1
 Manufacturer: Berner
 Model: CHD10-1048A
 1. 120 volt.
 2. Provide with 9503SD020-P automatic door switch.

END OF SECTION

SECTION 11 41 27**WALK-IN COOLER AND FREEZER****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section includes Included: Perform all work necessary and required to complete construction as indicated. Such work includes the furnishings of all labor, material and services necessary for a complete, lawful and operating combination walk-in cooler and freezer system with all equipment as shown or noted on the drawings or as specified herein. The work includes, but is not necessarily limited to the following:
1. Insulated panels
 2. Refrigeration
 3. Accessory equipments
- B. These specifications are intended to cover the installation of compressors, condensers, coils, condensing units and all other fittings, devices and accessories required to complete the refrigeration plans and schedules. The omission from these specifications or from the refrigeration plans and schedules of express reference to any parts necessary for the complete installation is not to be construed as releasing the Contractor from responsibility for furnishing such parts.
- C. Related Requirements:
1. Line voltage power wiring (60 volts or greater), motor starters in motor control centers, and disconnect switches are included in the Electrical Division, unless otherwise noted.

1.02 REFERENCE

- A. Enclosures shall be listed by the National Sanitation Foundation and its design and construction shall meet N.S.F. standard #7, and bear its seal of approval.

1.03 LOCAL CODES, REGULATIONS AND PERMITS

- A. All materials shall be in full accordance with local and/or state ordinances, and with any other prevailing rules and regulations regarding hazardous equipment.

1.04 WARRANTIES

- A. Panel Warranty: The foamed -in-place panels to be free from defects in material and workmanship under normal use and service for a period of ten years from the date of original shipment. All hardware, fiberglass panels and electrical components shall be warranted against defects in workmanship under normal use and service for a period of one year from date of completion of project and acceptance by Owner.

- B. Refrigeration Warranty: The refrigeration equipment and components are to be free from defects in material and workmanship under normal use and service for a period of one year from date of completion and acceptance by Owner. Limited extended Four Year warranties may be purchased.
- C. Extended Warranty: Provide four year extended warranty on motor compressor.

PART 2 - PRODUCTS

2.01 INSULATED ENCLOSURES

- A. Panels, by Kolpak or equal shall be prefabricated, all metal clad and sectionally constructed for accurate and simple field erection. The size shall be as shown on the plans (Contractor to VERIFY IN FIELD). Panels shall consist of foamed-in-place urethane insulation, sandwiched between interior and exterior metal "skin" which has been die-formed and gauged for uniformity in size. Edges of panels shall be foamed-in-place tongue and groove with locking facilities foamed-in-place at time of fabrications.

2.02 FINISH

- A. The panel finish shall be 26 gauge stucco-embossed galvalume. Finishes in accordance with USDA publication "Accepted Meat and Poultry Equipment," MPI-2. Provide sample.

2.03 FRAMING

- A. High-density frame construction: Sectional panels shall consist of exterior and interior skins of metal formed into pans to insure proper size and fit; or skins of specific material as maybe specified and available. Skins are to be secured to a structural frame constructed of high-density urethane lumber, providing 4" panel thickness. The high density lumber is to be formed with a tongue, groove, or flat surface, and is to be placed at the edge of each panel as appropriate to the mating surface. Tongue and groove at all panel joints, flat only at wall-to-building floor joints. High-density lumber shall form all sides of the sectional panel. Density shall be no less than 8 lb. cubic foot to assure gripping stability of fasteners.

2.04 INSULATION

- A. The individual panels shall be insulated with foamed-in-place (frothed, not poured) polyurethane binding tenaciously to the metal skins to form a rigid panel. The Class I insulation shall be certified by Underwrites' Laboratories as having a flame spread of 25 or lower and smoke generation of 450 or lower when tested in accordance with ASTM 8-84-76. This designation is not intended to reflect hazards presented by this or any other material under actual fire conditions. The thermal conductivity factor shall not exceed 0.115 BTU per hour per square foot per degree Fahrenheit per inch. Overall coefficient of heat transfer (U) factor shall not exceed .033 and (R) factor shall be (R-34) for 4" walls. The insulation must remain stable at a temperature range of -60-1/2 F. to +200-1/2 F. and have a density of 2.2 lbs. Insulation shall have a 97% closed cell structure.

2.05 SECTIONAL FASTENERS

- A. Assembly of walk-in shall be accomplished by Posi-Locs. Posi-Locs shall be foamed-in-place and activated by a hex wrench provided by the manufacturer. Access ports to locking devices shall be covered by snap caps. Access ports shall be on interior to allow assembly of walk-in from the inside.

2.06 GASKETS

- A. All sectional panels shall be joined together by a double row of vinyl foam gasket at the interior and exterior edges. They will provide a panel-to-panel self-sealing air-tight joint. Gaskets shall be resistant to damage from oil, fats, water, detergents and sunlight.

2.07 DOORS AND DOOR PANEL

- A. Each walk-in shall be fitted with one standard 32" x 80" swing-type entrance door per CBC 2016 11b-404.2.3. The door shall be flush type, finished in and out to match the wall in which located. Doors and door section shall be listed by Underwriters Laboratories and equipped with the following:
 - 1. Door shall be equipped with magnetic gasket, Posi-Seal door closure and latch. Hardware shall have provisions for locking using a Schlage cylinder (see 08710) and a safety release which prevents entrapment of personnel within the box.
 - 2. Door shall be self-closing with two strap-type, cam-lift hinges.
 - 3. Door jamb shall be made of Fiberglass Reinforced Plastic. An isolated, low wattage heater strip covered by magnetically attracting stainless steel shall be fitted onto this jamb (freezer only). This strip shall provide perfect sealing of magnetic gasket and prevent frost and condensation build-up.
 - 4. Each entrance door section shall be provided with an incandescent type vapor-proof light, pilot light switch and conduit between switch box and outlet box. Concealed wiring shall be standard on each entrance door section.
 - 5. A threshold with non-skid stripping shall be provided with each door section. Heater wire shall continue beneath the threshold (freezer).
 - 6. A 2" dial thermometer shall be included with each door section to indicate inside temperature.
 - 7. Threshold to comply with CBC 2016 11B-404.2.3, 11B-302, and 11B-303.

2.08 DOOR ACCESSORIES

- A. Digital thermometers shall be mounted flush on the door frames. Dial Flush 2", with 5 ft. cap tube.
- B. A Pilot Light and Switch shall be mounted on each door frame exterior. The indicating red or amber light shows when interior light is burning. All parts shall be U.L. listed, 15 amp capacity, and ready for jobsite electrical connection.
- C. Heater cable accessory for freezer. Heater cable wires, 115 volt, U.L. listed, shall be concealed behind the metal edge of the door jamb on three sides and sill which

shall be connected to an "Energy-saving Condensation Control" thermostat for low temperature ice and humidity protection.

- D. A Tri-Action air vent shall be provided to equalize pressure between the interior and exterior, caused by sudden temperature changes due to door openings and evaporator defrosting. The vent shall be heated to prevent moisture and/or frost accumulation (required for freezers).

2.09 VAPOR PROOF LIGHTS

- A. Incandescent vapor-proof light fixtures shall be furnished loosed, ready for installation. 100 watt bases with protective lemon globe covers.

2.10 REFRIGERATION

- A. The Contractor shall furnish and install any necessary refrigerant piping, fittings, vibration eliminators, line valves, solenoid valves, crankcase pressure regulating valves, thermostatic expansion valves, dehydrators, strainers, sight glasses, moisture indicators, refrigerant, oil, filters, insulation and all fittings and accessories necessary to make a complete installation unless otherwise specified together with all labor required to complete the installation and perform the service covered by this specification. The Contractor shall familiarize himself with the project, and shall cooperate with other Contractors doing work on the building. If any conflict, interference, or discrepancies come to the attention of the Contractor, he shall notify the Owner immediately before proceeding any further with the installation.
- B. Refrigerants: Refrigerants used shall be R-22 or R-404A unless otherwise specified.
- C. Refrigerant Piping Materials: Unless otherwise specified, all refrigeration piping shall be refrigeration grade Type K hard drawn decrease sealed copper tubing.
 - 1. All sweat-type fittings shall be wrought copper or forged brass. All elbows and return bends shall be of the long radius type. If flare fittings are required, they shall be of the frost proof type and constructed of forged brass. Soldered joints are referred and shall be used whenever practical.
- D. Remote-Preassembled System: Condensing unit shall include motor-compressor, condenser, receiver, motor starter assembly or contactor, pressure control, liquid filer-drier, sight glass, vibration eliminator (as required), suction filter and control panel assembled on a common base. Condensing units shall be fully hermetic or semi-hermetic type. Condenser shall be air-cooled or optional water-cooled. Condensing units shall be factory assembled and UL or ETL listed. Systems operating below 35-1/2 F. shall include a suction accumulator and defrost kit with time initiate, temperature terminate time clock and defrost heater contractors factory mounted and wired on the condensing unit. Evaporator housing shall be aluminum or have a non-corrosive finish. Evaporators shall be forced air type. Air discharge shall be parallel to the walk-in ceiling. Fan motors, guards multi-fin and tube-type coil, shall be housed in heavy gauge aluminum. Unit shall have drain pan with suitable drain pipe fitting. Freezer evaporators shall have an automatic electric defrost system including heater, time clock, fan delay control, and heated

drain pan. Defrost shall be time initiated and temperature terminated with built-in fail-safe control. All evaporators shall be UL listed. All systems include pump down cycle to provide additional protection against unwanted refrigerated flow. The coil shall have copper tubes expanded into aluminum fins. All fan motors shall be life lubricated and thermally protected. Electric defrost shall be provided on evaporators operating below 35-1/2 F. Coils and drain pans shall be electrically heated. The evaporator housing shall include space for concealing the TX valve. The solenoid valve, thermostat, heat exchanger and TX valve shall be supplied loose for field mounting by the Mechanical Contractor.

2.11 DRAIN LINES

- A. Installing contractor shall provide suitable drain lines from all evaporators. Drains shall be trapped outside the walk-in. Freezer drains shall be copper tubing and shall be heated and insulated to prevent freeze-up. All plumbing to be in accordance with local codes. Drain line heater kits available from Kolpak.

PART 3 - EXECUTION

3.01 REFRIGERANT PIPING INSTALLATION

- A. Tubing shall be installed in a neat, workmanlike manner with horizontal runs sloped toward the compressor at a rate of 1" per 20'. All lines shall be supported at intervals of not more than 8' and suitably anchored. Rubber grommets shall be used between tubing and clamps to prevent line chafing. Where vertical risers of more than 5 feet occur in a suction line, the riser shall be trapped at the bottom.
 - 1. Individual fixture or unit suction and liquid lines shall be of the size recommended by the Manufacturer as shown in the applicable installation and service instructions. Liquid and hot gas refrigerant lines shall be sized in accordance with good industry practice to avoid excessive pressure drops. Branch and main suction lines shall be sized to maintain adequate velocities to properly return oil to the compressor under minimum load conditions at the lowest saturated suction pressure to be expected. In order to avoid damage to the internal Silfos joints in vibration eliminators, line connections to vibration eliminators are to be made with a silver solder alloy such as Easy-Flo having a melting temperature of 900-1/2 F. or 1,200-1.2 F. All exposed suction lines, both low and medium temperature, shall be insulated as necessary to prevent condensation. Insulation shall be of the cellular type, such as Armstrong "Armaflex" or equal, shall fit the tubing snugly, and shall be applied and sealed in accordance with the manufacturer's instructions. Arrange the piping so that normal inspection and servicing of the compressor and other equipment is not hindered. Do not obstruct the view of the crankcase oil sight glass or run piping so that it interferes with removal of the compressor or other components.
- B. Installation of Accessories: Vibration eliminators shall be installed in the suction and discharge lines of all compressors with spring or flexible mounting. The vibration eliminator must be applied according to the manufacturer's

recommendations. A combination liquid sight glass and moisture indicator shall be installed in each system and located for easy visibility.

1. If liquid line driers are not otherwise specified, they shall be of the filter-drier type, and of the size recommended by the manufacturer. Drier cartridges shall not be installed until the second evacuation has been completed. A thermostat and solenoid valve shall be installed in each system.
- C. Drain Connectors: Unless otherwise specified, condensate drains from coils to the floor drain will be the responsibility of the Contractor. All condensate lines from refrigerated fixtures must be trapped.
- D. Condensing Units: Condensing Units shall include moto-compressor, condenser, receiver, motor starter assembly or rigid structural base and pressure control assembled, piped and wired by the manufacturer. The moto-compressor shall be of the fully hermetic or accessible hermetic type and shall include inherent or solid state motor protection. Condensing units in ambient temperatures below 55-1/2 F. shall include a crankcase heater and head pressure control. Air cooled compressors shall have a flooded type head pressure control unless an auxiliary cooling can is provided.
- E. Evaporators: The housing shall be aluminum or have non-corrosive finish. The coil shall have copper tubes expanded into aluminum fins. All fan motors shall be life lubricated and thermally protected.

END OF SECTION

SECTION 11 50 00
MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY AND SCOPE

- A. Section includes:
 - 1. Specialty items required for this Work as indicated on the Drawings, including the following: bike racks, skateboard racks, trash cans
- B. Related Divisions:
 - 1. Section 01 30 00 – Cast In Place Concrete

1.02 ACTION SUBMITTALS

- A. Supply all equipment in accordance with this specification.
- B. Submittals:
 - 1. Manufacturer's Data: Submit manufacturer's data and installation instructions in accordance with Section 01 33 00 – Submittal Procedures. Provide data indicating compliance with ASHRAE Standard 110.1995.

PART 2 - PRODUCTS

2.01 SPECIALTY PRODUCTS (substitutions will be considered under the provisions of Section 01 25 00 – Substitution Procedures)

- A. Bicycle Racks:
 - 1. Belson Outdoors, 111 North River Road, North Aurora, IL 60542.
 - a. (2) Model BRG36-G (bike capacity 36 each)
 - b. (2) Model BRG18-G (bike capacity 18 each)
 - c. Installation per manufacturer's instructions
- B. Trash Cans, each to have:
 - 1. Belson Outdoors, 111 North River Road, North Aurora, IL 60542
 - a. Model PFT34-D
 - b. Dome top lid Model R32DC
 - c. Color to be selected by Architect
 - d. Installation per manufacturer's instructions

PART 3 - EXECUTION**3.01 SITE EXAMINATION**

- A. The owner and/or his representative shall certify building conditions conducive to the installation of a finished goods product, including all critical dimensions.

3.02 INSTALLATION**A. Preparation:**

- 1. Prior to beginning installation check and verify that no irregularities exist that would affect quality of execution of work specified.

B. Coordination:

- 1. Coordinate the work of the Section with the schedule and other requirements of other work being performed in the area at the same time both with regard to mechanical and electrical connections to and in the fume hoods and the general construction work.

C. Adjust and Clean:

- 1. After installations are complete, adjust all moving parts for smooth operation.
- 2. Remove all packing materials and debris resulting from this work, and turn over the fume hoods to the Owner clean and polished both inside and out.
- 3. Repair or remove and replace defective work, as directed by owner and/or his representative upon completion of installation.

D. Protection:

- 1. Provide reasonable protective measures to prevent casework and equipment from being exposed to other construction activity.
- 2. Advise owner and/or his representative of procedures and precautions for protection of material, installed laboratory casework and fixtures from damage by work of other trades.

END OF SECTION

SECTION 11 52 13.52
ELECTRIC PROJECTION SCREEN

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electrically operated, ceiling recessed, front projection screens.

1.02 RELATED SECTIONS

- A. Division 5 - Metal Fabrications: Suspension systems for projection screens.
- B. Section 06 40 00 - Architectural Woodwork.
- C. Section 09 29 00 - Gypsum Board.
- D. Division 16 for electrical wiring, connections, and installation of remote control switches for electrically operated projection screens.

1.03 REFERENCES

- A. NFPA 70 - National Electrical Code.
- B. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.
- C. GREENGUARD Environmental Institute Gold.
- D. US Green Building Council.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Wiring diagram for electrically operated units.
- D. Shop Drawings: Shop drawings showing layout and types of projection screens. Show the following:
 - 1. Location of screen centerline.
 - 2. Location of wiring connections.
 - 3. Seams in viewing surfaces.

4. Detailed drawings for concealed mounting.
 5. Connections to suspension systems.
 6. Anchorage details.
 7. Accessories.
 8. Frame details.
- E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- F. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.05 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain each type of projection screen required from a single manufacturer as a complete unit, including necessary mounting hardware and accessories.
- B. Coordination of Work: Coordinate layout and installation of projection screens with other construction supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system, and partitions.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver projection screens until building is enclosed and other construction where screens will be installed is substantially complete.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Protect screens from damage during delivery, handling, storage, and installation.

1.07 COORDINATION

- A. Coordinate work with installation of ceilings, walls, electric service power characteristics, and location.

PART 2 - PRODUCTS

2.01 BASIS OF DESIGN

- A. Model: Envoy electric ceiling recessed front projection screen
- B. Acceptable Manufacturer: Draper, Inc., which is located at: 411 S. Pearl P. O. Box 425; Spiceland, IN 47385-0425; Toll Free Tel: 800-238-7999; Tel: 765-987-7999; Fax: 866-637-5611; Email: [request info \(drapercontract@draperinc.com\)](mailto:request info (drapercontract@draperinc.com)); Web: www.draperinc.com
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 – Substitution Procedures.

2.02 MOTORIZED, CEILING RECESSED, FRONT PROJECTION SCREENS

- A. Electric motor operated, ceiling-recessed, trap door ceiling closure. Ceiling-recessed headbox of composite wood, finished black, 7-9/16 inches (192 mm) deep and 7-9/16 inches (192 mm) wide.
1. Quiet Motor mounted inside screen roller on rubber isolation insulators. Motor operates at 44db. UL certified, rated 110-120V AC, 60 Hz, three wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches.
 2. Motor Screen Controls, UL certified.
 - a. Key operated 3-position control switch rated 115V AC, 60 Hz to stop or reverse screen at any point.
 - b. Motor shall be right mounted.
 3. Projection Viewing Surface:
 - a. Matt White XT1000E - On Axis gain of 1.0. 180 degree viewing cone. Washable surface. GREENGUARD Gold certified.
 4. Viewing Area H x W.
 - a. Audio Visual Format.
 - 1) Provide with black border option.
 - 2) 12 feet x 12 feet (3.66 m x 3.66 m).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify rough-in openings are properly prepared.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install front projection screens with screen cases in position and relationship to adjoining construction as indicated, securely anchored to supporting substrate, and in manner that produces a smoothly operating screen with plumb and

straight vertical edges and plumb and flat viewing surfaces when screen is lowered.

- C. Test electrically operated units to verify that screen, controls, limit switches, closure and other operating components are in optimum functioning condition.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 21 16
VERTICAL LOUVER BLINDS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Work Included: Provide vertical louver blinds system where shown on the drawings, as specified herein, and as needed for a complete and proper installation.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Section 00700 and Sections in Division 1, General Requirements, of these Specifications.

1.02 QUALITY ASSURANCE:

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS:

A. Comply with pertinent provisions of the General Conditions.

B. Product Data: Within 60 calendar days after the Contractor has received the District's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's Specifications and other data needed to prove compliance with the specified requirements;
3. Shop drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
4. Manufacturer's recommended installation procedures which, when approved by the District, will become the basis for accepting or rejecting actual installation procedures used on the work.

1.04 PRODUCT HANDLING:

Comply with requirements of manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS AND CONSTRUCTION:

Vertical blinds shall be provided by Louverdrape, Santa Monica, CA, or equivalent.

A. Design is based upon furnishing and installing "Elite", Model EL vertical blind assemblies. The vertical blinds shall have solid vinyl louvers.

B. Channel: Head channel shall be anodized, extruded aluminum allow 1 1/16" wide by 1 1/4" high with capped ends provided with Delrin or equivalent, sprocket wheels with Zytel.

- C. Carrier Trucks: Each carrier truck shall be 7/16" wide, made of Delrin plastic or equivalent, and traverse on Delrin slides. No wheels shall be allowed.
- D. Spacer Links: Flexible stainless steel spacer links 1/4" wide shall space and stabilize trucks by passing smoothly between stabilizer guides on each truck.
- E. Louvers: Louvers shall rotate 360 degrees and pack when traversed into no more than 7/16" per louver. When rotated, 3 1/2" louvers shall overlap not less than 1/4".
- F. Rotation: A #6 nickel-plated bead chain shall synchronize and actuate, 360 degree rotation by turning a keyed aluminum rod actuating plastic worm and spur gears in each truck in the top channel. Gears shall provide no less than 10-to-1 mechanical advantage and keep louvers fixed until reset by control. No cord or 1-to-1 ratio mechanisms shall be allowed.
- G. Traverse Action: Vertical blinds shall traverse left to right, right to left or split as directed by the Architect. Blinds shall traverse by means of a non-stretch traverse cord.
- H. Color: Colors selected by Architect from manufacturer's standard line.
- I. Provide chains, wands etc. to a minimum of 5 feet above finished floor. All exceptions shall be reviewed and approved by the project architect.

2.02 OTHER MATERIALS:

Provide other material, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the District.

2.03 REGULATORY REQUIREMENTS:

- a. Vertical Blinds shall be flame retardant in accordance with Subchapter 8, Chapter 1, Title 19, California Code Regulations.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION:

- A. Blind subcontractor shall be responsible for inspection of site, approval of mounting surfaces, verification of required backing, installation conditions and field measurements for this work.

3.02 INSTALLATION:

- A. Installation shall comply with manufacturer's recommendations.
- B. Installation shall provide adequate clearance from windows and shall overlap window openings to sufficiently obscure vision and light.

3.03 CLEANING:

- A. Clean finish installation of dirt and finger marks. Leave work area clean and free of debris.

END OF SECTION

SECTION 14 24 00**HYDRAULIC ELEVATORS****PART 1 GENERAL****1.01 SUMMARY**

- A. Section includes: Hydraulic passenger elevators as shown and specified. Elevator work includes:
1. Standard pre-engineered hydraulic passenger elevators.
 2. Elevator car enclosures, hoistway entrances and signal equipment.
 3. Jack(s).
 4. Operation and control systems.
 5. Accessibility provisions for physically disabled persons.
 6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
 7. Materials and accessories as required to complete the elevator installation.
- B. Related Sections:
1. Division 1 General Requirements: Meet or exceed all referenced sustainability requirements.
 2. Division 3 Concrete: Installing inserts, sleeves and anchors in concrete.
 3. Division 4 Masonry: Installing inserts, sleeves and anchors in masonry.
 4. Division 5 Metals:
 - a. Providing hoist beams, pit ladders, steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
 - b. Providing steel angle sill supports and grouting hoistway entrance sills and frames.
 5. Division 9 Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
 6. Division 22 Plumbing:
 - a. Sump pit and oil interceptor.
 7. Division 23: Heating, Ventilation and Air Conditioning
 - a. Heating and ventilating hoistways and machine rooms.
 8. Division 26 Sections:
 - a. Providing electrical service to elevators, including fused disconnect switches.
 - b. Emergency power supply, transfer switch and auxiliary contacts.
 - c. Heat and smoke sensing devices.
 - d. Convenience outlets and illumination in machine room, hoistway and pit.
- C. Work Not Included: General contractor shall provide the following in accordance with the requirements of the Model Building Code and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Section 300 for hydraulic elevators. State or local requirements must be used if more stringent.
1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
 2. Supply in ample time for installation by other trades, inserts, anchors, bearing

- plates, brackets, supports and bracing including all setting templates and diagrams for placement.
3. Hatch walls require a minimum two hours of fire rating. Hoistway should be clear and plumb with variations not to exceed 1/2" at any point.
 4. Elevator hoistways shall have barricades, as required.
 5. Install bevel guards at 75° on all recesses, projections or setbacks over 2" (4" for A17.1 2000 areas) except for loading or unloading.
 6. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoistway at each floor and roof.
 7. Pit floor shall be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.
 8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 42" minimum, (48" minimum for A17.1-2000 areas) shall be provided at the same height, above sill of access door or handgrips.
 9. Machine room to be enclosed and protected.
 10. Machine Room temperature must be maintained between 55° and 90° F.
 11. If machine room is remote from the elevator hoistway, clear access must be available above the ceiling or metal/concrete raceways in floor for oil line and wiring duct from machine room.
 12. Access to the machinery space and machine room must be in accordance with the governing authority or code.
 13. Provide an 8" x 16" cutout through machine room wall, for oil line and wiring duct, coordinated with elevator contractor at the building site.
 14. All wire and conduit should run remote from either the hoistways or the machine room.
 15. When heat, smoke or combustion sensing devices are required, connect to elevator machine room terminals. Contacts on the sensors should be sided for 120 volt D.C.
 16. Install and furnish finished flooring in elevator cab.
 17. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.
 18. Where sheet rock or drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.
 19. Before erection of rough walls and doors; erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.
 20. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.
 21. The elevator wall shall interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor's requirements.
 22. General Contractor shall fill and grout around entrances, as required.
 23. Elevator sill supports shall be provided at each opening.
 24. All walls and sill supports must be plumb where openings occur.
 25. For applications with jack hole, free and clear access to the elevator pit area for the jack hole-drilling rig is required.
 26. Where jack hole is required, remove all spoils from jack hole drilling.
 27. When not provided by Elevator Contractor, jack hole shall accommodate the

HYDRAULIC ELEVATORS

- jack unit. If required the jack hole is to be provided in strict accordance with the elevator contractor's shop drawings.
28. Locate a light fixture and convenience outlet in pit with switch located adjacent to the access door.
 29. A light switch and fused disconnect switch for each elevator should be located inside the machine room adjacent to the door, where practical, per the National Electrical Code (NFPA No. 70).
 30. As indicated by elevator contractor, provide a light outlet for each elevator, in center of hoistway (or in the machine room).
 31. For signal systems and power operated door: provide ground and branch wiring circuits, including main line switch. For car light and fan: provide a feeder and branch wiring circuits, including main line switch.
 32. Wall thickness may increase when fixtures are mounted in drywall. These requirements must be coordinated between the general contractor and the elevator contractor.
 33. Provide supports, patching and recesses to accommodate hall button boxes, signal fixtures, etc..
 34. Locate telephone and convenience outlet on control panel.

1.02 SUBMITTALS

- A. Product data: When requested, the elevator contractor will provide standard cab, entrance and signal fixture data to describe product for approval.
- B. Shop drawings:
 1. Show equipment arrangement in the machine room/control space, pit and hoistway. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
 2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
 3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
 4. Indicate electrical power requirements and branch circuit protection device recommendations.
- C. Powder Coat Paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- E. Metal Finishes: Upon request, standard metal samples provided.
- F. Operation and maintenance data. Include the following:
 1. Owners Manual and Wiring Diagrams.
 2. Parts list, with recommended parts inventory.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An approved manufacturer with minimum fifteen years

HYDRAULIC ELEVATORS

experience in manufacturing, installing, and servicing elevators of the type required for the project.

1. Must be the manufacturer of the power unit, controller, signal fixtures, door operators cab, entrances, and all other major parts of the elevator operating equipment.
 - a. The major parts of the elevator equipment shall be manufactured in the United States, and not be an assembled system.
 2. The manufacturer shall have a documented, on-going quality assurance program.
 3. ISO-9001:2000 Manufacturer Certified
 4. ISO-14001:2004 Environmental Management System Certified
 5. LEED Gold certified elevator manufacturing facility.
- B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than fifteen years of satisfactory experience installing elevators equal in character and performance to the project elevators.
- C. Regulatory Requirements:
1. ASME/ANSI A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
 2. Building Code: National.
 3. NFPA 70 National Electrical Code.
 4. NFPA 80 Fire Doors and Windows.
 5. Americans with Disabilities Act Accessibility Guidelines (ADAAG).
 6. CAN/CSA C22.1 Canadian Electrical Code.
 7. CAN/CSA B44 Safety Code for Elevators and Escalators.
 8. California Department of Public Health Standard Method V1.1-2010, CA Section 01350
- D. Fire-rated Entrance Assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(B), and NFPA 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).
- E. Inspection and testing: Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
1. Arrange for inspections and make required tests.
 2. Deliver to the Owner upon completion and acceptance of elevator work.
- F. Product Qualifications:
1. LCA, EPD and HPD data must be provided for all major components of the elevator system.
 2. LCA data must be compatible with GaBI Software.
 3. Environmental Product Declaration (EPD): Publicly available, critically reviewed life cycle analysis having at least a cradle-to-gate scope.
 4. GreenScreen Chemical Hazard Analysis: All ingredients of 100 parts-per-million or greater evaluated using GreenScreen for Safer Chemicals Method v1.2.

5. Health Product Declarations (HPD v2 or later): Complete, published declaration with full disclosure of known hazards, prepared using the Health Product Declaration Collaborative's "HPD builder" on-line tool; Unknown hazard listed will not be considered acceptable.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Manufacturing will deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

1.05 PROJECT CONDITIONS

- A. Prohibited Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.
- B. Provide the hole for the jack unit (if required by the type of jack provided), based on excavation through normal soil or clay which can be removed by manual digging or by standard truck-mounted regular drilling unit. Provide a casing if required to retain the walls of the hole. General contractor shall remove excavation spoils deposited in the elevator pit.
 1. If a physical obstruction or hindrance is encountered below the ground surface, including boulders, rock, gravel, wood, metal, pilings, sand, water, quick sand, caves, public utilities or any other foreign material, obtain written authorization to proceed with excavating using special excavation equipment.
 2. Maintain a daily log of time and material costs involved.
 3. Elevator contractor will be compensated on a time and material basis for additional costs incurred after encountering the physical obstruction or hindrance, including the cost of the special excavation equipment.

1.06 WARRANTY

- A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months after completion of installation or acceptance thereof by beneficial use, whichever is earlier.

1.07 MAINTENANCE

- A. Furnish maintenance and call back service for a period of 12 months for each elevator after completion of installation or acceptance thereof by beneficial use, whichever is earlier, during normal working hours, excluding callbacks. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation.
 1. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: ThyssenKrupp Elevator (Basis of Design)

2.02 MATERIALS, GENERAL

- A. All Elevator Cab materials including frame, buttons, lighting, wall and ceiling assembly, laminates and carpet shall have an EPD and an HPD, and shall meet the California Department of Public Health Standard Method V1.1–2010, CA Section 01350 as mentioned in 1.03.9 of this specification.
- B. Colors, patterns, and finishes: As selected by the Architect from manufacturer's standard colors, patterns, and finish charts.
- C. Steel:
1. Shapes and bars: Carbon.
 2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
 3. Finish: Factory-applied baked enamel.
- D. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness.
- E. Carpet: By others.

2.03 HOISTWAY EQUIPMENT

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.
- B. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.
- C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.
- D. Guide Shoes: Slide guides shall be mounted on top and bottom of the car.
- E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on a steel template that is fastened to the pit floor or continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.
- F. Jack: Jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the

HYDRAULIC ELEVATORS

following jack type: Twin post holeless telescopic 2-stage. Two jacks piped together, mounted one on each side of the car with each having two telescopic sections designed to extend in a synchronized manner when oil is pumped into the Assembly. Each jack section will be guided from within the casing or the plunger assembly used to house the section. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each Jack Assembly shall have a check valve built into the assembly to allow for automatically re-syncing the two plunger sections by moving the jack to its fully contracted position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section.

- G. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the landings and correct for overtravel or undertravel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.
- H. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. Provide proper grade readily biodegradable oil as specified by the manufacturer of the power unit (see Power Unit section 2.04.G for further details)

2.04 POWER UNIT

- A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit consisting of the following items:
 - 1. Oil reservoir with tank cover.
 - 2. An oil hydraulic pump.
 - 3. An electric motor.
 - 4. Oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.
- B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.
- C. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating shall be selected for specified speed and load.
- D. Control System: Shall be microprocessor based and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure.
- E. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.

1. Relief valve shall be externally adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
 2. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
 3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
 4. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.
- F. Solid State Starting: Provide an electronic starter featuring adjustable starting currents.
- G. Oil Type: USDA certified biobased product, ultra low toxicity, readily biodegradable, energy efficient, high performing fluid made from canola oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives. Especially formulated for operating in environmentally sensitive areas. USDA certified biobased product, >90% bio-based content, per ASTM D6866

2.05 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted\knock down construction.
1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.
 2. Main landing door & frame finish: Stainless steel panels, no. 4 brushed finish.
 3. Typical door & frame finish: Stainless steel panels with no. 4 brushed finish.
- B. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.
- C. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
 2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- D. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

2.06 CAR ENCLOSURE

- A. Car Enclosure:
1. Walls: Cab type TKLP, durable wood core finished on both sides with high pressure plastic laminate.
 2. Canopy: Cold-rolled steel with hinged exit.
 3. Ceiling: Suspended type, fluorescent lighting with translucent diffuser

- mounted in a metal frame.
4. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with brushed stainless steel.
 5. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
 - a. Door Finish: Stainless steel panels: No. 4 brushed finish.
 - b. Cab Sills: Extruded aluminum, mill finish.
 6. Handrail: Provide 1.5" diameter cylindrical metal on side and rear walls on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, no. 4 brushed finish.
 7. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.
- B. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station will give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

2.07 DOOR OPERATION

- A. Door Operation: Provide a direct current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel and the door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. Closed-loop, microprocessor controlled motor-driven linear door operator, with adjustable torque limits, also acceptable. AC controlled units with oil checks or other deviations are not acceptable.
1. No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
 2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
 3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel will reverse and the door will reopen to answer the other call.
 4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer will sound. When the obstruction is removed, the door will begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors will stop and resume closing only after the obstruction has been removed.

5. Limited Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors will reverse and reopen partially. After the obstruction is cleared, the doors will begin to close.
 6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors will recycle closed then attempt to open six times to try and correct the fault.
 7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors will recycle open then attempt to close six times to try and correct the fault.
 8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.
- B. Door Protection Devices: Provide a door protection system using 150 or more microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

2.08 CAR OPERATING STATION

- A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Swing return shall have a brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED's shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.
- B. Emergency Communications System: Integral phone system provided.
- C. Auxiliary Operating Panel: Not Required
- D. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.
- E. Special Equipment: Not Applicable

2.09 CONTROL SYSTEMS

- A. Controller: The elevator control system shall be microprocessor based and software oriented. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.
- B. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.
- C. Special Operation: Not Applicable
- D. Emergency Power Operation: (10-DOA) Upon loss of the normal power supply, building-supplied standby power is available on the same wires as the normal power supply. Once the loss of normal power is detected and standby power is available, the elevator is lowered to a pre-designated landing and the doors are opened. After passengers have exited the elevator, the doors are closed and the car is shut down. When normal power is restored, the elevator automatically resumes operation. The battery lowering feature is included in the elevator contract and does not utilize a building-supplied stand by power source.

2.10 HALL STATIONS

- A. Hall Stations, General: Vandal resistant buttons with center jewels which illuminate to indicate that a call has been registered at that floor for the indicated direction. Each button shall be provided with an internal automatic stop to prevent damage of switches that register the call. Provide 1 set of pushbutton risers. All fixtures shall be vandal resistant type.
Provide one pushbutton riser with faceplates having a brushed stainless steel finish.
 - 1. Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.
- B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.
- C. Hall Position Indicator: Not Applicable
- D. Hall lanterns: Not Applicable
- E. Special Equipment: Not Applicable

2.11 MISCELLANEOUS ELEVATOR COMPONENTS

- A. Oil Hydraulic Silencer: Install an oil hydraulic silencer (muffler device) at the power unit location. The silencer shall contain pulsation absorbing material inserted in a blowout proof housing arranged for inspecting interior parts without removing unit from oil line.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and machine rooms/control space, as constructed and verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. Install elevator systems components and coordinate installation of hoistway wall construction.
 - 1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
 - 2. Comply with the National Electrical Code for electrical work required during installation.
- B. Jack unit excavation (if required by the type of jack provided): Drill or otherwise excavate below elevator pit construction as required to install the jack unit.
 - 1. Install casing for jack unit.
 - 2. Provide HDPE jack protection system for all in ground jacks.
 - 3. Set casing for jack unit assembly plumb, and partially fill with water-settled sand, eliminating voids. Back fill depth shall be sufficient to hold the bottom of the jack in place over time.
- C. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- D. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.
- E. Lubricate operating parts of system where recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

- A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required by A17.1 Code and local authorities having jurisdiction. Perform other tests, if any, as required by governing regulations or agencies.
- B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

3.04 ADJUSTING

- A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

3.05 CLEANING

- A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless stall shall be cleaned with soap and water and dried with a non-abrasive surface; shall not be cleaned with bleached-based cleansers.
- B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.
 - a. Use environmentally preferable and low VOC emitting cleaners for each application type. Cleaners that contain solvents, pine and/or citrus oils are not permitted.

3.06 PROTECTION

- A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.07 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.
- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

3.08 ELEVATOR SCHEDULE

- A. Elevator Qty. 1

1. Elevator Model: endura Above-Ground (2-Stage)
2. Rated Capacity: 3500 lbs.
3. Rated Speed: 80 ft./min.
4. Operation System: TAC32
5. Travel: 15'-2"
6. Landings: 2 total
7. Openings:
 - a. Front: 2
 - b. Rear: 0
8. Clear Car Inside: 6' - 8" wide x 5' - 5" deep
9. Cab Height: 8'-0" nominal
10. Hoistway Entrance Size: 3' - 6" wide x 7'-0" high
11. Door Type: Single Speed
12. Power Characteristics: 460 volts, 3 Phase, 60 Hz.
13. Seismic Requirements with the 2016 CBC, Title 24 CCR Part 2, and ASCE 7-10 using the following parameters:
 - a. Risk Category III
 - b. Site Classification D
 - c. Importance Factor 1.25
 - d. Seismic Design Category D
 - e. $S_{ds} = 0.504$
14. Fixture & Button Style: Vandal Resistant Signal Fixtures
15. Special Operations: None

3.09 SPECIAL CONDITIONS (Note: Add Special Conditions as Needed)

END OF SECTION

SECTION 14 42 00**WHEELCHAIR LIFTS****PART 1 - GENERAL**

- 1.01 REFERENCE:
Requirements in Addenda, Alternates, Conditions, and Division 1 collectively apply to this work.
- 1.02 DESCRIPTION:
- A. Principal Work Items Are:
1. Passenger lift, self-contained.
 - a. Platform.
 - b. Ramp.
 - c. Platform side enclosures.
 - d. Controls.
 - e. Electrical and mechanical mechanisms, enclosed.
 - f. Base and frame.
 2. Setting in operation, testing.
- B. Related Work Specified Elsewhere:
1. Supporting and/or surrounding construction: Respective Sections.
 2. Electrical power to designated terminal points, and final hook-up: Division 16.
- 1.03 SUBSTITUTIONS:
Only written approval of the District will permit substitutions for materials specified. Refer to Section 00700, Article 30, Substitutions, for procedure.
- 1.04 QUALITY ASSURANCE:
- A. Design Criteria: Contractor shall be solely responsible for design and construction of all components to conform to all applicable Codes and Safety requirements.
- B. Requirements of Regulatory Agencies:
1. Codes and Ordinances: Conform to CCR, Titles 19, 21 and 24, State Handicapped Requirements, UBC, and all other applicable requirements, whichever is most stringent.
 2. Earthquake Provisions: Brace and/or anchor all equipment to resist a horizontal force of 50% of its operating weight in any direction per Title 24, Table 2-23J, Part B.
- C. Source Quality Control: Electrical components to have label, listing or approval of Underwriters' Laboratories or NEMA.
- 1.05 SUBMITTALS:
- A. Samples (in duplicate): Manufacturer's standard colors and finish materials for all components.
- B. Shop Drawings and Product Data: Follow General Conditions procedure, except

where modified below.

1. Shop Drawings:
 - a. Submit two copies for all work.
 - b. Show all anchors to building structure.
2. Product Data: Two copies of manufacturer's standard printed brochure describing all standard components.

C. Operation and Maintenance Data:

1. General: Refer to Specifications Section 01700, Contract Close-out.
2. Manuals: Duplicate copies, operation, service procedures and maintenance date.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING:

Deliver materials in manufacturer's protective packaging. Protect equipment and exposed finishes from damage during installation.

1.07 JOB CONDITIONS:

- A. Sequencing, Scheduling: Coordinate this work with work of related Sections.
- B. Temporary Use of Lifts: Do not use for construction purposes or during construction period, unless written permission is obtained from District.

PART 2 - PRODUCTS

2.01 LIFT(S):

A. Acceptable Manufacturers and Products:

1. The McKinley Elevator Corporation, represented locally by National Wheel-O-Vator, 17611 Armstrong Avenue, Irvine, California 92614, ph: 949-261-9244, fax: 949-955-3875, Randy Weiler or 555 Fulton Street, Suite 202, San Francisco, California, 94102, ph: 415-626-9951, fax: 415-626-9954, Scott Moon as a standard of quality.
2. Other Manufacturers and Products: Refer to Paragraph 1.03, Substitutions.

B. Model: HBC42 or equal:

1. Capacity: 750 lbs. Static load rating = 500%.
2. Maximum Lift Height: 48".
3. Speed: 12' per minute.
4. Motor: 1/2 HP, 1750 rpm, instant reversing, 115V, 60 Hertz, single phase, 15A.
5. Emergency Stop and Alarm with Battery Backup
6. Remote Alarm & ADA phone,
7. Drive means shall be 1:2 roller chain hydraulic equipped with a type "A" instantaneous slack chain safety device. The safety device linkage shall be made of stainless steel.

8. Brake: A spring actuated electrically released brake mounted directly on ball screw shaft. Braking action to be automatic upon release of any of the control switches.
9. Safety Device: Ball nut with integral safety to prevent uncontrolled descent in case of ball nut failure.
10. Controls: 24 VAC.
 - a. Car Operating Control: Push-button up-down, switch keyed.
 - b. Call-Send Controls: Push-button up-down switches at top and bottom landings.
 - c. Limit Switches: Adjustable up and down travel limit switches. Final limit switch to cut power to unit if normal switch fails.
 - d. Under-Platform Safety Switch: To stop car if any object contacts underside of platform.
11. Construction: All steel, galvanized with non-skid surface on car floor and ramp. Motor and lifting mechanism completely enclosed.
12. Car:
 - a. Platform Size: 3' x 4' and/or standard.
 - b. Platform Side Enclosures: 42" high.
 - c. Locking Gates: 42" high, self-closing with both electrical and mechanical contacts to prevent car movement unless gates are properly closed.
 - d. Provide platform safety under panel.
13. Locking Gates at Upper Landing: Same as car gates.
14. Finish: Factory applied baked enamel, manufacturer's standard color selection. Architect to select color.
15. Provide all components for a fully functional lift, Manufacturer to supply any and all necessary items and optional items for a proper fit and to comply with all current OSHA and CBC standards at time of bid and/or installation.

PART 3 - EXECUTION

3.01 INSPECTION:

- A. Examine supporting and/or surrounding construction connection points to electrical services, and other related work.
- B. Do not start work until unsatisfactory conditions are corrected.

3.02 INSTALLATION:

Set unit in place; anchor securely to building structure. Install all parts. Interconnect all controls.

3.03 FIELD QUALITY CONTROL:

- A. Provide all personnel, equipment, and instruments required for testing.
- B. Testing: Put lift into operation, check all controls for proper function, check all safety features, adjust as required to ensure proper functioning of entire installation.

3.04 ADJUSTMENT AND CLEANING:

- A. Adjustment: Check, adjust, and readjust. Repair any damaged finishes.
- B. Cleaning:

1. Remove excess construction materials, and foreign materials from work area, and all equipment.
2. Clean all exposed lift surfaces.

END OF SECTION

SECTION 21 00 00**GENERAL FIRE PROTECTION PROVISIONS****PART 1 - GENERAL****1.01 GENERAL CONDITIONS:**

- A. The foregoing General and Special Conditions shall form a part of this Division with the same force and effect as though repeated herein. The provisions of this Section shall apply to all the Sections of Division 21.

1.02 CODES AND REGULATIONS:

- A. All work and materials shall be in full accordance with current rules and regulations of 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 specifications shall govern. Applicable codes and regulations are:
 - 1. California Code of Regulations – CCR:
 - a. Title 8, Industrial Relations.
 - b. Title 24, Building Standards.
 - 2. California Building Code – CBC.
 - 3. California Mechanical Code – CMC.
 - 4. California Plumbing Code – CPC.
 - 5. California Green Building Code.
 - 6. American National Standards Institute – ANSI.
 - 7. American Society of Mechanical Engineers – ASME.
 - 8. American Society for Testing and Materials – ASTM.
 - 9. American Water Works Association – AWWA.
 - 10. California Electrical Code – CEC.
 - 11. National Electrical Manufacturers Association – NEMA.
 - 12. National Fire Protection Association – NFPA.
 - 13. Sheet Metal and Air Conditioning Contractors National Association – SMACNA.
 - 14. Underwriters' Laboratory – UL.
 - 15. Occupational Safety and Health Act - OSHA.

1.03 PERMITS AND FEES:

- A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required by local ordinances. All charges are to be included in the work. Permits for equipment connected to a particular system are to be considered as a part of the work included under each system; for example, permits for electric motor connection are part of electrical work, permits for domestic water connections are part of plumbing work. All charges for service connections, meters, etc. by utility companies or districts shall be included in the work.

1.04 COORDINATION OF WORK:

- A. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, sprinklered heads, equipment, supports, etc. shall be carefully planned, prior to installation of any work, to avoid all interference's with each other, or with structural, electrical or architectural elements. Verify the proper voltage and phase of all equipment with the electrical plans. All conflicts shall be called to the attention of the Architect prior to the installation of any work or the ordering of any equipment.

1.05 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.

1.06 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.

1.07 SUBMITTALS:

- A. Submit shop drawings in accordance with Division 01.
- B. 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. Material and 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.
 - 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, Architect, Engineer, and Contractor; Table of Contents; and indexed tabs dividing each group of materials or item of equipment. All items shall be marked with the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on the drawings.
 - 3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be highlighted, 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.

- C. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and the features desired. Unless otherwise noted, alternate manufacturers may be submitted for review by the Engineer. Calculations and other detailed data indicating how the item was selected shall be included. 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.
- D. 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 Architect, the design drawings and specifications shall control and shall be followed.

1.08 OPERATION AND MAINTENANCE INSTRUCTIONS:

- A. Printed: Four copies of the Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts lists for all equipment, etc. shall be submitted to the Architect. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. FP-1). All wiring diagrams shall agree with revised 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. Fire Pump, 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. **(These submittals shall be submitted with regular submittals at start of job so Commissioning Contractor can start on the commissioning check list for LEED certification or Title 24 Requirements)**
- B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The Fire Alarm Contractor shall present that portion of the instruction that applies to the control system. The Engineer's office shall be notified 96 hours prior to this meeting.
- C. Posted: The Contractor shall prepare operation instructions for all systems which shall be typewritten, reviewed by the Engineer, and mounted under glass adjacent to the appropriate control panel.
- D. Acknowledgment: The Contractor shall prepare a letter indicating that all operation and maintenance instructions (printed, verbal and posted) have been given to the Owner,

to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Architect.

1.09 RECORD DRAWINGS:

- A. The Contractor shall maintain a set of prints for the project as a record of all construction changes 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. buildings, curbs and walks. In addition, the fire sprinkler piping, water, etc. within the building shall be recorded by offset distances from building walls. The original drawings will be made available to the Contractor from which he shall have a set of reproducible drawings made. The Contractor shall then 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 Architect for review (as an alternative, the marked-up prints may be photocopied full size on reproducible stock).

PART 2 - PRODUCTS

2.01 PROTECTIVE COATING FOR UNDERGROUND PIPING:

- A. All ferrous pipe below grade (except cast iron) 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. Manville Corporation. Protective coating shall be extended 6" above surrounding grade.

2.02 CONCRETE ANCHORS:

- A. Steel stud with expansion anchor requiring a drilled hole; powder driven anchors are not acceptable. Minimum concrete embedment shall be 4-1/2 diameters. Minimum spacing shall be 10 diameters center-to-center and 5 diameters from center to edge of concrete. Maximum allowable stresses for tension and shear shall be 80% of the ICBO test report values "with special inspection". Anchors shall be Hilti, Phillips - or Approved equal.

2.03 SEISMIC RESTRAINTS:

- A. All fire sprinkler systems (all equipment, piping, etc.) shall be provided with seismic restraints in accordance with "Guidelines for Seismic Restraint of Mechanical Systems" dated 2016 NFPA No. 13.

2.04 SYSTEM IDENTIFICATION:

- A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, indicate the fluid conveyed or its abbreviation, either by preprinted markers or stenciled marking, and include arrows to show the direction of flow. 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 floor, walls or ceilings or otherwise pass into

inaccessible spaces, and at 50' maximum intervals along exposed portion of lines. Marking of short branches and repetitive branches for sprinkler head connections is not required.

- B. 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. FP-1). Provide 1/2" high lettering, white on black background. Nameplates shall be permanently secured to the unit.
- C. Valves: Provide valve tags on all valves of each piping system. Provide brass tags or plastic laminate tags. Prepare and submit a tagged valve schedule, listing each valve by tag number, location and piping service. Mount in glazed frame where directed.

2.05 EQUIPMENT SUPPORT FRAMES:

- A. Unless specifically noted otherwise, it shall be the responsibility of Fire Sprinkler Contractor to furnish and install all support frames for its equipment.

PART 3 - EXECUTION

3.01 SCHEDULING OF WORK:

- A. All work shall be scheduled subject to the approval of the Architect, Engineer and Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site.

3.02 CONDUCT OF WORK:

- A. 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 Divisions engaged upon this project or to the Owner.
- B. Fire Sprinkler Contractor shall arrange for all cutting necessary for the proper installation of its work, providing all sleeves and chases necessary. Cutting shall not be done in such a manner to impair the strength of the structure. Any damage resulting from work shall be repaired by the Contractor at his expense to the satisfaction of the Architect.
- C. Progressively, daily at the completion of each day's work, 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.

3.03 EXCAVATION AND BACKFILL:

- A. Excavation: Trenches are to be excavated to grade and depth established by drawings. Unless otherwise noted, minimum earth cover above top of pipe shall be 24", not including base and paving in paved areas. Width of trenches at top of pipe shall be a minimum of 16" plus the outside diameter of the pipe. Provide all shoring required by site conditions. Barrel of pipe shall have uniform support on trench bottom, hand excavate additional depth at bells, hubs and fittings. Where over-

excavation occurs, provide compacted selected backfill to pipe bottom. Where ground water is encountered, remove to keep excavation dry, using well points and pumps as required.

B. Backfill:

1. Around Pipe and to One Foot Above Pipe: Material shall be river run sand or native granular free flowing material, free of clay lumps, silt or vegetable matter and shall have 100% passing through the No. 4 sieve and a maximum of 3% passing through the No. 200 sieve. Place carefully around and on top of pipe, taking care not to disturb piping. Consolidate with vibrator.
2. One Foot Above Pipe to Grade: Material to 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 approval by the Engineer.
3. Remove all water sensitive settlement from trench backfill regardless of location and compaction requirements.

- C. Compaction: Compact to a density of 95% within building and 90% outside building. Demonstrate proper compaction by testing at one-half of the trench depth. Perform three tests per 100' of trench.

3.04 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. The actual openings and the required cutting and patching shall be provided. 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 also be provided. Cutting and 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.

3.05 MANUFACTURER'S RECOMMENDATIONS:

- A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of a 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.

3.06 QUIETNESS:

- A. Piping and equipment shall be arranged and supported so that vibration is a minimum and is not carried to the building structure or spaces.

3.07 DAMAGES BY LEAKS:

- A. The Contractor shall be responsible for damages to other work 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 to other work caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

3.08 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.

END OF SECTION

SECTION 21 00 01**FIRE PROTECTION SYSTEM****PART 1 - GENERAL****1.01 GENERAL CONDITIONS:**

- A. The foregoing Section 21 00 00, General Fire Protection Provisions shall form a part of this specification.

1.02 SCOPE:

- A. Included: Perform all work necessary and required to complete construction in the proposed building as indicated. Such work includes the furnishing of all labor, materials and services necessary for a complete lawful and operating wet pipe fire protection system with all equipment as shown or as noted on the drawings or as specified herein including alarm, central monitoring and notification systems.

1. Fire Sprinkler Piping, Heads and Accessories.
2. Underground Fire Service.
3. Fire Sprinkler Riser and Accessories.
4. Fire Department Connection.
5. Post Indicator Valve & Detector Check.
6. Hydraulic Calculations.

- B. Work Specified Elsewhere:

1. Electrical Wiring (60 volts or greater).
2. Fire Alarm System.

1.03 CODES AND STANDARDS:

- A. CBC.
- B. NFPA.
- C. CFC.
- D. UBC Standards.
- E. Local Standards.
- F. California Green Building Code.

1.04 DESIGN:

- A. Calculations: The system shall be designed for hazard occupancy as determined by the local Fire Prevention Agency in accordance with NFPA No. 13. System shall be hydraulically calculated and complete calculations and shop drawings shall be submitted to and approved by the local authority and the Architect. Submit and obtain approval from the local Fire Prevention agency and Architect prior to starting any work. All head locations shall be submitted to and approved by the Architect.

1.05 DEFINITIONS:

- A. Piping: The term piping shall mean all pipe, fittings, valves and accessories as required for a complete piping system.
- B. Agencies and Organizations:
 - 1. ASTM - American Society for Testing and Materials.
 - 2. ISO - Insurance Services Office.
 - 3. NFPA - National Fire Protection Agency.
 - 4. UL - Underwriters' Laboratories, Inc.

PART 2 - PRODUCTS**2.01 STANDARDS:**

- A. All material shall be in accordance with NFPA No. 13, "Standard for the Installation of Sprinkler Systems."

2.02 PIPING MATERIAL:

- A. Piping shall be as specified in NFPA No. 13.
- B. Underground piping shall be as specified in NFPA No. 24.

2.03 SPRINKLER HEAD:

- A. Automatic pendant or upright sprinkler head, UL listed. Semi-recessed chrome finish in finished areas, standard bronze finish in concealed areas. Temperature ratings shall be in accordance with NFPA No. 13. Provide wrench and extra heads (of each type installed) in accordance with code requirements.
- A. Coordinate with Architectural reflected ceiling plan for head locations and types.
- B. Provide 18 GA. wire guard over sprinkler heads in Gym.

2.04 MISCELLANEOUS:

- A. Pipe support: Pipe support shall be in accordance with NFPA No. 13 and as required to suit structure.

PART 3 - EXECUTION**3.01 PIPING INSTALLATION:**

- A. General: Piping shall be concealed in walls or above the ceilings 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.

B. Standards: All piping shall be installed in accordance with NFPA No. 13 "Standard for the Installation of Sprinkler Systems." The spacing and details of the support and bracing of the fire sprinkler piping shall comply with NFPA 13.

C. Miscellaneous:

1. Escutcheons: Provide chromium plated escutcheons where piping penetrates walls, ceilings or floors in finished areas.
2. Pattern: Sprinklers shall be installed in a symmetrical pattern with lighting fixtures. When located in tiled ceilings, heads shall be centered in tiles.

3.02 IDENTIFICATION:

- A. All controls, piping, valves and equipment shall be labeled for functions and service in accordance with NFPA No. 13.

3.03 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. 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 his work and that of other contractors to original conditions. Leaks and defects shown by the tests shall be repaired and entire work retested. Tests shall be in accordance with NFPA No. 13 and the local authority.

END OF SECTION

SECTION 22 00 00**GENERAL PLUMBING PROVISIONS****PART 1 - GENERAL****1.01 GENERAL CONDITIONS:**

- A. The foregoing General and Special Conditions shall form a part of this Division with the same force and effect as though repeated herein. The provisions of this Section shall apply to all the Sections of Division 22.

1.02 CODES AND REGULATIONS:

- A. All work and materials shall be in full accordance with current rules and regulations of 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 specifications shall govern. Applicable codes and regulations are:

1. California Code of Regulations – CCR:
 - a. Title 8, Industrial Relations.
 - b. Title 24, Building Standards.
2. California Building Code – CBC.
3. California Mechanical Code – CMC.
4. California Plumbing Code – CPC.
5. California Green Building Code.
6. American Gas Association – AGA.
7. American National Standards Institute – ANSI.
8. American Society of Heating, Refrigerating and Air Conditioning Engineers – ASHRAE.
9. American Society of Mechanical Engineers – ASME.
10. American Society for Testing and Materials – ASTM.
11. American Water Works Association – AWWA.
12. Cast Iron Soil Pipe Institute – CISPI.
13. California Electrical Code – CEC.
14. National Electrical Manufacturers Association – NEMA.
15. National Fire Protection Association – NFPA.
16. National Sanitation Foundation – NSF.
17. Plumbing and Drainage Institute – PDI.
18. Sheet Metal and Air Conditioning Contractors National Association – SMACNA.
19. Underwriters' Laboratory – UL.
20. Occupational Safety and Health Act - OSHA.
21. California Assembly Bill 1953 (AB1953).

1.03 PERMITS AND FEES:

- A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required by local ordinances. All charges are to be included in the work. Permits for equipment connected to a particular system are to be considered as a part of the work included under each system; for example, permits for electric motor connection are part of electrical work, permits for domestic water or gas connections

are part of plumbing work. All charges for service connections, meters, etc. by utility companies or districts shall be included in the work.

1.04 COORDINATION OF WORK:

- A. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, fixtures, equipment, supports, etc. shall be carefully planned, prior to installation of any work, to avoid all interference's with each other, or with structural, electrical or architectural elements. Verify the proper voltage and phase of all equipment with the electrical plans. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment.

1.05 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 Engineer.

1.06 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.

1.07 SUBMITTALS:

- A. Submit shop drawings in accordance with Division 01.
- B. 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. Material and 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.
 - 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 marked with the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on the drawings.

3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be highlighted, 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.
 - C. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and the features desired. Unless otherwise noted, alternate manufacturers may be submitted for review by the Engineer. Calculations and other detailed data indicating how the item was selected shall be included. 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.
 - D. 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.
- 1.08 OPERATION AND MAINTENANCE INSTRUCTIONS:

- A. Submit one electronic pdf copy for review and after approved submit three hard copies of the Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts lists for all equipment, 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. WH-1). All wiring diagrams shall agree with revised 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. Water Heaters, Pumps, 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. **(These submittals shall be submitted with regular submittals at start of job so Commissioning Contractor can start on the commissioning check list for LEED Certification or Title 24 Requirements)**
- 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 instruction that applies to the control system. The Engineer's office shall be notified 96 hours prior to this meeting.

- C. Acknowledgment: The Contractor shall prepare a letter indicating that all operation and maintenance instructions (printed, verbal and posted) have been given to the Owner, to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Engineer.

1.09 RECORD DRAWINGS:

- A. The Contractor shall maintain a set of prints for the project as a record of all construction changes 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. buildings, curbs and walks. In addition, the water, gas, sewer, etc. within the building shall be recorded by offset distances from building walls. The original drawings will be made available to the Contractor from which he shall have a set of reproducible drawings made. The Contractor shall then 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 (as an alternative, the marked-up prints may be photocopied full size on reproducible stock).

PART 2 - PRODUCTS

2.01 PROTECTIVE COATING FOR UNDERGROUND PIPING:

- A. All ferrous pipe below grade (except cast iron) 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. Manville Corporation. Protective coating shall be extended 6" above surrounding grade.

2.02 CONCRETE ANCHORS:

- A. Steel stud with expansion anchor requiring a drilled hole; powder driven anchors are not acceptable. Minimum concrete embedment shall be 4-1/2 diameters. Minimum spacing shall be 10 diameters center-to-center and 5 diameters from center to edge of concrete. Maximum allowable stresses for tension and shear shall be 80% of the ICBO test report values "with special inspection". Anchors shall be Hilti, Philips - or Approved equal.

2.03 SEISMIC RESTRAINTS:

- A. All plumbing systems (all equipment, piping, etc.) shall be provided with seismic restraints in accordance with "Guidelines for Seismic Restraint of Mechanical Systems" dated 1998 by SMACNA.

2.04 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 preprinted markers or stenciled marking, and include arrows to show the direction of flow. 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 floor, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portion of lines. Marking of short branches and repetitive branches for equipment connections is not required.

- B. 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. WH-1). Provide 1/2" high lettering, white on black background. Nameplates shall be permanently secured to the unit.
- C. Valves: Provide valve tags 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. Provide brass tags or plastic laminate tags. Prepare and submit a tagged valve schedule, listing each valve by tag number, location and piping service. Mount in glazed frame where directed.

2.05 EQUIPMENT SUPPORT FRAMES:

- A. Unless specifically noted otherwise, it shall be the responsibility of Plumbing Contractor to furnish and install all support frames for its equipment.

PART 3 - EXECUTION

3.01 SCHEDULING OF WORK:

- A. All work shall be scheduled subject to the approval of the Engineer and Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site.

3.02 CONDUCT OF WORK:

- A. 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 Divisions engaged upon this project or to the Owner.
- B. Plumbing Contractor shall arrange for all cutting necessary for the proper installation of its work, providing all sleeves and chases necessary. Cutting shall not be done in such a manner to impair the strength of the structure. Any damage resulting from work shall be repaired by the Contractor at his expense to the satisfaction of the Engineer.
- C. Progressively, daily at the completion of each day's work, 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.

3.03 EXCAVATION AND BACKFILL:

- A. Excavation: Trenches are to be excavated to grade and depth established by drawings. Unless otherwise noted, minimum earth cover above top of pipe shall be 24", not including base and paving in paved areas. Width of trenches at top of pipe

shall be a minimum of 16" plus the outside diameter of the pipe. Provide all shoring required by site conditions. Barrel of pipe shall have uniform support on trench bottom, hand excavate additional depth at bells, hubs and fittings. Where over-excavation occurs, provide compacted selected backfill to pipe bottom. Where ground water is encountered, remove to keep excavation dry, using well points and pumps as required.

B. Backfill:

1. Around Pipe and to One Foot Above Pipe: Material shall be river run sand or native granular free flowing material, free of clay lumps, silt or vegetable matter and shall have 100% passing through the No. 4 sieve and a maximum of 3% passing through the No. 200 sieve. Place carefully around and on top of pipe, taking care not to disturb piping. Consolidate with vibrator.
2. One Foot Above Pipe to Grade: Material to 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 approval by the Engineer.
3. Remove all water sensitive settlement from trench backfill regardless of location and compaction requirements.

- C. Compaction: Compact to a density of 95% within building and 90% outside building. Demonstrate proper compaction by testing at one-half of the trench depth. Perform three tests per 100' of trench.

3.04 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. The actual openings and the required cutting and patching shall be provided. 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 also be provided. Cutting and 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 Engineer.

3.05 MANUFACTURER'S RECOMMENDATIONS:

- A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of a 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.

3.06 QUIETNESS:

- A. Piping and equipment shall be arranged and supported so that vibration is a minimum and is not carried to the building structure or spaces.

3.07 DAMAGES BY LEAKS:

- A. The Contractor shall be responsible for damages to other work 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 to other work caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

3.08 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.

END OF SECTION

SECTION 22 00 01**PLUMBING****PART 1 - GENERAL****1.01 GENERAL CONDITIONS:**

- A. The foregoing Section 22 00 00, General Plumbing Provisions shall form a part of this specification.

1.02 SCOPE:

- A. Included: Perform all work necessary and required to complete construction as indicated. Such work includes the furnishings of all labor, materials and services necessary for a complete, lawful and operating plumbing system with all equipment as shown or noted on the drawings or as specified herein. The work includes, but is not necessarily limited to, the following:

1. Sanitary sewer system.
2. Domestic water system.
3. Plumbing fixtures.
4. Plumbing equipment.
5. Condensate drains.
6. Storm drain system.
7. Gas piping.

- B. Work Specified Elsewhere:

1. Line voltage power wiring (60 volts or greater), motor starters in motor control centers, and disconnect switches are included in the Electrical Division, unless otherwise noted.
2. Access doors.
3. Concrete and reinforcing steel.
4. 23 00 01, Heating, Ventilating and Air Conditioning.

1.03 CODES AND STANDARDS:

- A. All pipe, pipe or plumbing fittings or fixture, solder, or flux shall be lead free that provides water for human consumption per California Assembly Bill 1953 (AB1953).
- B. See Section 22 00 00 for additional requirements.

1.04 SUBMITTALS:

- A. Provide product data for all materials per Division 01.

PART 2 - MATERIALS**2.01 PIPING MATERIALS:**

- A. Sanitary Sewer:

1. Soil, Waste and Vent Piping:
 - a. Inside Building and Within Five Feet of Building Walls: Standard weight coated cast iron pipe and fittings. Plain end with neoprene gasket and stainless steel retaining sleeve, CISPI 301, ASTM A888 hubless cast-iron, or hub end with rubber gasket, ASTM A74, ASTM C564. Size 2" and smaller above grade may be standard weight galvanized steel, ASTM A53, with coated cast iron recessed drainage fittings, ANSI B16.12. All cast iron pipe and couplings shall be American made and tested, no imported pipe or coupling is acceptable. Use heavy-duty (4-Band) couplings for all soil and waste piping. Use standard (2-Band) couplings for all vent piping. Tyler Pipe, AB & I Foundry or Charlotte Pipe. Couplings shall be Tyler, Anaco or Husky.

Outside Building:

 - i. For domestic waste only: Polyvinyl chloride gravity sewer pipe with bell and rubber Z-gasket, ASTM D3034, SDR 35. Carlon, J.M.
 - ii. PVC-DWV sewer pipe with solvent weld, ASTM D2665. Schedule 40 wall thickness. Traps, sink outlets, cleanouts, etc., shall be same material. Traps shall have union connections.
 - iii. Where cover is less than 15", pipe shall be cast iron, same as for inside of building.
 2. Cleanouts: Floor cleanouts: Smith 4020 with nickel bronze top in finished areas; Smith 4220 in utility areas. Wall cleanouts: Smith 4530 with stainless steel cover and screw. Comparable models of Josam, Wade, Zurn or equal.
 3. Cleanout Box: Precast reinforced concrete. Cast iron lid marked for service. Christy or equal; F22 in foot traffic area; G5 in roadways.
- B. Storm Drain:
 1. Piping:
 - a. Inside Building and Within Five Feet of Building walls: Same as Soil, Waste, and Vent Piping.
 - b. Outside Building:
 - i. 10" and Smaller: Standard strength non-reinforced concrete bell and spigot, ASTM C14, or Polyvinyl chloride gravity sewer pipe with bell and rubber Z-gasket, ASTM D3034, SDR 35. Carlon, J.M. Where cover is less than 15", same as for inside building.
 - ii. 12" and Larger: Reinforced concrete, Class III, 2000 D-load, ASTM C76.
 - iii. Fittings: Fittings and couplings shall be specifically designed for the type of pipe used. Fittings and couplings designed for perforated or under drain piping will not be allowed.
- C. Water and Gas:
 1. Hot and Cold Water Piping:
 - a. Inside Building: Schedule 40 galvanized steel pipe, ASTM A120. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3 or Type L hard temper seamless copper, ASTM B88. Wrought copper fittings ANSI B16.22. Vacuum pipe shall have long sweeping elbow fittings. 95/5 tin-silver soldered joints. Brazesafe, Silcan or equal brazing material.
 - b. Outside Building Below Grade: Same as Inside Building with protective coating on ferrous pipe or Schedule 40 PVC pipe thru 2", Class 315 2" thru 4".
 2. Gas Piping:

- a. Above Grade: Schedule 40 black steel pipe, ASTM A120. 150 psi black malleable iron screwed fittings, ANSI B16.3, ANSI B31.8. Galvanized pipe and fittings will not be allowed. Flexible connections shall be convoluted brass with dielectric couplings, AGA approved. Outside building flexible connections shall be convoluted stainless steel with dielectric couplings, AGA approved. Prime and paint all piping.
- b. Outside Building – Below Grade: Same as Inside Building – Above Grade, with protective coating of ferrous pipe or medium density polyethylene (MDPE) PE2708 or PE2406 pipe manufactured in accordance with ASTM D2513 and IAPMO Standards.

D. Condensate Drain Piping: Same as cold water piping.

1. Valves:

- a. General: Manufacturer's model numbers are listed to complete description. Milwaukee, Kitz, Apollo, Nibco, Stockham or equal. All valves shall be full size of upstream piping. **Ball valves shall be substituted for gate valves 2" and smaller. Butterfly valves shall be substituted for gate valves 2-1/2" and larger. Cv factors for ball valves shall not be less than equal size gate valves.**
- b. Gate Valve: 2" and smaller: All bronze, rising stem, union bonnet, wedge disk, 200 psi WOG. Milwaukee No. 1152. The material of the valve stem shall be limited to a maximum of six (6) percent zinc content. 2-1/2" and larger: Iron body, bronze mounted. Non-rising stem. Wedge disk. 200 psi WOG. Flanged or AWWA hub as applicable. Open/ closed indicator. Milwaukee No. F2882. Underground valves shall have square operating nut.
- c. Check Valve: 2" and smaller: All bronze swing check, regrinding. 200 psi WOG. Milwaukee No. 509, 1509 or equal. 2-1/2" and larger: Non-slam type, 125 psi iron body wafer type with renewable seats and stainless steel spring. Milwaukee 1400 series or equal.
- d. Plug Valve: Eccentric bronze plug. Nickel chromium alloy iron body. Bronze bushings. Buna-N O-rings. UL approved for gas distribution. 175 psi WOG. DeZurick Series 400 or equal.
- e. Ball Valves: Two or three piece construction, forged bronze body, chrome plated brass ball, threaded ends, teflon seats, PTFE or reinforced teflon stem seals, lever handle. Underground valves shall have "T" handle. Provide one operating "T" extension handle for all underground valves. Milwaukee BA100/150, BA300/350, Nibco or equal.
- f. Gas Valves: 2" and smaller, Milwaukee BB2-100; 2-1/2" and larger, Rockwell #142 or equal.
- g. DI Water Valves & Accessories: All UPW process valves shall be True Union-style diaphragm or True Union-style quarter-turn ball valve produced from the same low-extractable PVC compound as piping. All valve diaphragms and seats shall be PTFE; valve o-rings shall be EPDM or *Viton® as applicable. All valve union nuts shall have buttress-style threads. All valve components shall be replaceable. System components shall be joined utilizing Harvel LXT® One-Step specialty solvent cement specifically formulated for joining the system.
- h. Valve Box: Precast reinforced concrete. Cast iron lid marked for service. Christy or equal; F22 in foot traffic areas; G5 in roadways.
- i. Butterfly Valve: Iron Body, Aluminum bronze disk (connection to shaft shall not be by pins, screws or bolts). Ductile body PPS coated with EPPM coated ductile disc. O-ring seals. Resilient removable seat. 416 stainless steel two piece shaft. 6" and smaller valves shall have multi-position lever handle.

Underground valves shall have square operating nut. Provide one operating "T" handle for underground valves. Provide 2" extension neck at insulated pipes. Milwaukee "C" series, Kitz or equal.

2. Miscellaneous Specialties:
 - a. 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.
 - b. Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi.
 - c. Dielectric Coupling: Insulating coupling rated for 250 psig. EPCO or equal.
 - d. Shock Absorbers: Sioux Chief "Hydra-Rester", Zurn "Shoktrol", PPP "SC Series" or equal.

E. Flue Piping:

1. Gas Flue Piping: Flue pipe shall be type as recommended by equipment manufacturer for which the pipe is connected to. UL listed. Metalbestos, Amerivent or equal.
2. Flue Cap: Designed to properly ventilate flue regardless of wind direction. Storm proof, bird proof. Metalbestos, Amerivent or equal.

F. Miscellaneous Piping Items:

1. Pipe Support:
 - a. Pipe Hanger: Adjustable split ring, swivel hanger and rod. Black malleable iron. Size and maximum load per manufacturer's recommendation. Felt lined, B-Line B3690F, Unistrut or equal.
 - b. Construction Channel: 12 gage 1-5/8" x 1-5/8" steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Unistrut, Superstrut or equal.
2. Pipe Sleeves: 24 gage galvanized steel. Adjus-to-Crete #10 with #99 thimble for floors. #100 for walls.
3. Flashing: Vent flashing and flashing for piping through roof shall be prefabricated 24 gauge galvanized steel roof jacks with 8" square flange around pipe. For tile or other roofing systems where pliable flashing is required, flashing shall be lead. Seal with weatherproofing mastic.

2.02 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. Pipe Insulation: Elastomeric type, ASTM C534, with a thermal conductivity of 0.27 at 75°F when measured in accordance with ASTM C177 or ASTM C518.
 1. Wall thickness: 3/4 in.
 2. Adhesive: Conform to Manufacturer's recommendations.
- C. 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-sq. ft-degrees F, at a mean temperature of

50 degrees F. 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, thickness shall be 1" for pipe sizes less than 2", 1-1/2" thickness for pipe sizes 2" and larger. CSG Insulation Corp., Manville, Owens-Corning or equal.

- D. Fiberglass Blanket: Unfaced. Thermal conductivity shall not exceed 0.25 Btu-in/hr sq. ft-degrees F, at a mean temperature of 50 degrees F. 1-1/2" thickness. Manville, Owens-Corning or equal.
- E. PVC Jacket (for exposed pipes and fittings): Pre-molded polyvinyl chloride (PVC) jackets. Size to match application. Provide PVC vapor barrier, pressure-sealing tape by same manufacturer. Zeston or equal.

2.03 FIXTURES:

- A. General: This Division shall rough-in for and install all plumbing fixtures shown on drawings. All trim not concealed shall be brass with polished chromium plate finish unless otherwise noted. 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. Manufacturer's model numbers are listed to complete description. Water consumption quantities listed on schedule are maximum. Equivalent models of American Standard, Crane, Haws, Kohler, Eljer, Zurn or equal. For drainage fixtures, equivalent models of Josam, Smith, Wade, Zurn or equal.
- C. Stops and P-traps: All fixtures shall be provided with stops and p-traps as applicable.
 - 1. Stops: All hot and cold water supplies shall be 1/2" angle stops with IPS inlets and compression outlets, stuffing box, screw driver lock shield, and 1/2" flexible brass tubing riser. Speedway. Wall mounted trim shall have concealed loose key wall stop. Chicago 1771 or equal.
 - 2. P-traps: Brass, ground joint. 17 gage. American Standard, California Tubuler or equal.
 - a. Trap primers shall be provided with ball valve and cylinder key-lock access panel for all floor drains and floor sinks. PPP, Inc. or equal.

2.04 EQUIPMENT:

- A. General Requirements:
 - 1. General: These equipment specifications are to supplement the drawings. Refer to schedules on drawings for the specific equipment to be provided. Capacities shall be in accordance with the schedules shown on the drawings. Capacities are to be considered minimum.
 - 2. Dimensions: Equipment must conform to space requirements and limitations as indicated on the drawings and as required for operation and maintenance. Equipment will not be accepted that does not readily conform to space conditions.
 - 3. Ratings: Electrical equipment shall be in accordance with NEMA Standards and UL listed where applicable standards have been established.
 - 4. Basis of Design: Manufacturers and model numbers listed in schedules as the basis of design are intended to represent the standard of quality and the features desired.

5. 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.
6. 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 not included in equipment package. Manual and magnetic starters shall have ambient compensating running over-current protection in all ungrounded conductors. Magnetic starters shall be manual reset. Controllers and other devices shall be in NEMA 3 or 12 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. Design shall limit starting inrush current and running current to values shown on drawings.
 - d. Starters: Motor starters shall be provided for all equipment except where starter is in a motor control center as designated on the electrical drawings.
 - e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt 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. Electric Drinking Fountain: Wall hung. Provide steel mounting brackets. Stainless steel basin. Removable grid drain. Chrome plated brass bubbler with automatic flow regulator and self-closing valve. Nonferrous evaporator. Hermetic compressor with automatic reset overload protection. Air cooled condenser. Adjustable thermostat. UL listed. ARI certified. Oasis, Sunroc.
- C. Water Heater, Gas: Glass lined tank. 150 psi working pressure. Fully insulated. Automatic temperature control. High limit control. Provide ASME rated temperature and pressure relief valve sized in accordance with energy input, dielectric couplings and drain cock. AGA and CEC approved. Extended warranty for a period of 5 years minimum. State, A.O. Smith, National, Rheem or equal.
- D. Water Heater, Instantaneous Gas: 150 psi working pressure. Automatic temperature control. High limit control. Direct vent sealed combustion with category III stainless steel venting. Coated copper heat exchanger. Provide with remote control panel. AGA and CEC approved. Extended warranty period of 5 years minimum. Nortiz, Rheem, Takagi or equal.

- E. Water Heater, Electric: Glass lined tank. 150 psi working pressure. Fully insulated. Automatic temperature control. High limit control. Provide ASME rated temperature and pressure relief valve sized in accordance with energy input, dielectric couplings and drain cock. UL listed and CEC approved. Extended warranty for a period of 3 years minimum. State, A.O. Smith, National, Rheem or equal.
- F. Water Heater, Instantaneous Electric: Tankless, automatic temperature control. High limit control. Provide microprocessor controls. UL listed and CEC approved. Warranty for a period of 1-year minimum. Rheem, Chronomite, Eemax or approved equal.
- G. Pressure Booster System:
1. Furnish and install a Model DS-135-40 Duplex constant speed, variable flow factory assembled water booster system as manufactured by Canariis Corporation, Riverview, Florida. The unit shall be rated for a system capacity of 135 GPM, with a system pressure of 35 PSIG, including a minimum suction pressure of 5 PSIG.
 2. The complete Packaged Pumping System, including pumps, motors, control equipment, ASME tank(s), valves, fittings and manifolds must be UL Listed. In addition to the UL Listing for the complete system the control panel assembly must be separately listed under UL-508 Industrial Control Equipment.
 3. Factory Assembly:
 - a. The booster system shall be factory assembled on a steel skid including pumps, motors, valves, 3 inch Type L Copper suction and discharge manifolds, and all interconnecting piping, wiring and controls. Provide isolation valves on the suction and discharge of each pump. The valves shall be Ball Valves. Provide two 4 ½ ANSI grade A, panel mounted gauges for indicating system suction and discharge pressure. All skid mounted components shall be factory finished in a high quality enamel paint.
 - b. Individual pumps, motors, pressure regulating or check valves may be serviced with the booster system in operation, and all components shall be suitable for the maximum working pressure in the system.
 4. Pumps:
 - a. System shall include multi-stage vertical centrifugal pumps with ANSI flanged connections. The pump suction/ discharge chamber, motor stool and pump shaft coupling shall be constructed of cast iron. The impellers, pump shaft, diffuser chambers, outer discharge sleeve and impeller seal rings or seal ring retainers shall be constructed of stainless steel. Intermediate and lower shaft bearings shall be bronze or tungsten carbide and ceramic. Pumps shall be equipped with a mechanical seal assembly with tungsten carbide seal faces mounted in stainless steel seal components. The pump motor shall be NEMA C face design mounted directly to the top of the pump:
 - i. Pump No. 1 shall be rated 135 GPM at 104 ft head.
 - ii. Pump No. 2 shall be rated 135 GPM at 104 ft head.
 5. Motors:
 - a. Motors shall be 460/3/60 and manufactured in accordance with NEMA standards:
 - i. Pump No. 1 shall be rated 3.0 HP, 3500 RPM.
 - ii. Pump No. 2 shall be rated 3.0 HP, 3500 RPM – Motors shall be selected so they do not exceed name plate HP rating throughout the programmed pump operation.
- that
sequence of

6. System Valves:
 - a. Constant system pressure shall be maintained by a pilot operated diaphragm type combination pressure regulating and non-slam check valve on each pump. Main valve and cover to be cast iron with a fused epoxy coating and stainless steel stem and cover bolts. Construction shall be suitable for the maximum working pressure of the system.
7. Hydro-Pneumatic Tank:
 - a. Provide a hydro-pneumatic tank with a carbon steel shell and a replaceable F.D.A. approved heavy duty bladder to separate the air and water. No water shall come in contact with the metal walls of the tank. Features shall include an air fill valve, pressure gauge connection and bottom system connection suitable for 100% drawdown.
 - b. The tank must be constructed in accordance with Section VIII of the ASME code and be N.B. stamped and shall be a FXA400 ASME 125 psi 300 Gallon Tank.
 - c. The tank shall be mounted adjacent and the tank feed line shall be connected between the lead pump(s) discharge and it's PRV to provide maximum tank storage.
8. Lead Pump Operation:
 - a. The lead pump shall run only as necessary to maintain system pressure and shall be controlled automatically by means of a pressure switch and minimum run timer to prevent short cycling.
9. Lag Pump Sequence:
 - a. The lag pump shall be sequenced on and off automatically in accordance with the system demand.
 - b. The lag sequence control shall be pressure switch operated with on delay and minimum run timers to prevent short cycling.
10. Control Panel:
 - a. Each system shall include a UL listed enclosed industrial control panel in a NEMA 3/3R enclosure factory mounted and wired on the steel skid. The panel shall be furnished with Main Disconnect With External Handle and Fusing with through the door handle(s), magnetic starters with (3) leg overload protection, pump run lights, H-O-A selector switches, 115 volt fused control transformer, necessary relays and timers and pump start, stop and sequence controls.
11. Control Panel Options:
 - a. In addition, the control panel shall be furnished with the following features:
 - i. Low Suction Pressure Shutdown Circuit with Auto Reset and Light.
 - ii. Automatic Alternation.
 - iii. System Temperature Probe and Purge.
 - iv. Key Lockable Enclosure.
12. Factory Test:
 - a. After factory assembly, the packaged pumping system shall be hydrostatically tested as well as undergo a complete electric and hydraulic test from 0 to 100% design flow at the factory. All controls, pump sequencing devices, alarms and instrumentation shall be tested and calibrated for proper operation during factory testing.
13. Warranty:
 - a. The booster system shall be warranted in writing against defects in materials or workmanship under normal use and service for a period of one year after date of original operation but not more than 18 months from date of shipment from the Company's factory when installed and used in accordance with good standard practice.

14. Start-Up Service:

- a. The service of a factory trained representative shall be made available on the jobsite for start-up and instructing operating personnel. Notify the Engineer 2 days prior to the start-up.
- H. Storage Tank: ASME steel tank with epoxy interior liner with 5 year warranty. Tank shall be provided with factory manhole, lifting lugs and threaded pipe connections. The tank shall be field insulated with a minimum of R-13 batt insulation with 20 gage aluminum jacket. Raypak, Laars, Lochinvar or equal.
- I. Circulation Pump: Bronze pump with stainless steel or non-metallic impeller. Shaft shall be stainless steel or ceramic with carbon bearings with EPDM O-ring and gaskets. Replaceable cartridge type circulators shall have stainless steel cartridge. Connections shall be sweat, threaded or flanged. Taco, Bell & Gossett, Grundfos, Armstrong or equal.

PART 3 - EXECUTION**3.01 PIPING INSTALLATION:****A. General:**

1. Piping Layout: Piping shall be concealed in walls, above ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Owner's Representative. No structural member shall be cut, notched, bored or otherwise altered 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. Expansion joints shall be installed as required. Vertical lines shall be installed to allow for building settlement without damage to piping. All exposed piping to be primed and painted, see painting section.
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 the same suitable alloy as pipe. Welding or brazing shall be performed in accordance with requirements of recognized published standards of practice and by licensed or otherwise certified contractors. Welder or Brazer shall be a person who specialized in welding or brazing of pipes and holds a recognized certificate of competency from a recognized testing laboratory, based on the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
 - c. Other: Joints other than threaded or welded shall be installed in accordance with manufacturer's recommendations.
 - d. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
 - e. Electrical Equipment: Joints shall be avoided, where possible, over electrical equipment.

- f. Copper pipe 1-1/2" or less may be soldered. Above 1-1/2" and all below grade shall be brazed.
3. Fittings:
- Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
 - Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
 - Unions: A union shall be installed on the leaving side of each valve, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
 - Valves: All valves shall be full line size. At equipment connections, valves shall be full size of upstream piping.
4. Pipe Support:
- 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. Vertical piping shall be supported at floor and ceiling. Support pipe within 12" of all changes in direction. Support individual pipes with pipe hanger. All pressure piping, drainage piping above grade and metallic piping of dissimilar metal from hangers shall have isolating shield, or felted hangers.
 - Screwed Pipe:

Pipe Size Between Supports*	Max. Spacing
(in)	(ft)
1/2	6
3/4	8
1	8
1-1/4 & larger	10

* Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings.

- Copper Tubing: Copper tubing shall be supported at approximately six (6) foot intervals for piping one and one-half (1-1/2) inches and smaller in diameter and ten (10) foot intervals for piping two (2) inches and larger in diameter.
 - 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.
- Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for approval.
5. Excavation and Backfill: Minimum cover on all piping shall be as follows unless otherwise noted:
- Up to 2-1/2" pipe - 24" cover.
 - 3" and larger pipe - 30".
6. Miscellaneous:
- Escutcheons: Provide chromium plated escutcheons where piping penetrates walls, ceilings or floors in finished areas.
 - Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" clearance between sleeve and pipe or pipe insulation.

- c. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined.
 - d. Shock Absorbers: Install per manufacturers recommendations.
- B. Sanitary Sewer Piping:
- 1. General: Where inverts are not indicated, sanitary sewer 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.
 - 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. Cleanouts at urinals shall be installed above urinal.
 - 3. Vents: Vents shall terminate not less than 6" above the roof nor less than 12" from any vertical surface nor within 10 feet of any outside air intake. Install horizontal vent lines at 1/4" per foot pitch. Offset vents 2 feet minimum from gutters, parapets, ridges and roof flashing.
 - 4. Acid Waste & Vent: Push together joints tightly, then mark with permanent marker before fusing joints. After fusing joints with piping manufacturer's tools then cut off fusing tabs on pipe. Tailpiece and traps shall be threaded union fittings only.
- C. Water Piping: Connections to branches and risers shall be made from the side of the 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. Provide ball valve shutoff for each building and at each connection to equipment and trap primers. Shock absorbers shall be installed in a vertical position at end of branch runs as specified in this section whether specifically shown or not on drawings. Connections to equipment shall be made with flexible connectors. Non-metallic pipe shall have 18 AWG copper tracer wire laid on top of pipe and taped in place at 15-foot spacing, terminate 4" above grade at ends of pipe runs.
- D. Gas Piping: Shall be pitched to drain to drip legs at each piece of equipment. No unions shall be installed except at connections to equipment. Provide shutoff at each equipment connection. Connections to equipment shall be made with flexible connectors. Under floor piping shall be sleeved, sealed and vented. Polyethylene or polyvinyl chloride pipe and fittings shall be joined in accordance with manufacturer's recommendation. Metal-to-plastic transition fittings shall be installed at all transitions. Non-metallic pipe shall have 18 AWG copper tracer wire laid on top of pipe and taped in place at 15-foot spacing, terminate 4" above grade at ends of pipe runs. All gas below grade shall have continuous caution tape installed 12" above gas line. All exposed gas piping shall be primed and painted, see painting section.
- E. Condensate Drain Piping: Install with constant pitch to receptacle, 1/4" per foot where possible, otherwise 1/8" per foot minimum. Provide trap at each air handling unit to prevent air leakage. Connections to equipment shall be made with flexible connection unless connection is internally isolated.
- F. Storm Drain Piping: Install at 1/4" per foot pitch.
- G. Flue Piping: Flue piping shall be installed in accordance with its UL listing and manufacturer's instructions.

3.02 PIPING INSULATION INSTALLATION:

A. Domestic Tempered Water Supply:

1. General: All domestic tempered water supply piping, except for exposed connections to fixtures, shall be insulated. Do not insulate unions or valves less than 2", unless exposed to weather.
2. Install elastomeric pipe insulation by slipping over end of pipe. Where not feasible, slit insulation longitudinally, snap over piping and seal with adhesive. Insulate fittings with larger diameter sleeves or insulation, lapping pipe insulation a minimum of 2 in.
3. Butt sections of insulation tightly together and seal with adhesive to provide a continuous vapor and thermal barrier.
4. 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 sealing tape.
5. Fittings and Valves:
 - a. Wrap fitting with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket in accordance with manufacturer's recommendations. Seal all joints with factory supplied pressure sealing vapor barrier tape with 2" (min.) overlap on both sides of joint. Insulate valves to stem.
 - b. For miscellaneous fittings 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 and at least two coats of vapor barrier coating. All exposed ends of insulation shall be adequately sealed.

B. ADA Compliant Fixtures:

1. At sinks/ lavatories which are to be ADA Compliant, the p-trap and angle stop assemblies shall be insulated with Trap Wrap Protective Kit 500R by Brocar, Truebro Handi Lav-Guard #102W or #105W or equal. Abrasion resistant exterior cover shall be smooth and have 1/8" wall minimum over cushioned foam insert. Fasteners shall remain substantially out of sight.

3.03 FIXTURE INSTALLATION:

- A. Fixture Height: Shall be standard height except those specified as ADA Compliant. Such fixtures shall be mounted in accordance with CBC, Section 11B, Division 6 and drawing details.
- B. 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).
- C. Floor Drains or Floor Sinks: Shall be placed parallel to room surfaces, set level, flush with floor and adjusted at proper height to drain and easily accessible for inspection and cleaning. Cover openings during construction to keep all foreign matter out of drain line.

- D. Other Connections: Rough-in and connection for trim or fixtures supplied by others shall be included in this specification section.
- E. Floor Mounted Fixtures: Shall be provided with proper support plates. Caulk fixtures against floors with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).

3.04 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.
- B. Connections to Equipment: Where size reductions are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

3.05 TESTS AND ADJUSTMENTS:

- A. General: Unless otherwise directed, tests shall be witnessed by the Owner's Representative. 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 his work, and that of other contractors, 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. New sections shall be isolated from existing sections for testing purposes. 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. Test the new sections or branches of piping only.
- B. Gravity System:
 - 1. Sanitary Sewer: All ends of the new sections of sewer system shall be capped and lines filled with water to the top of the highest vent, 10 feet 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. Condensate Piping: Maintain 15 psig water pressure for a duration of 4 hours.
- 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. Test the new sections or branches of piping only.
 - 2. Domestic Tempered, Cold & DI Water Piping: Maintain 60 psig water pressure for a minimum duration of 2 hours.
 - 3. Gas, Vacuum and Air Piping: Maintain 60 psig air pressure for a minimum duration of 2 hours.
- D. Accessible Lavatories:

1. Faucet controls and operating mechanisms shall be installed and tested to comply per CBC Section 11B-606.4.

3.06 DISINFECTION:

- A. Disinfect all domestic hot and cold water piping systems in accordance with California Plumbing Code Sections 609.9.1 through 609.9.4. The method to be followed shall be that prescribed by the Health Authority or, in case no method is prescribed by it, the following:
 1. The pipe system shall be flushed with clean, potable water until potable water appears at the points of outlet.
 2. The system or parts thereof shall be filled with a water-chlorine solution containing not less than 50 parts per million of chlorine, and the system or part thereof shall be valved-off and allowed to stand for 24 hours; or, the system or part thereof shall be filled with a water-chlorine solution containing not less than 200 parts per million of chlorine and allowed to stand for 3 hours.
 3. Following the allowed standing time, the system shall be flushed with clean, potable water until the chlorine residual in the water coming from the system does not exceed the chlorine residual in the flushing water.
 4. The procedure shall be repeated where it is shown by bacteriological examination made by an approved agency that contamination persists in the system.
- B. Disinfection process shall be performed by certified testing agency or 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, water samples shall be collected by certified testing agency or by health department for bacteriological analysis. Certificate of Bacteriological Purity shall be obtained and delivered to the Owner through the Owner's Representative.

END OF SECTION

SECTION 23 00 00**GENERAL MECHANICAL PROVISIONS****PART 1 - GENERAL****1.01 GENERAL CONDITIONS:**

- A. The foregoing General and Special Conditions shall form a part of this Division with the same force and effect as though repeated herein. The provisions of this Section shall apply to all the Sections of Division 23.

1.02 CODES AND REGULATIONS:

- A. All work and materials shall be in full accordance with current rules and regulations of 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 specifications shall govern. Applicable codes and regulations are:

1. California Code of Regulations – CCR:
 - a. Title 8, Industrial Relations.
 - b. Title 24, Building Standards.
2. California Building Code – CBC.
3. California Mechanical Code – CMC.
4. California Plumbing Code – CPC.
5. California Green Building Code.
6. Air Diffusion Council – ADC.
7. American Gas Association – AGA.
8. Air Moving and Conditioning Association – AMCA.
9. American National Standards Institute – ANSI.
10. Air Conditioning and Refrigeration Institute – ARI.
11. American Society of Heating, Refrigerating and Air Conditioning Engineers – ASHRAE.
12. American Society of Mechanical Engineers – ASME.
13. American Society for Testing and Materials – ASTM.
14. American Water Works Association – AWWA.
15. California Electrical Code – CEC.
16. National Electrical Manufacturers Association – NEMA.
17. National Fire Protection Association – NFPA.
18. Sheet Metal and Air Conditioning Contractors National Association – SMACNA.
19. Underwriters' Laboratory – UL.
20. Occupational Safety and Health Act - OSHA.

1.03 PERMITS AND FEES:

- A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required by local ordinances. All charges are to be included in the work. Permits for equipment connected to a particular system are to be considered as a part of the work included under each system; for example, permits for electric motor connection are part of electrical work, permits for domestic water or gas connections

are part of plumbing work. All charges for service connections, meters, etc. by utility companies or districts shall be included in the work.

1.04 COORDINATION OF WORK:

- A. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, ductwork, equipment, supports, etc. shall be carefully planned, prior to installation of any work, to avoid all interference's with each other, or with structural, electrical or architectural elements. Verify the proper voltage and phase of all equipment with the electrical plans. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment.

1.05 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 Engineer.

1.06 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.

1.07 SUBMITTALS:

- A. Submit shop drawings in accordance with Division 01.
- B. 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. Material and 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.
 - 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 marked with the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on the drawings.

3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be highlighted, 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.
 - C. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and the features desired. Unless otherwise noted, alternate manufacturers may be submitted for review by the Engineer. Calculations and other detailed data indicating how the item was selected shall be included. 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.
 - D. 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.
- 1.08 OPERATION AND MAINTENANCE INSTRUCTIONS:

- A. Submit one electronic pdf copy for review and after approved submit three hard copies of the Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts lists for all equipment, 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-1). All wiring diagrams shall agree with revised 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. 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. **(These submittals shall be submitted with regular submittals at start of job so Commissioning Contractor can start on the commissioning check list for LEED Certification or Title 24 Requirements)**
- 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 instruction that applies to the control system. The Engineer's office shall be notified 96 hours prior to this meeting.

- C. Posted: The Contractor shall prepare operation instructions for all systems which shall be typewritten, reviewed by the Engineer, and mounted under glass adjacent to the appropriate temperature control panel. These instructions shall include applicable temperature control diagrams.
- D. Acknowledgment: The Contractor shall prepare a letter indicating that all operation and maintenance instructions (printed, verbal and posted) have been given to the Owner, to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Engineer.

1.09 RECORD DRAWINGS:

- A. The Contractor shall maintain a set of prints for the project as a record of all construction changes 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. buildings, curbs and walks. In addition, the water, gas, under-floor ducts, etc. within the building shall be recorded by offset distances from building walls. The original drawings will be made available to the Contractor from which he shall have a set of reproducible drawings made. The Contractor shall then 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 (as an alternative, the marked-up prints may be photocopied full size on reproducible stock).

PART 2 - PRODUCTS

2.01 PROTECTIVE COATING FOR UNDERGROUND PIPING:

- A. All ferrous pipe below grade (except cast iron) 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. Manville Corporation. Protective coating shall be extended 6" above surrounding grade.

2.02 CONCRETE ANCHORS:

- A. See structural drawings for concrete anchor locations, embedment, and testing requirements.

2.03 SEISMIC RESTRAINTS:

- A. All mechanical systems (all equipment, piping, etc.) shall be provided with seismic restraints in accordance with *DPM #0052-13 (B-LINE)*

2.04 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 preprinted markers or stenciled marking,

and include arrows to show the direction of flow. 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 floor, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portion of lines. Marking of short branches and repetitive branches for equipment connections is not required.

- B. 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-1). Provide 1/2" high lettering, white on black background. Nameplates shall be permanently secured to the unit.
- C. Valves: Provide valve tags on all valves of each piping system, excluding check valves, valves within equipment, shut-off valves at equipment and other repetitive terminal units. Provide brass tags or plastic laminate tags. Prepare and submit a tagged valve schedule, listing each valve by tag number, location and piping service. Mount in glazed frame where directed.
- D. Controls: Label all panels, thermostats and by-pass timers with plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-1). Provide 1/4" high lettering, white on black background. Nameplates shall be permanently secured to the unit.

2.05 EQUIPMENT SUPPORT FRAMES:

- A. Unless specifically noted otherwise, it shall be the responsibility of Mechanical Contractor to furnish and install all support frames for its equipment.

PART 3 - EXECUTION

3.01 SCHEDULING OF WORK:

- A. All work shall be scheduled subject to the approval of the Engineer and Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site.

3.02 CONDUCT OF WORK:

- A. 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 Divisions engaged upon this project or to the Owner.
- B. Mechanical Contractor shall arrange for all cutting necessary for the proper installation of its work, providing all sleeves and chases necessary. Cutting shall not be done in such a manner to impair the strength of the structure. Any damage resulting from work shall be repaired by the Contractor at his expense to the satisfaction of the Engineer.
- C. Progressively, daily at the completion of each day's work, 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.

3.03 EXCAVATION AND BACKFILL:

- A. Excavation: Trenches are to be excavated to grade and depth established by drawings. Unless otherwise noted, minimum earth cover above top of pipe shall be 24", not including base and paving in paved areas. Width of trenches at top of pipe shall be a minimum of 16" plus the outside diameter of the pipe. Provide all shoring required by site conditions. Barrel of pipe shall have uniform support on trench bottom, hand excavate additional depth at bells, hubs and fittings. Where over-excavation occurs, provide compacted selected backfill to pipe bottom. Where ground water is encountered, remove to keep excavation dry, using well points and pumps as required.
- B. Backfill:
1. Around Pipe and to One Foot Above Pipe: Material shall be river run sand or native granular free flowing material, free of clay lumps, silt or vegetable matter and shall have 100% passing through the No. 4 sieve and a maximum of 3% passing through the No. 200 sieve. Place carefully around and on top of pipe, taking care not to disturb piping. Consolidate with vibrator.
 2. One Foot Above Pipe to Grade: Material to 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 approval by the Engineer.
 3. Remove all water sensitive settlement from trench backfill regardless of location and compaction requirements.
- C. Compaction: Compact to a density of 95% within building and 90% outside building. Demonstrate proper compaction by testing at one-half of the trench depth. Perform three tests per 100' of trench.

3.04 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. The actual openings and the required cutting and patching shall be provided. 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 also be provided. Cutting and 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 Engineer.

3.05 MANUFACTURER'S RECOMMENDATIONS:

- A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of a 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.

3.06 QUIETNESS:

- A. Piping, ductwork and equipment shall be arranged and supported so that vibration is a minimum and is not carried to the building structure or spaces.

3.07 DAMAGES BY LEAKS:

- A. The Contractor shall be responsible for damages to other work 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 to other work caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

3.08 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.

END OF SECTION

SECTION 23 00 01**HEATING, VENTILATING AND AIR CONDITIONING****PART 1 - GENERAL****1.01 GENERAL CONDITIONS:**

- A. The foregoing Section 23 00 00, General Mechanical Provisions shall form a part of this specification.

1.02 SCOPE:

- A. Included: Perform all work necessary and required to complete construction as indicated. Such work includes the furnishings of all labor, materials and services necessary for a complete, lawful and operating air conditioning, heating, ventilating system with all equipment as shown or noted on the drawings or as specified herein. The work includes, but is not necessarily limited to, the following:
 - 1. Heating, ventilating and air conditioning equipment.
 - 2. Air distribution system (Ductwork, Air Terminals, etc.).
 - 3. System insulation.
 - 4. Controls and control wiring and conduit for control wiring.
- B. Work Specified Elsewhere:
 - 1. Line voltage power wiring (60 volts or greater), motor starters in motor control centers, and disconnect switches are included in the electrical section.
 - 2. Connection of gas and condensate drains to equipment.
 - 3. Access doors.

PART 2 - MATERIALS**2.01 DUCTWORK MATERIALS:**

- A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL-181 not exceeding a flame spread of 25 and smoke developed of 50. All ductwork shall be per Chapter 6 of the CMC.
- B. Low Velocity Metal Ductwork: Metal ductwork shall be galvanized sheet steel, ASTM A527.
- C. Low Velocity Flexible Ductwork: Insulated flexible ductwork. Continuous internal liner bonded to galvanized steel wire helix. One pound per cubic foot glass fiber insulation, R-8. Thermal conductivity shall not exceed 0.13 Btu/hr sq. ft.- degrees F at a mean temperature of 75°F. Seamless vapor barrier jacket. Each length shall have a factory installed metal sleeve at each end. Duct shall be capable of continuous operation at 1.5" of water static pressure and 4000 ft./ min. air velocity. Maximum length 5 ft., single piece at runouts to air terminals. Genflex, Lamborn or equal.
- D. Kitchen Hood Exhaust Duct: Ductwork shall be galvanized steel all welded construction, ASTM A240. United McGill Corp.

- E. Spiral Duct: Ductwork shall be galvanized steel with uni-seal spiral seamlock and uni-seal fittings, ASTM A653. United McGill Corp or equal. All exposed spiral duct shall be painted, color selected by Owner.
- F. Bonding Adhesive: Durodyne WBG, Scotchgrip Adhesive 4230 or equal.
- G. Duct Mastic: Minnesota Mining and Manufacturing Duct Sealer 800, Tuff-Bond No. 12, Glencot Seal-Flex or equal.
- H. Duct Joints:
 - 1. As an option to joints and seams designated by SMACNA or shown on Drawings, the following systems may be used:
 - a. Ducts with sides 24 inches to 48 inches, transverse duct joint system by Ductmate Jr., Nexus or equal (SMACNA "E" Type connection).
 - b. Ducts 48 inches and larger, Ductmate Regular, Nexus (SMACNA "J" Type connection) or equal.
- I. Fiber Tape: Mineral impregnated fiber tape and plastic activator-adhesive. Hardcast Inc., United McGill Uni-Cast or equal.
- J. Evaporative Cooler Duct: Ductwork shall be double wall insulated galvanized steel exterior and aluminum or stainless steel interior glass fiber insulation. 1.5 lb./cu. ft. density, 2" thick minimum, R-8. Thermal conductivity shall not exceed 0.13 Btu/ hr. sq. ft.-degrees F at a mean temperature of 75 degrees F. CSG Insulation Corp., Manville, Owens-Corning, Knauf or equal. Duct dimensions shown on drawings for double wall duct are clear (net) opening inside.

2.02 AIR TERMINALS AND DUCT FITTINGS:

- A. Grilles: (Grilles, Registers and Diffusers)
 - 1. Information on Drawings: Refer to the Air Distribution Schedule on the drawings for the list of grilles. Manufacturer's model numbers are listed to complete the description. Equivalent models of J & J, Krueger, Barber-Colman, Anemostat, Price, Titus or equal. Refer to the floor plans for neck size, CFM, air diffusion pattern, and fire damper, if required.
 - 2. Performance: 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 re-selected by the Contractor for the proper diffusion, spread, drop and throw.
 - 3. Frame and Accessories: All supply, return, and exhaust grilles shall be provided with cushion heads and attachments to structure, 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 drawing, coordinate prior to ordering.
 - 4. Finish: All ceilings and wall grilles shall have a paintable white finish unless otherwise noted. Interior components shall be flat black.
 - 5. Gyms: Provide 12 Ga. wire safety cables for all overhead grilles in Gym.
- B. Turning Vanes: Double wall, hollow metal, air-foil shape. Spacing in accordance with manufacturer's recommendations. Aero Dyne, HEP or equal.

- C. Flexible Connection: UL listed neoprene coated 30-ounce fiberglass cloth. 3" metal, 6" fabric, 3" metal. Ventglas or equal.
- D. 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, ½" 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).

Must specify duct smoke detector - coordinate with electrical.

- E. Fire/ Smoke Damper: Multi-blade construction in accordance with CBC & CMC. UL 555 and UL 555S labels. Blades shall have metal-to-metal seals and not rely on actuator torque to maintain leakage rating. Prefco, Air Balance, Ruskin, Greenheck 5020-1 with 5800MB2 power open/spring close operator, or equal.
- F. Fire Damper: Dynamic rated fire dampers, U.L. 555 label. Prefco, Air Balance, Ruskin, Greenheck or equal.
- G. Louvers: Refer to the Air Distribution Schedule on the drawings. Manufacturer's model numbers are listed to complete the description. Equivalent models of Ruskin, Greenheck, Dayton or approved equal. Contractor shall fabricate and provide 16 GA. galvanized perforated panel (50% Free Area) over exterior of all louvers and have field painted to match exterior wall. Refer to the floor plans for all sizes.

2.03 DUCTWORK INSULATION MATERIALS:

- A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL-181 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Acoustic Lining: Glass fiber. One side coated to prevent fiber erosion up to 6000 ft./ min. Average noise reduction coefficient of 0.90. 0.13 Btu/ hr – sq. ft. – degrees F conductivity at a mean temperature of 75 degrees F, R-8. CSG Insulation Corp., Schuller, Owens-Corning, Knauf or equal. Duct dimensions shown on drawings for lined duct are clear (net) opening inside of lining.
- C. Fiber Glass Blanket: Foil faced, 0.13 Btu/ hr – sq. ft. – degrees F conductivity at a mean temperature of 75 degrees F, R-8. CSG Insulation Corp., Schuller, Owens-Corning, Knauf or equal.
- D. Bonding Adhesive: Benjamin Foster 85-15 or equal.

2.04 PIPING MATERIALS:

- A. Flue Piping:

1. Gas Flue Piping: Flue pipe shall be type as recommended by equipment manufacturer for which the pipe is connected to. UL listed. Metalbestos, Amerivent or equal.
 2. Flue Cap: Designed to properly ventilate flue regardless of wind direction. Storm proof, bird proof. Metalbestos, Amerivent or equal.
- B. Flue/ Combustion Air Piping:
1. Gas Flue Piping: Schedule 40 PVC pipe with solvent weld fittings.
 2. Flue Cap: Designed to properly ventilate flue regardless of wind direction. Storm proof, bird proof. Factory concentric vent/ combustion air termination kit.
- C. Refrigerant Piping:
1. Type L hard temper seamless copper, ASTM B88. Wrought copper fittings ANSI B16.22. 50/ 50 lead-tin solder joints above grade, 95/ 5 tin-silver brazed joints below grade. Provide schedule 40 PVC sleeve pipe for all below grade refrigerant piping. All piping shall be sized per equipment manufacturer requirements.
 2. Valves and Specialties:
 - a. Line Valves: Bronze body, ball type, TFE locked in seals. Back seated valve stem. Contromatics C-11.
 - b. Filter-Drier: Replaceable core. Capacity in accordance with ARI Standard 710. Sporlan "Catch-All".
 - c. Moisture Indicator-Sight Glass: Double port. Henry, Sporlan.
 - d. Vibration Isolating Connection: Seamless flexible bronze tubing, braid covered. Suitable for system pressure. American, Flexonics.
- D. Refrigerant Piping (Ductless Split System Multi-Zone):
1. Type ACR soft temper seamless copper, ASTM B280. Cast copper alloy fittings for flared copper tubes, ASME B16.26. Follow the Society of Automotive Engineers SAE J533 Standard-Flares for tubing. All piping shall be sized per equipment manufacturer requirements.
 2. Valves and Specialties:
 - a. Line Valves: Bronze body, ball type, TFE locked in seals. Back seated valve stem. Contromatics C-11.
 - b. Filter-Drier: Replaceable core. Capacity in accordance with ARI Standard 710. Sporlan "Catch-All".
 - c. Moisture Indicator-Sight Glass: Double port. Henry, Sporlan.
 - d. Vibration Isolating Connection: Seamless flexible bronze tubing, braid covered. Suitable for system pressure. American, Flexonics.
- E. Miscellaneous Piping Items:
1. Pipe Support:
 - a. Pipe Hanger: Adjustable split ring, swivel hanger and rod. Black malleable iron. Size and maximum loads per manufacturer's recommendation. Felt Lined, Kin-Line 450 F.
 - b. Construction Channel: 12 gage 1-5/8" x 1-5/8" steel channel. Single or multiple sections. Self-locking nuts and fittings. Kin-Line, Unistrut.
 2. Pipe Sleeves: 24 gage galvanized steel. Adjus-to-Crete #10 with #99 thimble for floors. #100 for walls.

- F. Flashing: Flashing for piping through roof shall be prefabricated 24 gage galvanized steel roof jacks with 8" square flange around pipe. Seal with weatherproofing mastic.

2.05 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. Refrigerant Piping: Rubber based elastomeric preformed pipe insulation. Thermal conductivity shall not exceed 0.25 Btu-in/hr-SF-degree F at mean temperature of 75 degrees F., 3/4" thick. Provide aluminum pipe and fitting jacketing. 0.016" thickness for straight pipe, 0.024" thickness for fittings with integral moisture barrier, pre-fabricated strapping and seals for piping exposed to weather, Childers, Pabco or equal.
1. Insulation shall be provided on both refrigerant lines for ductless split systems.

2.06 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 recommend external wiring.
6. Fan Selection:
- a. Fan Curves: Performance curves shall be submitted for all units of 3000 CFM or greater. Operating point for forward curved fans shall be from point of maximum efficiency towards increased CFM limited by horsepower scheduled. Operating point for backward inclined fans shall be selected near point of maximum efficiency. Curves shall plot CFM verses static pressure with constant brake horsepower, RPM and efficiency lines.
 - b. 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 in completed and prior to acceptance. Provide pressure differential gage across all filter banks.
 - b. Filter Media: 2" media. MERV-11. Clean filter resistance 0.25" water at 500 fpm. Throw-away frame. Class 2. Camfil Farr AP-Eleven.
 - c. Pressure Differential Gage: Diaphragm actuated. 4" dial. Zero adjustment. Accuracy +/- 2% of full scale. Range as required. Provide static pressure sensors, tubing and mounting brackets. Dwyer Series 2000. Mark gage to indicate filter replacement pressure, coordinate point with filter and equipment manufacturers.
8. 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.

9. Sound Ratings: Shall be in accordance with ASHRAE 36-72. Sound ratings shall not exceed scheduled values.
10. 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.

B. Air Conditioning Unit (thru 15 tons):

1. General: Self-contained heating/cooling unit designed for outdoor installation. Factory assembled and tested. Provide all starters and relays required for operation. 24 volt control circuit from integral transformer. Weatherproof cabinet, galvanized steel with enamel finish. Drain pan. Multivane, centrifugal supply fan. ARI certified. Gas equipment AGA certified. BDP, Carrier, York, Trane, Lennox and Daikin.
2. Refrigeration: Sealed Hermetic compressor with heater, high/ low pressure switch, recycling timer. Air-cooled condenser with propeller fan. Non-ferrous finned coil. Low ambient control to 45 degrees F, unless otherwise noted.
3. Heat: Gas fired. Aluminized or ceramic-coated welded steel heat exchanger. Electric ignition. Automatic gas valve, 100% safety shutoff.
4. Economizer with Power Exhaust: Economizer shall be a modulating power exhaust type where the unit will exhaust at the minimum outside air setpoint and exhaust 100% during economizer mode. Economizer with power exhaust is shipped separately and shall be field installed and wired under this section.
 - a. Provide plastic air sampling tube to sense pressure in room for control of power exhaust. Tube shall be placed thru ceiling with escutcheon plate in room that unit serves.
 - b. Modulating Economizer Sequence of Operation:

The economizer system initially responds to a signal from the cooling thermostat and functions as a true first stage for cooling, while providing maximum fuel economy. The economizer is automatically locked out during the heating mode and holds the outdoor air damper at the minimum position settings.

During the occupied period, the discharge sensor provides a signal to the actuator during free cooling or economizer mode. The signal opens the economizer damper until the discharge temperature drops below 50 degrees F. At this time the signal causes the motor to drive the damper back to minimum position. As the discharge temperature climbs to 60 degrees F the motor will drive back open. During the occupied period, the actuator will not close past the minimum position.

If the fully open actuator cannot satisfy the space demand, mechanical cooling is sequenced on.

During the unoccupied period, the actuator will override minimum position setting and drive fully closed. On a loss of power, the actuator will spring return fully closed.

When in heating operation, or when outdoor air temperature or enthalpy conditions are high, economizer operation is locked out, and actuator is held at minimum position.

The staging relay is used when the first stage compressors must provide mechanical cooling when assisting the economizer.

The staging relay can be omitted when the second stage compressors can be used to assist the economizer with mechanical cooling.

c. CO2 Sensor Economizer Integration:

When a CO2 sensor is used in conjunction with an economizer, the minimum position jumper between P and P1 on the logic is removed, and the sensor connected. When the CO2 sensor gets a reading higher than the setpoint, the sensor will signal the logic to modulate the o/a dampers open. The HVAC unit functions as if there is no economizer during the CO2 call for fresh air.

When the CO2 level falls below the setpoint, the damper modulates back to the minimum position.

d. Modulating Power Exhaust Sequence of Operation:

When the outside air damper on an economizer starts to open, extra air is introduced the system. As this happens, a mercury switch mounted on the economizer closes. This causes a switch to close on the variable speed controller, allowing high voltage power to be sent to an exhaust motor and blower.

The mercury switch is adjusted to close at the 1% outside air damper position.

The power exhaust is a centrifugal blower power exhaust. The power exhaust uses an adjustable transducer (0-10 VDC) to accurately compare the space pressure to atmospheric pressure, and adjust the amount of exhaust air accordingly. The exhaust volume adjustment is accomplished using a variable frequency drive with a built-in PID control to maintain a field adjustable pressure set point.

4. Economizer: Economizer shall be a modulating gear driven type where the outside air will modulate from closed to minimum outside air setpoint and 100% during economizer mode. Economizer is shipped separately and shall be field installed and wired under this section.
5. Guarantee: Provide 5 year extended parts warranty on the condenser coil and compressor.

C. Ductless Split System Air Conditioning:

1. Condensing Unit:
 - a. General: Self-contained unit designated for outdoor installation. Factory assembled and tested. Provide all starters and relays required for operation. 24 volt control circuit from integral transformer. Weatherproof cabinet, galvanized steel with enamel finish. Drain pan. ARI certified. Provide 3/4" x 18 GA. expanded metal coil guards. Daikin, Quietside, Carrier, York, Trane and Mitsubishi.
 - b. Refrigeration: Sealed Hermetic compressor with internal vibration isolating mount. Crank case heater, high/low pressure switch, anti-recycle timer. Air-cooled condenser with propeller fan. Non-ferrous finned coil. Low ambient control to 25°F, unless otherwise noted.
 - c. Guarantee: Provide 5 year extended warranty on the condenser coil and compressor.
2. Indoor Unit: Multi-speed direct drive blower on vibration mountings, filters, capacity as scheduled on plans. Daikin, Quietside, Carrier, York, Trane and Mitsubishi.
3. Coil Section: Encased coil. Casing shall be galvanized steel finished with baked enamel. Direct expansion evaporation coils complete with distribution piping, expansion valve, drain pan, and drain connection. Daikin, Quietside, Carrier, York, Trane and Mitsubishi.

F. Exhaust Fans:

1. General: All exhaust fans shall be tested and rated in accordance with AMCA Standard 210. Fans exposed to the weather shall have ventilated weatherproof housing over motor and drive assembly.
2. Ceiling Fan: Ceiling mounted direct drive centrifugal exhaust fan with exhaust grille. Motor mounted on rubber-in-shear isolators. Motor and fan removable through grille. Acoustically lined housing. Backdraft damper. UL listed. Penn, Cook, ACME, Greenheck or equal.
3. Kitchen Hood Fan: Multivane centrifugal fan. Ball bearings. Vibration isolation mount. All aluminum construction with steel or aluminum wheel, and aluminum curb base. Weatherproof disconnect switch. Upblast type UL listed for removal of smoke and grease laden vapors (YZHW, 762), for kitchen hood service. Cook, Greenheck, Penn, ACME or equal.
4. Utility Fan: Multivane centrifugal fan. Ball bearings. Vibration isolation mount. All aluminum construction with steel or aluminum wheel, and aluminum curb base with built-in stack. Weatherproof disconnect switch. CFD and by-pass damper included. Upblast type UL listed for removal of chemical vapors, for fume hood service. Greenheck or approved equal.
5. Roof Fan: Multivane centrifugal fan. Ball bearings. Vibration isolation mount. All aluminum curb base. Weatherproof disconnect switch. Down blast type UL listed. Cook, Greenheck, Penn, ACME or equal.

6. In-Line Fan: Attic mounted direct drive centrifugal exhaust fan. Motor shall be open drip proof with permanently lubricated sealed bearings and built-in thermal overload protection and disconnect plug. Acoustic lined housing. Backdraft damper. UL listed. Provide 24"x24" access panel with cylinder key lock when above hard ceiling. Penn, Cook, ACME, Greenheck or equal.
- G. Make-up Air Unit:
1. General: Greenheck or equal shall be furnished per schedule. Equipment shall consist of a furnace section (fueled by natural gas), blower, and direct evaporative cooling section. The unit shall be tested as a complete package prior to shipment.
 2. Furnace and Controls: Indirect fired gas furnace shall be 80% efficient, ETL list and certified to ANSI Z83-8. The furnace shall have a blow through fan design. Furnace shall be capable of operation with natural gas and have a power venting system. The burner and heat exchanger shall be constructed of stainless steel. Standard furnace features shall include main gas pressure regulator, main gas valve, electronic staged or electronic modulating controls, electronic intermittent pilot ignition system, high limit and a 24 volt control transformer.
 3. Unit Casing and Frames: Unit shall be of double wall construction. Internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at job site. All components shall be easily accessible through removable doors. Insulation in accordance with NFPA 90A and tested to meet UL 181 erosion requirements and secured to unit with water proof adhesive and permanent mechanical fasteners. Permatecor exterior finish, color by Architect. Unit base to be designed for curb mounting, curb to be furnished with the unit. Unit base shall over hang the curb for a positive seal against water run-off.
 4. Fan Section: Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally spring isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings or ball bearing pillow blocks. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.
 5. Motors and Drives: Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy-duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces, 10-horse power and less shall be supplied with an adjustable drive pulley.
 6. Electrical: All internal electrical components shall be prewired for single point power connection. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 120 VAC circuit, integral door interlocking disconnect switch with separate motor fusing and terminal strip. Contactors Class 20 adjustable overload protection and single-phase protection shall be standard.
 7. Filter Section: Filters shall be mounted in a V-bank arrangement such that velocities across the filters do not exceed 550.0 ft./ min. Filters shall be easily accessible through a removable access panel.

8. Direct Evaporative Cooling Section: Evaporative Cooling media shall be Munters CELdek with a depth of 12 inches for a cooling effectiveness of 90%, with a stainless steel housing all provided by the Heat Recovery Unit manufacturer. Drain and overflow connections with bleed kit shall be piped through the side of the HRE unit.
 9. Weather Hood: Weather hoods shall be the same finish as the unit and shall be constructed of G90 galvanized steel with bird screen mounted at the intake.
 10. Control Panel: Provide remote control panel with On-Off-Vent-Cool-Heat indicator lights and programmable thermostat control on face of panel. Permatecor coated galvanized control panel.
- H. Air Conditioning Unit (Above 25 Tons):
1. Description:
 - a. Self-Contained - Factory assembled and tested; designed for slab installation; and consisting of compressors, condensers, evaporator coils, condenser and evaporator fans, refrigeration, gas heater, filters, and dampers. Provide 5 year compressor warranty and 15 year non-prorated heat exchanger warranty. Aeon or approved equal.
 2. Construction:
 - a. Unit shall be completely factory assembled, piped and wired and shipped in one section.
 - b. Unit shall be specifically designed for outdoor slab mount application with a fully weatherproof cabinet.
 - c. All cabinet walls, access doors, roof and floor shall be a high performance composite panel constructed with G90 galvanized steel on both sides and a closed cell polyurethane foam interior core providing a rigid, impact resistant surface.
 - i. The walls of the air tunnel compartments shall be 2 inches thick with a minimum R value of 12.5.
 - ii. The walls of the coil compartment shall be 1-½ inches thick with a minimum R value of 9.4.
 - iii. The roof of the air tunnel compartments shall be sloped at a minimum of ¼ inch per foot and shall be an average of 2-½ inches thick and an R value of 15.7.
 - iv. The floor of the conditioned air and control compartments shall be 1 inch thick with a minimum R value of 6.25.
 - v. The access doors shall be 1-½ inches thick with a minimum R value of 9.4.
 - vi. The foam shall have a minimum density of 2 pounds per cubic feet.
 - vii. All foam material shall be tested in accordance with ASTM D-1929 for a minimum flash ignition temperature of 610 degrees F.
 - viii. All panels shall have a thermal break with no metal path from inside to outside.
 - d. Paint finish shall be capable of withstanding at least 2000 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.
 - e. Unit specific color coded wiring diagrams shall match the unit color coded wiring and will be provided in both point-to-point and ladder form.
 - f. Diagrams shall also be laminated in plastic and permanently affixed inside the control compartment.

- g. Access to filters, heating section, and other items needing periodic checking or maintenance shall be through hinged access doors with quarter turn lockable latches. Door fastening screws are not acceptable. The blower access door shall be bolted closed.
 - h. Access doors shall have stainless steel hinges and full perimeter gasketing.
 - i. All openings through the base pan of the unit shall have upturned flanges of at least 1/2" in height around the opening through the base pan.
 - j. Air side service access doors shall have rain break overhangs.
 - k. Unit shall have decals and tags to indicate unit lifting and rigging, service areas and caution areas. Installation and maintenance manuals shall be supplied with each unit.
3. Supply Fans:
- a. The fan shall be direct drive single width single inlet un-housed airfoil centrifugal, plenum fans. Supply fans shall have all aluminum construction. Fans attached to 1760 rpm motors shall be rated for a minimum of 1800 RPM maximum speed. Fans attached to 1170 rpm motors shall be rated for a minimum of 1200 RPM maximum speed. Direct drive fans shall be directly connected to and supported by the motor shaft. Motor bearings shall be rated for 200,000 hours service and shall have external lubrication connections. Fan(s) and motor(s) shall be dynamically balanced, and the entire fan assembly mounted on rubber isolators. Supply air shall be from the bottom of the cabinet. Variable Volume Systems VFD drive(s) shall be factory mounted and wired to the fan motor(s).
4. Outside Air:
- a. Shall be a fully modulating economizer integral controls. The outside air damper and return air damper assembly shall be constructed of extruded aluminum, hollow core, air foil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 25 CFM of leakage per sq. ft. of damper area when subjected to 2 in. w.g. air pressure differential across the damper. Damper motor shall be spring return to ensure closing of outdoor air damper during periods of unit shut down or power failure.
5. Return Fan Section:
- a. Power Return Fans: Axial flow direct drive fans shall be constructed of a polymeric material with fiberglass reinforcement and adjustable blade pitch. Direct drive fans shall be directly connected to and supported by the motor shaft. Motor bearings shall be rated for 200,000 hours service and shall have external lubrication connections. Fan(s) and motor(s) shall be dynamically balanced. Variable Volume Systems VFD drive(s) shall be factory mounted and wired to the fan motor(s).
6. Condenser:
- a. Air Cooled Condenser Section:
 - i. The condensing section shall be equipped with vertical discharge axial flow direct drive fans. Direct drive fans shall be directly connected to and supported by the motor shaft.
 - ii. The condenser coils shall be sloped at least 30 degrees to protect the coils from damage.
 - iii. Condenser coils shall be copper tubes with aluminum fins mechanically bonded to the tubes.
 - iv. Condenser coils to be sized for a minimum of 10°F of refrigerant sub-cooling.

- v. Provide 3/4"x18" GA. expanded aluminum condenser coil guards shop fabricated and installed by contractor.
7. Filters: 2-inch-thick, fiberglass, throwaway with an ASHRAE efficiency of 30%. With direct dial reading Magnehelic gauge mounted in the control compartment
 8. Evaporator Coils:
 - a. Evaporator coils shall be copper tube with aluminum fins mechanically bonded to the tubes.
 - b. Evaporator coils shall have galvanized steel end casings.
 - c. Evaporator coils shall have equalizing type vertical tube headers.
 - d. Evaporator coils shall be furnished with a thermostatic expansion valve.
 - e. Evaporator coils shall be furnished with a double sloped stainless steel drain pan for the positive drainage of condensate.
 - f. A drain connection shall be provided on each side of the unit. The manufacturer shall provide a P-trap condensate drain fitting for field installation to the drain connections.
 9. Refrigeration System:
 - a. Compressors shall be scroll type with internal thermal overload protection and mounted on the compressor manufacturer's recommended rubber vibration isolators. Each compressor shall have independent refrigerant circuits.
 - b. Compressors shall be mounted in an isolated compartment to permit operation of the unit without affecting air flow when the door to the compartment is open.
 - c. Compressors shall be isolated from the base pan and supply air to avoid any transmission of noise from the compressor into the building area.
 - d. System shall be equipped with thermostatic expansion valve type refrigerant flow control.
 - e. System shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant controls.
 - f. Unit shall be equipped with Schrader type service fittings on both the high side and low pressure sides of the system.
 - g. Unit shall be equipped with refrigerant liquid line dryers.
 - h. Unit shall be fully factory charged with refrigerant.
 - i. Hot gas bypass shall be provided on all refrigerant circuits.
 - j. Each compressor shall be individually staged for capacity control.
 - k. All circuits shall be equipped with liquid line sight glasses.
 - l. Unit shall be equipped with a 5 minute anti-short cycle delay timer for each stage.
 - m. Unit shall be equipped with 20 second between stage delay timers for each stage.
 10. Gas Heat Section:
 - a. Unit shall heat using natural gas fuel and with a minimum four stages of heat capacity.
 - b. Unit shall be provided with a gas heating furnace consisting of an aluminized steel heat exchanger with multiple concavities, an induced draft blower and an electric pressure switch to lockout the gas valve until the combustion chamber is purged and combustion air flow is established. Drum type heat exchangers or heat exchanger tubes with separate internal turbulators are not acceptable.

- c. Unit shall be provided with a gas ignition system consisting of an electronic igniter to a pilot system, which will be continuous when the heater is operating, but will shut off the pilot when heating is not required.
 - d. Unit shall have gas supply piping entrances in the unit base for through the curb gas piping and in the outside cabinet wall for across the roof gas piping.
 - e. The gas heat exchanger shall carry a 15 year non pro-rated warranty.
11. Controls: Programmable thermostat.
 12. Smoke Detector:
 - a. Unit shall be provided with a smoke detector (Notifier #FSD-751P, CSFM #3240-0028:205) sensing in the supply air portion of the unit wired to shut off the unit control circuit for the supply air fan and to alert the Fire Alarm System.
 13. Power:
 - a. Unit shall be provided with a factory installed and wired internal disconnect.
 - b. Unit shall be provided with phase and brown-out protection to shut down all motors in the unit if the phases are more than 10% out of balance on voltage, or the voltage is more than 10% under design voltage or on phase reversal.
 14. Curb:
 - a. Curb shall be constructed of insulated galvanized steel. Curbs are to be fully gasketed between the curb top and unit bottom with the curb providing full perimeter support, cross structure support and air seal for the unit. Curb gasketing shall be furnished within the control compartment of the slab mounted unit to be mounted on the curb immediately before mounting of the slab mounted unit. Curb shall be 36 inches high and include horizontal supply duct connection, return duct connection and turning vanes within curb.
- I. Evaporative Coolers:
1. Heavy-duty type, with epoxy coated galvanized steel construction.
 2. Furnish centrifugal blower with performance certified in accordance with AMCA 210 test procedures, pump (with transformer when required), and 6 position rotary wall switch.
 3. Provide level adjustment on distribution trough.
 4. Use resilient mounts on motor.
 5. Manufacturer: Essick/ Champion, Arvin, Arctic Circle, Adobe Air/ Alpine, Champion or approved equal.
- J. Range Hood:
1. General: Self-contained stainless steel residential style unit designed for indoor installation and UL listed. Factory assembled and tested. Provide with washable aluminum filters, integral controls for multi-speed fan and two (50 watt max.) halogen flood lights. Verify color or stainless steel with Architect/ Owner prior to ordering. Broan or equal.

PART 3 – EXECUTION

3.01 DUCTWORK INSTALLATION:

A. General:

1. Standards: Unless otherwise noted, all ductwork shall be constructed and installed in accordance with current SMACNA "HVAC Duct Construction Standards". Ductwork and accessories shall be installed in a manner to prevent vibration and rattling.
 2. Seismic bracing: All ducts shall be braced and supported per SMACNA Guidelines for "Seismic Restraints Manual for Mechanical Systems" dated 1998, including Appendix E.
 3. Duct Access Doors: Provide access doors as required to adjust equipment and dampers.
 4. Flexible Connections: Connections of ductwork to all equipment shall be with 6" (min.) flexible connection. Install with ample slack and uniform gap after deflection of vibration isolators. There shall be no metal to metal contact across flexible connection. Protect outdoor connections with weatherproof metal shroud on top and sides, no metal-to-metal contact. Provide at all seismic joints.
 5. Ducted Returns: All air handling that is not directly located in the space that it serves shall have ducted returns.
 6. Open ends of ductwork shall be covered during construction to keep inside clean.
- B. Low Velocity-Low Pressure (up to 2000 ft/ min; 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 shall be straight tap-in with extractor or 45 degree takeoff, as shown on drawings.
 - c. Duct Joints: Seal duct joints airtight with fiber tape and adhesive per manufacturer's printed instruction. Ducts in weather shall be sealed air and water tight with duct mastic before closing and taping.
 - i. Where Ductmate type joints are used, the manufacturer's designated procedure shall be followed. Ductmate joints on roof shall have continuous cleat on top duct flange to prevent water from collecting on gasket.
 - d. Dampers: Install volume control damper and damper regulator in all branch ducts.
 - e. Duct dimensions shown on drawings for lined ducts, are clear net openings inside of lining.
 - f. Top of ducts exposed to weather shall be cross broken and sloped slightly to side to allow rain water to run off. Ducts that do not drain off top will be need to be replaced at contractors' expense.
 2. Flexible Glass Fiber Ductwork: Hangers shall be 2" wide metal straps spaced to prevent sagging, 3 feet spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. All joints and fittings shall be sheet metal and shall be installed with metal bands or 3 (min) self-tapping screws and fiber tape. Maximum length of flexible duct shall be 5 ft. Single piece minimum length shall be 3 ft. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius to duct centerline not less than 1.5 times the duct diameter).

each
rejected and

3.02 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 "HVAC Duct Construction Standards", details on

drawings and manufacturers instructions. Terminals and fittings shall be installed in a manner to prevent vibration and rattling.

- B. Fire Smoke Damper: Fire smoke dampers shall be installed in accordance with their State Fire Marshal approval and the manufacturer's recommendations.
- C. Gym: Attach safety cable to inside of duct and to grille neck with #10 sheet metal screws.

3.03 DUCTWORK INSULATION INSTALLATION:

- A. General: All supply and return sheet metal ductwork shall be insulated.
- B. Concealed Ductwork: Wrap ductwork with fiberglass blanket lapped 2" minimum. Secure with foil tape at all joints for a complete vapor barrier.
- C. Acoustic Lining: All ductwork in equipment rooms, where exposed to weather, and elsewhere as indicated on drawings, shall have acoustic lining. 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.

3.04 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. Expansion joints and/or flexible connectors shall be installed as required. Vertical lines shall be installed to allow for building settlement without damage to piping. Lines shall be adequately braced against vertical and lateral movement.
 - 2. 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. Vertical piping shall be supported at floor and ceiling. Support pipe within 12" of all changes in direction. No perforated straphanger shall be used in any work.

- b. Refrigerant Piping: Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted and erected before brazing. Install specified accessories. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation shall not be less than 70 degrees F. 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 ellis. Seal ends of conduit watertight.
- c. Flue Piping: Flue piping shall be installed in accordance with its UL listing and manufacturer's instructions. All welders shall be certified in accordance with AWS Standard D9.1, Specifications for welding sheet metal.
- d. PVC 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.

3.05 PIPING INSULATION INSTALLATION:

- A. Refrigerant Piping: Cover suction piping with foamed plastic insulation. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendation. Cover all fittings, unions, valves, and connections. Piping exposed to weather shall be covered with aluminum jacketing, seal all joints and seams with grey outdoor mastic or silver silicone sealant. Piping exposed in room shall be covered with piping chase painted to match wall.

3.06 EQUIPMENT INSTALLATION:

- A. General: It shall be the responsibility of the contractor to insure that no work done under other specification sections shall in any way block, or otherwise hinder access panels or diminish the effectiveness of equipment vibration isolation.
- B. Connections to Equipment: Where size reductions are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet. Connections made to equipment mounted on vibration isolators shall be with flexible connectors, installed adjacent to equipment.
- C. Start Up: Engage manufacturer or factory-authorized service representative to perform start up supervision. Manufacturer shall provide on-site start up and commissioning assistance through job completion. Complete installation and start up checks according to manufacturer's written instructions.

3.07 TEMPERATURE CONTROL SYSTEM:

- A. Thermostats shall have the capability of terminating all heating at a temperature of no more than 70 degrees F, or terminating all cooling at a temperature of no less than 78 degrees F, and to provide a temperature range of up to 10 degrees F between full heating and full cooling. Thermostats shall be 7 day programmable, WiFi enabled with sub-base capable of battery back up or capacitor to retain program in the event of a power outage. All control wiring, regardless of voltage, shall be installed in conduit.

Refer to Thermostats manufacture and model as noted on equipment schedules for district standard model.

3.08 SYSTEM AIR BALANCE:

- A. Scope: Provide the services of a qualified independent test and balance agency certified by the Associated Air Balance Council (AABC) or The National Environmental Balancing Bureau (NEBB) to test, adjust and balance, retest, and record performance of the system to obtain design quantities as specified. Balancing contractor must also be TABB certified and have a C-20 license.
- B. Qualifications: Prior to commencing work, the agency shall be approved by the Owner's Representative.
- C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be available for examination. Application of instrumentation shall be in accordance with AABC standards.
- D. Procedure: General: Balanced quantities shall be plus 5%, minus 5% of design quantities. All name-plate data, manufacturer, model, and serial numbers shall be recorded for each item tested.
- E. 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 Owner's Representative 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 Owner's Representative in making any tests he may require during this period of time.
- F. 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 downward 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, dampers or the addition of dampers cleaning of insect screens and replacement of filters 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.
- G. Test, adjust and retest water bleed rates from evaporative coolers. Record all data.

END OF SECTION

SECTION 26 00 00**ELECTRICAL****PART 1 – GENERAL****1.01 RELATED DOCUMENTS:**

Contact requirements of the foregoing GENERAL CONDITIONS, SPECIAL CONDITIONS and supplements thereto and all requirements of Division 1 of these Specifications shall form a part of this Section with the same force and effect as though repeated herein. The provisions of this Section shall apply to all of the following Sections of Division 26 of these Specifications. All applicable portions of the work under Division 26 shall conform fully to all provisions of all other Division 16 Sections along with other Sections of these Specifications.

1.02 SUMMARY OF WORK:

The Contractor shall provide all materials, tools, equipment, labor and services necessary to furnish and install complete working electrical systems as shown on the plans and described within these Specification. All systems, at project completion and before final acceptance, shall be demonstrated to have a complete and working functional operation. The work includes but is not specifically limited to items indicated on Drawings and specified herein.

1.03 DESCRIPTION AND INSTALLATION OF SYSTEMS:

- A. The electrical drawings are diagrammatic and do not necessarily show all raceway, wiring, number or types of fittings, offsets, bends or exact locations of items required by the electrical systems. Items not shown or indicated which are clearly necessary for proper operation, payment or installation of systems shown shall be provided at no-increase in contract price.
- B. The exact routing of systems and location of devices and equipment shall be governed by coordination with other trades, structural and architectural conditions. The Architect or Electrical Engineer reserves the right, at no increase in contract price, to make reasonable changes in location of electrical equipment or wiring systems; so as to coordinate with other systems, group them into orderly relationships, or to increase their utility. Contractor shall verify requirements in this regard prior to roughing in.
- C. Install electrical work in cooperation with other trades and make proper provisions to avoid interferences and coordinate with structural and architectural features, in a manner approved by the Architect or Electrical Engineer. All changes caused by neglect to make such provisions shall be at Contractor's expense. Provide offsets and special fittings, as required to facilitate installation of the work.
- D. When a particular product or type of product is specified with a manufacturer's designation, the latest published specifications, installation, and construction

information of the manufacturer shall constitute the minimum acceptable standard. Any substitutions shall be made in accordance with Section 1.09 SUBSTITUTIONS.

1.04 RELATED DOCUMENTS:

A. Codes and Regulations: All electrical equipment and material and its installation shall conform to the current requirements of the following authorities and Section 01-080 CODES AND STANDARDS:

1. Occupational Safety and Health Act (OSHA).
2. 2016 California Electric Code (CEC)
3. California Code of Regulations (CCR).
 - a. Title 8, Safety Orders.
 - b. Title 19, Fire and Panic Safety Standard.
 - c. Title 24, Part 1, Administrative Regulations.
4. 2016 California Fire Code
5. 2016 California Building Code (Based on the International Building Code, now incorporated as CCR-T24, Part 2.)

NOTE: Where two or more codes conflict, the most restrictive shall apply. Nothing in these Drawings and Specifications shall be construed to permit work not conforming to applicable codes.

B. Tests and Standards: The tests, standards, or recommended procedures of the following agencies shall relate to all parts of these Specifications and shall be considered a minimum:

1. American National Standards Institute (ANSI).
2. Underwriters Laboratories, Inc. (UL).
3. National Electric Manufacturers Association (NEMA).
4. Electrical Testing Laboratories (ETL).
5. National Fire Protection Association (NFPA).
6. Insulated Power Cable Engineers Association (IPCEA).
7. Institute of Electrical and Electronic Engineers (IEEE).
8. Illumination Engineering Society (IES).

1.05 EXAMINATION OF DOCUMENTS AND SITE:

Before submitting a proposal, each bidder shall carefully examine the electrical, mechanical, architectural, and structural drawings and specifications. He shall also visit the site and fully inform himself as to all existing conditions and limitations applying to the work. If, after such examination and study, it appears that any change from the drawings and specifications should be allowed, the bidder shall so state in writing together with any change in cost involved.

By the act of submitting a proposal, each bidder shall be deemed to have made such examinations of the drawings and specifications and premises, and it will be assumed that he is therefore familiar with the entire scope of the project and has based his proposal upon the work described in the Drawings and Specifications and upon all existing conditions and limitations applying to his work.

1.06 EXECUTION:

- A. **Workmanship:** The work shall be performed by competent workmen, skilled in the particular phase of the work entailed. The work shall be first class throughout, neat, accurate and in full accordance with the intent of these Specifications and the satisfaction of the Architect or Electrical Engineer.
- B. **Safety:** All standard safety procedures as set forth by OSHA, CCR, and California Division of Industrial Safety shall be strictly adhered to.
- C. **Coordination:** The Contractor shall familiarize himself with the work of other crafts so as to be able to provide electrical service of correct size and voltage and other requirements to any equipment to be installed. The installations shall be coordinated as to location and time, and interference causing delays and non-acceptable construction shall be avoided.

Prior to commencing construction the Electrical Contractor shall arrange a conference with the general and sub-contractors as well as equipment suppliers and shall verify types, sizes, locations, requirements, controls, and diagrams of all equipment furnished by them.

Exact equipment rough-in locations shall be verified from shop drawings.

- D. **Cutting and Repairing:** The Electrical Contractor shall do all cutting necessary for the proper installation of his work, repair any damage done by himself or his workmen, and coordinate his work with that of others. Do no cutting or patching without approval of the Architect or Electrical Engineer. Round holes through concrete slabs or walls shall be core drilled with a diamond drill, rectangular openings shall be cut with a diamond saw. In no case shall any concrete beam or column be cut.
- E. **Sleeves and Openings:** Electrical Contractor shall be responsible for all sleeves and openings through walls and floors required by electrical work. All openings around conduits in sleeves shall be sealed with a material of equal fire rating as the surface penetrated. Openings not utilized shall be temporarily sealed in a similar manner. All required sleeves shall be furnished to and coordinated with

the General Contractor.

- F. **Cleaning and Painting:** All exposed work shall be thoroughly cleaned upon completion of work. All panelboards and equipment not located in electrical or mechanical rooms or closets shall be field painted per painting specifications, color as selected by Architect. Panelboard enclosures, fixtures, and equipment, where finish has been marred in shipment or installation, shall be completely refinished. Minor finish damage shall be rectified as indicated by the Architect or Electrical Engineer. Contractor shall remove all waste and rubbish resulting from his work from the site.

1.07 QUALITY CONTROL:

- A. **Supervision:** The Contractor shall personally, or through a competent representative, constantly supervise the work from beginning to completion and final acceptance. He shall cooperate fully with the inspection authorities in the provision of information and access to the work. He shall, to the best of his ability, maintain the same job foreman throughout the life of the project unless a replacement is requested or authorized by the Architect or Electrical Engineer.
- B. **Inspection and Tests:** The Contractor shall furnish all labor and test equipment required to fully test and adjust the equipment installed under this specification and demonstrate its proper operation.
1. Arrange for all tests and inspections and provide minimum 48 hours notice to the Architect or Electrical Engineer.
 2. A test must demonstrate that each piece of equipment, outlet, fixture, device, and appurtenance is in sound operating condition and in proper cooperative relation to associated equipment.
 3. All tests shall be conducted under supervision of the Architect or Electrical Engineer, and any defects of any nature which are apparent as a result of such test shall be made correct to the satisfaction of the Architect or Electrical Engineer before final acceptance is made.
 4. No equipment shall be tested, or operated for any other purpose, such as checking motor rotation, until it has been fully checked in accordance with the manufacturer's instructions.
- C. **Warranty:** The Contractor agrees to replace or repair, to the satisfaction of the Owner, any part of the installation which may fail due to defective material and/or workmanship or failure to follow Drawings and Specifications, for a period of one year after final acceptance. Any damage to other work resulting from such failure or the correction thereof shall be remedied at the Contractor's expense. The Contractor shall, further, secure from the manufacturers of special equipment, such as signal systems, their respective guarantees and deliver same to Owner. Guarantees between Contractor and his suppliers shall not affect warranties between Contractor and Owner.

1.08 GROUNDING:

- A. The conduit system supports, cabinets, switchboards, etc., and neutral conductors must be permanently and effectively grounded by means of approved ground clamp, in accordance with the electrical safety orders of the Department of Industrial Relations of the State of California.
- B. This Contractor shall exercise every precaution to obtain good contacts at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded around the boxes with a #6 B&S gauge, rubber covered, double braided wire with ground clamps.
- C. Equipment and raceway bonding procedures shall be rigidly maintained and meet all jurisdictional requirements of codes and regulations.
- D. A separate grounding conductor shall be run in all receptacle circuits.

1.09 SUBSTITUTIONS:

- A. The Specifications or Drawings are in no way to be construed as being proprietary toward one product. Those products, or types of products, listed are intended to set the standard for quality, design, and installation procedure. However, no right is implied upon the part of the Contractor to substitute other materials, products or systems without the written approval of the Architect or Engineer.
- B. All requests for substitution shall be made in accordance with Section 01-640 of the General requirements - SUBSTITUTIONS.
- C. All requests for substitutions shall be in writing, received at least 14 days prior to bid date, and shall indicate all information required thereon including differences from the specified item. The request for substitution shall be accompanied by cuts, product literature, performance data, specifications, drawings, samples or other means as may be required for proper evaluation by the Architect or Electrical Engineer.
- D. All proposed substitutions shall be standard product of the firm under current manufacture and be a catalog item at time of bid.
- E. Acceptance of substitution shall not relieve the Contractor from responsibility for complying with requirements of the Contract Documents. The Contractor shall be responsible for changes in other parts of the work occasioned by his substitutions and shall bear their expense.
- F. Representative samples may be required for determination of equality.

1.10 SUBMITTAL:

- A. Make submittal for all material to be used on the project, whether as specified or substitutions, within thirty five (35) days after award of Contract by the Owner, in accordance with Section 01-300, SUBMITTAL, and the following:

1. All submittal shall be neat and bound in a suitable folder or binder.
 2. Identify each item by manufacturer, brand, trade, name, number, size, rating, and whatever other data is necessary to properly identify and check materials and equipment. Words "as specified" are not sufficient identification.
 3. Identify each submittal item by reference to specifications section paragraph in which item is specified, or Drawings and Detail Number.
 4. All submittal shall be submitted in coherent groups, e.g. all light fixtures at one time. No partial, or incomplete submittal will be accepted.
 5. Organize submittal in same sequence as they appear in specification sections, articles or paragraphs.
- B. Product Data: Submit eight copies, in groups, as follows:
1. Boxes, pullboxes, conduits, and raceway types required, including fittings
 2. Electric Wire, cable and connectors
 3. Circuit breakers, Panelboards, Transformers, and disconnects.
 4. Lighting fixtures and Controls
 5. Wiring Devices
 6. Fire Alarm System Equipment
- C. Shop Drawings: Shop drawings shall show physical arrangement, wiring diagram, construction details, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, weight, power sources, circuit numbers, and shall be compatible with the Contract Drawings and Specifications.

Show wiring as actually installed, connected, and identified for this specific project. Include identification of cables and cable conductors.

Shop and instruction drawings shall cover the equipment or device to be installed and not merely the general class of such equipment or device.

1.11 DOCUMENTATION:

- A. Construction Record Drawings: The Contractor shall furnish to the Architect or Engineer, in accordance with the GENERAL REQUIREMENTS, a complete set of "as constructed" drawings which clearly indicate all deviations from the basic contract drawings, including exact dimension locations and depths for all stubbed conduits, location and size of spare conduits, & conductors, all new and uncovered existing work outside the buildings, power feeder runs, and

communications "primary" conduit runs. Corrections and changes shall be kept up to date at all times.

- B. All submittal and shop drawings will be resubmitted with record drawings showing all revisions and changes made, clearly marked with field termination wire so as to reflect actual construction record conditions. Revisions and changes will be enumerated and new dates of drawings shown.

1.12 PORTABLE OR DETACHABLE PARTS:

The Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of the installation such as fuses, keys, locks, adapters, locking clips, and inserts until final completion of his work. These parts shall be itemized and delivered to the Owner at Project Closeout.

END OF SECTION

SECTION 26 05 00**COMMON WORK RESULTS FOR ELECTRICAL:****PART 1 – GENERAL****1.01 SCOPE:**

Furnish and install material and equipment as indicated on the drawings and as specified.

1.02 MATERIALS AND EQUIPMENT:

Shall be new and of the best quality used for the purpose in good commercial practice.

1.03 UL APPROVAL:

All material and equipment within the scope of the UL re-examination service shall be approved by the Underwriters' Laboratories for the purpose for which they are used and shall bear their label.

1.04 STORAGE:

All material and equipment shall be stored in a manner to prevent damage or corrosion. Equipment with components which can be damaged due to moisture shall be placed in special heated storage facilities.

1.05 DRAWINGS:

Drawings for all equipment are intended to be diagrammatic only. Any location not actual dimension is not to be considered as necessarily final or accurate. Exact locations must be determined in the field from the requirements of the equipment that is to be installed.

1.06 COORDINATION:

Before rough-in of any utility lines, services, and feeders, or of any equipment, this Contractor must coordinate his work with that of other crafts and trades so that these services shall be installed in their proper locations and without interference to the equipment or building structure. This will require cooperation among all crafts and trades, the inspector, and General Contractor, along with study of shop drawings and the building drawings.

1.07 ELECTRICAL WORK EXPOSED TO WEATHER:

- A. All electrical devices and equipment installed in exposed locations shall be protected by suitable NEMA type 3R enclosures, cast boxes with gasketed covers, or other Engineer approved methods.
- B. All ferrous metal portions of electrical work exposed to weather including

conduits, clamps, supports, etc. shall be hot-dip galvanized.

1.08 SEISMIC ANCHORAGE:

- A. Provide complete seismic anchorage and bracing for the lateral and vertical support of conduit and electrical equipment, as required by Section 2312 of the California Building Code, and the following.
- B. Anchorage of Equipment: All mechanical and electrical equipment shall be braced or anchored to resist a horizontal force acting in any direction using the following criteria:
 - Fixed equipment on grade - - - - 33% of operating weight
 - Fixed equipment on structure - - 50% of operating weight
 - Emergency power and communication equipment on grade - - - - - 50% of operating weight
 - Emergency power and communication equipment on structure - - - - 75% of operating weight
 - For flexibly mounted equipment use 2 x the above values.
 - Simultaneous vertical force - use 1/3 horizontal force.
- C. Submit calculations prepared and signed by a Structural Engineer licensed in the State of California, showing compliance with the above for all electrical equipment weighing more than 50 pounds, excepting items corresponding exactly in configuration and weight to those specified and detailed. Where anchorage details are not shown on drawings, the field installation shall be subject to the approval of the Electrical Engineer.
- D. Conduit that crosses structural separation between buildings or building units shall be installed with flexible connections, suitable to accommodate longitudinal and transverse displacements.

1.09 SUBMITTAL:

- A. Product Data: Submit manufacturer's data including specifications, installation instruction and general recommendations for each item submitted under Submittal, Section 16010, 1.10. Submit calculations in accordance with Section 1.08.

PART 2 – PRODUCTS

2.01 CONDUIT MATERIALS AND COMPONENTS:

- A. Rigid Metal: All exposed exterior damp locations, in concrete walls and slabs, in concrete block walls, or elsewhere shown on plans. Rigid metal conduit shall be new galvanized thickwall threaded, furnished in 10 foot lengths.
- B. Thin Wall E.M.T.: Interior dry locations above ground, exposed only in non-finished areas. E.M.T. shall be new galvanized, furnished in 10 foot lengths. E.M.T. shall be coupled with steel screw type connectors in concealed locations,

and plastic bushed sealing type couplings in exposed locations. Crimp and die cast type connectors are not acceptable.

- C. Flexible Metallic Conduit: Connections from junction boxes to lay-in fluorescent fixtures to 6 feet or less in accessible ceilings. conduits shall be flexible interlocking single strip zinc coated, or aluminum steel with copper ground wire.
- D. Flexible Liquidtight Metallic Conduit: Connections to machinery. Conduit shall be flexible interlocking single strip steel conduit with liquidtight exterior cover, with all connections made with plastic bushed fittings and with copper ground wire (maximum length 30").
- E. Plastic P.V.C., Schedule 40: Underground locations and below vapor barrier of slabs, and in solid grouted masonry walls where wall entry and exit points are made with rigid galvanized steel. No plastic conduit shall be installed in slab floors or in exposed locations. P.V.C. conduit shall be Type 40 heavy thickwall polyvinyl chloride conduit, minimum 3/4" size, Underwriters' Laboratories tested, furnished in 10 foot lengths.

2.02 OUTLET AND SWITCH BOXES:

- A. Boxes shall be one piece die formed galvanized steel of shape and with fittings necessary to suit location and use. Boxes shall be of sufficient size to contain all wires, devices, and connection fittings required without crowding. Ceiling and surface mounted boxes shall be minimum 4" square or octagonal. Plaster rings shall be provided where required.
- B. Exposed boxes shall be cast type with gasketed weatherproof cover.
- C. Combined Emergency and Normal: All wall boxes with switches for both emergency and normal lights shall have a divider as required to separate normal and emergency circuits.

2.03 WIRING DEVICES:

- A. Wall Switches:
 - 1. 120/277 Volt Switches: Quiet slow make, slow break design, toggle handle, with totally enclosed case, rated 20 ampere, specification grade. Provide matching two pole, 3 way, and 4 way switches.
 - 2. Acceptable types are:

Hubbell	
One pole	1221-I
Two-pole	1222-I
Three-Way	1223-I
 - 3. Color: Device color to match existing, verify exact device colors with

Architect prior to purchase and installation. Switches on emergency power to be red.

B. Receptacles:

1. Standard Duplex Receptacles: Full gang size, polarized duplex, parallel blade, U-grounding slot, specification grade, rated at 20 amperes, 125 volts, designed for split feed service.
Hospital Grade Receptacles: Required for patient care areas, operating rooms, corridors, emergency power receptacles and where indicated as hospital grade.

Acceptable types are:

Type (Hubbell no.s):	Specification grade
Normal power	5362-I
Isolated Ground	IG 5362-I
Ground Fault	GF 5362-I

2. Nameplates: Provide engraved or embossed plastic for receptacles other than standard duplex receptacles, indicating voltage, phase and amperes.
3. Color; Normal Power Circuits: Device color to match existing. Verify colors of all devices with Architect prior to purchase and installation.

2.04 WALL PLATES:

- A. Scope: Provide plate for each wiring device and for each signal or communication outlet.
- B. Interior Flush: All locations unless noted otherwise; smooth stainless steel.
- C. Weatherproof Plates: Cast metal, gasketed; for receptacles, provide spring loaded gasketed doors. Provide at all weatherproof locations.
- D. Where two gang boxes are required for single gang devices, provide special plates with devices opening in one gang and second gang blank.
- E. Plates with Engraving: Provide black paint filled engraving for the following.
 1. Switch plates for all outlets not within sight of switch. Engrave with function and location of outlet.
 2. Lighting controls; engraved area identification of each switch where 3 or more switches are ganged together.
- F. Blank bushed or special outlet plates shall be provided for all signal and communications systems outlets as required.

2.05 WIRE:**A. Low Voltage - (Under 600 Volt):**

1. Branch circuit wire shall be copper type THWN/THHN, 600 volt, from new fresh stock, bearing U.L. label, delivered to site in unbroken packages; minimum power size 12 AWG. All 20/1 home runs over 150 feet from panel shall be increased to next larger size. Conductors #8 or larger, shall be stranded copper, #10 AWG and smaller shall be solid copper or as shown on plans. All control wires shall be stranded.

PART 3 – EXECUTION**3.01 INSTALLATION OF CONDUIT RACEWAYS:**

- A. **General:** Install conduits in a neat manner, concealed except as noted. Mount conduits directly to building structure with clamps or one hole straps where possible. Secure straps with cadmium plated wood screws into wood, and machine screws into metal or inserts preset in concrete. Where impractical to secure directly to structure, suspend on conduit hangers. Wherever possible, group and rack multiple conduit runs.
- B. **Installation and Cleaning:** Install free from dents, kinks and bruises. Red lead all threaded conduit joints before coupling. Plug ends at time of installation to prevent entry of dirt or moisture. Thoroughly clean out conduits before installing conductors. Thoroughly clean all exposed conduit exteriors.
- C. Provide tagged pullwire in all empty conduits. Pullwire shall be 1/8" stranded nylon, leave 36" free coiled each end.
- D. **Protective Coating:** All metallic conduits installed in contact with earth or in concrete on contact with earth shall be coated with a minimum 40 mil P.V.C. coating on all conduit lengths and fittings. The coating shall correspond to ATSM D638-68, D1706, D140-64, and D746-64T specifications and Federal test standard 141, method 615z. Coating shall be continuous without flaws showing exposed metal. Coating shall extend to the device conduit is terminated to in exposed locations and 12" above grade in unexposed locations.
- E. Conduits which stub-up through floor shall be installed so that none of the curved portions of the elbow is exposed. Conduit bends and risers terminating below-grade runs shall be 40 mil PVC coated galvanized rigid steel.
- F. **Conduit Routing:** Route exposed conduits parallel or perpendicular to walls or floors. Install conduits in masonry walls at time of wall construction. NO conduits will run under heavy equipment, footing or other structural elements. Where runs must cross footings, install in sleeves per structural details.
- G. **Conduit Runs in Ceiling Areas:** Conduits run above accessible ceiling shall be routed parallel or perpendicular to ceiling system and structural members. All

conduit runs shall be coordinated to avoid conflicts with mechanical and structural systems, lighting fixtures and ceiling support system. Conduits shall be installed as close to the above structure as possible to avoid conflict with removal of ceiling panels.

- H. Conduits Penetrating Membranes: Where conduits penetrate wall or slab membrane moisture barriers, penetration shall be sealed in accordance with the requirements of applicable sections of these Specifications for "Thermal and Moisture Protection".
- I. Conduits Penetrating Roof: Provide flashing and counter flashing making watertight joints where conduits pass through roof or waterproofing membranes, in accordance with existing roofing manufacturer's warranty requirements.
- J. Escutcheons: Conduits penetrating wall, floors, or ceiling in exposed locations shall be installed with appropriate escutcheon plates.
- K. Separations: Coordinate with all other crafts to allow minimum of 12" running and 6 inches crossing clearance at flues, hot water pipes, steam pipes, and heat sources. Keep electrical conduits free from contact with all other piping runs of other systems or of dissimilar metals.
- L. Conduits Crossing Building Joints: Conduits shall not be run in concrete slab or wall construction where passing through an earthquake or expansion joint. At such condition, conduit shall be run exposed or in furred ceiling space with 24" length of flexible conduit crossing joints.
- M. Conduits Penetrating Floors and Walls: Provide grouting around raceways where penetrating floor slabs, concrete or masonry walls. At fire separation walls or floors, use Engineer approved expanding type putty, Nelson Flameseal or equal, to maintain the fire rating of the surface penetrated.
- N. Conduit Support: Support of conduit and tubing in steel stud walls shall be by #18 gauge steel wire, secured to steel bars or straps attached to steel studs. Conduits rising vertically between wall studs shall be tied to a horizontal cross support attached tightly to eliminate any movement.
- O. Conduit Hangers:
 - 1. Conduit hangers spaced at 8'-0" on center maximum with one hanger adjacent to each outlet box, shall be installed wherever conduit cannot be directly attached to structure. Hangers shall be secured to wood structures with steel brackets and wood screws, to steel structures with appropriate clamps, and to concrete structures with preset imbedded inserts or machine screws with expansion shields. Present inserts are preferred to provide a secure anchorage with greatest location flexibility. Power or velocity driven type attachments will not be allowed. Complete hanger installation shall provide a safety factor of 5 based upon maximum CEC allowed conduit fill.
 - 2. Hangers for rigid conduit and EMT 2" and smaller in concealed spaces

shall be galvanized perforated type strap wrapped around raceway and bolted; then fastened to structure as described above.

- 3. Trapeze type supports shall be used where conduits are run grouped together. such hangers shall consist of 3/8" minimum steel rods, structural steel channels, and clamps of Kindorf, Unistrut, or approved equal manufacture.

3.02 INSTALLATION OF JUNCTION BOXES AND INTERIOR PULL BOXES:

Locate pull boxes and junction boxes above removable ceilings or in electrical rooms, utility rooms, or storage areas. No junction box will be installed in an inaccessible area.

3.03 INSTALLATION OF OUTLET AND SWITCH BOXES:

- A. Mounting: Mount outlet boxes flush in areas other than mechanical rooms, electrical rooms, and above removable ceilings. Boxes shall be set true and flush with all necessary and correct adapters and/or plaster rings. All boxes set deeper than code allowable shall be corrected by use of factory made extension rings such as Raco #976 or equal.
- B. Device Locations: Locations of devices on plans are approximate only. Contractor shall study the architectural and structure plans and locate the outlets so that his work is coordinated with the work of others and the fixtures and devices present a pleasing and symmetrical appearance when installed. The location of outlets centered on any architectural feature shall be exact. Outlet locations may be moved a maximum of 10' from the location shown on the drawings before roughing-in without cost to Owner. Switches in relation to door swings and cabinets must be coordinated with architectural drawings. This Contractor shall coordinate with Mechanical Contractor and security and fire alarm Contractor regarding thermostat and security outlets and other equipment locations.
- C. Device Height: The following dimensions for locating wall outlets represent the distance from the finished floor to the center of the outlet, unless noted otherwise.

Outlet	Inches
Convenience receptacle	18 to center
Lighting switch	45 to center

Adjust outlet mounting height to agree with required location for equipment served.

- D. Boxes located in stud walls shall be mounted as follows:
 - 1. Blocking material shall be installed behind all boxes with conduit entrances on one side only or on opposite sides. Outlet box shall be securely attached to both the adjacent stud and the blocking material.

Blocking material shall be same as wall studs and shall be attached to two adjacent studs.

2. Rear blocking may be omitted for boxes with conduit entrances on two adjacent sides if conduits are secured within 8" of box to adjacent wall stud or to a horizontal support between studs. Box shall be securely attached to adjacent stud. Support material shall be same as wall studs or a piece of tubing secured between studs.
- E. Boxes in counterbacks or casework shall be installed in accordance with architectural details. Where not indicated in details, the Architect shall be consulted prior to installation.
- F. Boxes above accessible suspended ceilings shall be mounted to horizontal trapeze hangers, secured to rod attached to structure above, or attached to ceiling system suspension wire with "Caddy" clips. Conduit and boxes shall be located a minimum of 12" above ceiling where suspended depth permits. Conduit and boxes shall not be installed prior to ceiling unless system is attached or braced to structure as to prevent horizontal movement of conduit.
- G. Common Boxes and Alignment: Devices shown adjacent to each other at the same mounting shall be gang installed under a common plate, except for outlets of different voltages such as telephone and duplex receptacles. Outlets mounted one over the other, or side by side, shall be in exact alignment, centered on one another.
- H. Box Separation: Boxes and conduit shall be installed in a manner which minimizes sound transmission between rooms. Boxes mounted in a common wall shall be off-set horizontally a minimum of 12 inches and mounted in different stud spaces wherever possible. Boxes in fire rated construction shall be installed per CBC Chapter 43. No boxes shall be mounted back to back. No through boxes shall be used. Off-set boxes shall be connected with flexible conduit not to exceed 18" in length.
- I. Sealing: All unused holes or openings in boxes shall be slugged or sealed by an acceptable means.

3.04 INSTALLATION OF WIRING DEVICES:

- A. Devices shall be securely fastened to outlet box with face flush with plate.
- B. Mount receptacles vertically in appropriate boxes.

3.05 INSTALLATION OF WALL PLATES:

Install cover plates on wiring devices. Plates shall be set plumb and flush with finish wall surface. Plates located adjacent to one another shall be exactly the same height.

3.06 INSTALLATION OF FLOOR BOXES:

- A. Confirm exact placement with related work before installing. Install so that box

will set flush with concrete floor.

- B. Securely anchor fitting to floor box. Install finish.

3.07 INSTALLATION OF WIRE:

- A. Scope: Provide all wiring for complete electrical work, installed in code conforming raceway. Branch circuit wiring shall be #12 AWG minimum, unless noted otherwise.
- B. Home Runs: Branch circuit conductors shall be home run to panelboards or motor control centers in groupings shown on the drawings. Combining branch circuit home run conductors in single conduits other than that shown shall not be permitted.
- C. Color coding shall be strictly adhered to and shall be as follows:
1. Color coding shall be:

120/240 Volt	277/480 Volt
A Phase – Black	A Phase - Brown
B Phase - Red	B Phase - Orange
C Phase - Blue	C Phase - Yellow
Neutral - White	Neutral - Grey
Ground - Green	
Travelers - Pink	
 2. Color coding utilized shall be noted on electrical "as constructed" drawings and shop drawings.
 3. The wires shall be of solid colors in size #6 and smaller. In sizes #4 and larger the wires shall be black and 3" width of the appropriate color tape shall be applied around the wire at 12" intervals starting 2" from the termination of the end of the wire.
 4. The color coding for control circuit wires will be as noted on the plans or as agreed upon with the Architect or Electrical Engineer and will be of a color other than that designated for the phase wires. Where control wires are installed and various colors are used, they shall be noted on the "as constructed" drawings and shop drawings turned in at the completion of the job.
- D. Pulling: Use approved wire pulling lubricant for pulling #4 AWG and larger wire. Oil or grease is prohibited as a conductor pulling lubricant. All conductors #8 and small shall only be pulled by hand. Pulling lubricant for conductors over 600 V will be approved by the conductor manufacturer and the Architect or Electrical Engineer.
- E. Splices: Join the conductors securely, both mechanically and electrically using crimp, compression, or pressure type connectors, except that screw-on type connectors shall not be used for wires larger than #10 AWG. The splice area

shall be taped to provide equal or greater insulation than the original. Tape run-back over the original insulation shall extend 3 to 5 overall diameters of the insulated wire.

No splices in conductors over 600 V or feeders over #6 AWG is permitted.

- F. Splice only in accessible junction or outlet boxes.
- G. Wiring in panelboards, switchboards, and cabinets shall be neatly installed. Wiring shall be grouped, laced or clipped, and fanned out to wiring terminals.
- H. Identification and Markings: In addition to all other requirements for identification and marking of wires, panelboards, and junction boxes, the following shall be strictly adhered to:
 - 1. The identification of individual wires terminating in either junction boxes, circuit breakers, terminal strips, or on control devices shall be done by means of appropriate tape marker.
 - 2. Where subdistribution wires terminate they shall be marked with the point of origination or point of destination, phase, and voltage to ground. This will include all subdistribution circuits originating from 480/277 volt or 240/120 volt distribution panels serving lighting circuits, receptacle circuits, small power equipment, and small mechanical equipment.
 - 3. Thus each end of a particular feeder or subdistribution class circuit shall be marked as to its phase and point of origination or destination and either voltage line to line in distribution class circuits or voltage to ground in subdistribution class circuits.
 - 4. All control circuits will be marked at each control panel as to their function and where they terminate.
Where control wires terminate into relays or enclosures or terminal cans remote from the main point of control, the wires will be marked as to their function and where they originate.
 - 5. All associated wiring integral within a control cabinet may be marked with the printed circular wire wrapping at each end.
 - 6. Where wires are pulled through or looped through a junction box, they shall be marked as to the point of origin and the point of destination. All markings in above ground junction boxes will be via linen tags with indelible ink and all markings on junction boxes or pull boxes below ground level will be by means of 1/4" plastic tape with embossed letters. This plastic tag will circle the wire and both ends stapled together.
- I. All junction boxes in attic spaces terminating or serving as gathering points for 208 volt circuits will have the cover painted blue.
- J. Testing: All wires under 600 volt potential shall be tested with a 600 volt megohm prior to energization and the readings shall be recorded and handed in

with the record drawings at the completion of the project. The tests shall be conducted from phase to phase and from each phase to ground.

3.08 INSTALLATION OF MECHANICAL AND OWNER'S EQUIPMENT WIRING:

- A. Furnish all power supplies for Mechanical Division equipment as shown on the mechanical plans.
- B. Make all connections of power to all mechanical and Owner's equipment along with installation of required disconnection means. This Contractor shall make all connections to other miscellaneous equipment which required line or low voltage power. Verify accessibility of all outlets and re-adjust outlets if necessary to meet the Code. Verify sizes and current characteristics of all equipment before installation of wiring and adjust wiring properly as required.
- C. Supply all electrical junction boxes for mechanical equipment.
- D. After all wiring to each unit is complete, Electrical Contractor shall cooperate with Mechanical or Equipment Contractors in testing equipment for proper operation and shall correct wiring as required for proper operation.

END OF SECTION

SECTION 26 50 00**LIGHTING****PART 1 – GENERAL****1.01 SCOPE:**

- A. Provide lighting fixtures of sizes, types and rating as indicated; complete with, but not necessarily limited to, housings, LED lamps/arrays, reflectors, lenses, drivers, wiring, and mounting hardware.
- B. Contractor shall be responsible for fixture counts.

1.02 DESIGNATION:

- A. Unless otherwise shown on the plans, fixture type designation for an individual fixture shall be typical for similarly indicated fixtures within the entire room or defined area.
- B. Unless otherwise shown on the plans, fixtures mounted in a continuous row shall be of the same type as any individual designated fixture within the row.
- C. In the event a fixture is un-designated on plans, it shall be of the same type as fixtures of similar function within rooms or areas.

1.03 COORDINATION:

- A. Confirm compatibility and interface of other materials with luminaire and ceiling system. Report discrepancies to the Architect or Electrical Engineer, and defer ordering until clarified.
- B. Supply plaster frames, trim rings, and back boxes to other trades.
- C. Coordinate with Division Mechanical to avoid conflicts between luminaire supports, fittings & mechanical equipment.
- D. All fixtures shall be coordinated with the architectural reflected ceiling plan. If any discrepancies occur, the Architect or Electrical Engineer must be notified in writing before installation is started.

1.04 SUBMITTAL:

Make product submittal per Section 260000.

- A. Product Data shall include complete list of fixtures along with catalog cuts or detailed drawings of each.
- B. Shop Drawings: Provide fixture construction details for fixtures going into 1' x 1' rectangular or gypsum board ceilings, and custom fabricated fixtures.

PART 2 – PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS:**

The fixtures described in the light fixture schedule on the drawings are to be used as a standard of quality to be maintained. Substitute items of same function and performance are acceptable in conformance with Section 260500.

2.02 FIXTURES: General

- A. Provide fixtures complete with all component parts to make a complete installation. Fixtures shall have a suitable interior means of grounding the enclosure.
- B. All fixtures shall bear the U.L. label and shall be suitable for installation location.
- C. All attaching devices for recessed or surface mounted fixtures mounted in the ceiling shall be of formed or rolled steel and of sufficient strength to prevent movement of fixture after installation.
- D. The Architect or Electrical Engineer shall have the right to reject any fixture damaged due to improper packaging. Any fixture with broken or bent metal, broken lenses, or an appearance deemed not to be normal, may also be rejected by the Architect or Electrical Engineer at the expense of the Contractor.
- E. Provide gasketing, stops, and barriers to form light traps and prevent light leaks.
- F. Trademarks or Monograms: There shall be no visible trademarks or monograms on the lighting fixtures.
- G. Recessed Fixture Trims and Doors: The Electrical Contractor shall use the following fixture trim frame designs unless specified otherwise.
 - 1. Lay-in frames: Lay-in frames for all exposed "T" ceiling systems.
 - 2. Flanged Trims: Flanged trims for plasterboard, spline or metal lathe and plaster ceiling systems. Provide plaster or mounting frames where required.
 - 3. All hinged doors to have flat steel lens design unless specified otherwise.
 - 4. All Trim Frames and Doors: All trim frames and doors to be baked white enamel finish unless specified otherwise.
 - 5. Hidden "T" Systems: Electrical Contractor to provide vinyl fixture trim-outs for all fixtures installed in hidden "T" systems to complete unfinished edge of tile openings.

2.03 LED DRIVERS:

- A. Drivers shall be high power factor, constant current type.
- B. Drivers shall be equipped with 0-10V dimming, unless specifically noted otherwise.

2.04 LED DIODES:

- A. Lighting fixtures shall be installed complete with factory installed LED diodes as described in schedules and herein.
- B. LED lamps that are screw base, aftermarket, or are not factory installed, are not permitted.

2.05 EXTERIOR FIXTURES:

- A. Metal parts of exterior fixtures exposed to weather conditions shall be constructed of cast or spun aluminum, cast bronze, stainless steel or other nonferrous metals available to withstand exposure.
- B. Steel fixtures installed in damp or wet locations shall have zinc-chromate or equal primer.
- C. Provide gaskets on all trims and housing.

2.05 WET LOCATIONS:

All lighting fixtures installed in wet or damp locations shall have U.L. approved "wet" or "damp" location labels visible in interior of fixtures.

PART 3 – EXECUTION**3.01 INSTALLATION OF LIGHTING FIXTURES:**

- A. Fixture installation shall conform to all applicable standards for installation, mounting, wiring, and quality.
- B. All fixtures shall be grounded and bonded in accordance with applicable codes. Where fixtures are installed in rows, a bonding screw shall be used to maintain bonding integrity from fixture to fixture.
- C. All fixtures, lenses, and other trim shall be aligned, cleaned, free of paint and blemishes before final acceptance.
- D. Fixtures weighing more than two pounds shall be supported by means other than the outlet box. All outlet boxes shall be able to support a minimum of eight pounds.
- E. For fixtures weighing more than two pounds, support shall be provided at all four

- corners, plus the outlet box. Each support shall be able to carry a minimum of four times its intended load.
- F. No support or insert, except pendant canopies, shall be visible from the floor.
 - G. Where fixtures are pendant suspended, the use of ball aligner canopies, stem, and other required mounting devices shall be required for installation.
 - H. When fixtures are stem mounted, the variation in distance from the finished floor shall vary no more than 1/2" from the heights as specified on the plans.
 - I. Mounting Heights of Pendant-Mounted Fixtures shown on plans of in specifications shall be to the bottom of the fixture. Mounting heights of the wall-mounted fixtures shall be to the center of the outlet box unless otherwise noted.
 - J. Surface-Mounted Fixtures: The Electrical Contractor shall provide surface-mounted incandescent or fluorescent fixtures with UL approval for direct mounting on the various ceilings unless specified otherwise. Spacers will not be approved.
 - K. Fixtures in Conflict with Ducts and Piping: electrical Contractor shall coordinate the location of the incandescent and fluorescent fixtures to the available space left between the various ducts and piping. The mounting heights of the adjacent mechanical equipment and any adverse situation shall be as directed by the Architect or Electrical Engineer.
 - L. Spacing of Stem Hangers of commercial and Industrial Fixtures: Mount individually or in continuous rows to be approximately 4' 0" o.c. or 8' 0" o.c., as recommended by the individual manufacturers specified.
 - M. Installation of recessed fixtures in accessible-type suspended ceilings shall be such that the fixtures will exactly suit the type of ceilings used without altering the fixture or the ceiling. Each fixture shall be wired with a piece of flexible conduit sufficiently long to remove fixture enclosure from ceiling without disconnecting unit. Fixture manufacturer shall prepare drawings or catalog sheets in which all details of fixture installation are carefully analyzed. Contractor to submit these shop drawings for approval. If clearance above "T" bar system is too restricted in "tip-in" fixture, the Electrical Contractor shall coordinate with acoustic ceiling installer by leaving one cross "T" off until the cross "T" shall be secured into its proper place.
 - N. All fixtures shall be supported from the building structural members or from bridging attached to the structural members. Provide all necessary blocking and hardware so that fixtures hang true, square, plumb, and in proper alignment. Recessed fluorescent fixtures in T-bar ceilings shall have minimum of two #12 steel hanger wires from each 4-foot fixture, one at either end.
 - O. All LED drivers shall operate within NEMA sound ratings. Noisy or otherwise defective drivers shall be replaced.
 - P. All lamps shall be operating and all fixtures shall be clean at time of final

inspection.

- Q. Recessed Fixtures shall have their support brackets screwed into ceiling channels.

3.02 FIELD QUALITY CONTROL:

- A. Upon completion of installation of interior lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. The Contractor shall replace at his expense all noisy fixtures, broken or cracked lenses or other defects. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with testing.
- B. At the time of Substantial Completion, replace lamps in interior lighting fixtures which are observed to be noticeably dimmed after Contractor's use and testing, as judged by Electrical Engineer.

3.03 ADJUSTMENT AND CLEANING:

- A. Clean interior lighting fixtures of dirt and debris.
- B. Protect installed fixtures from damage during remainder of construction period.

END OF SECTION

SECTION 27 00 00
COMMUNICATIONS

PART 1 – GENERAL

1.01 RELATED SECTIONS

- A. This specification section provides general conditions for all division 27 specifications. All contractors working with in the division 27 specification shall adhere to this specification.

1.02 STATEMENT OF WORK

- A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing Structured Cabling and Communications Systems.
- B. Contractor will provide a bid including all labor, materials, tools and equipment required for the complete installation of work called for on the Construction Drawings and described in this Document. It is the responsibility of the Contractor to provide all material necessary to provide a complete and operable system. If the contractor feels that the system described is incomplete they must address this in writing to the Owner/Owner's Representative before providing a bid.
- C. All questions concerning non-specified product and services will be address to the Owner's Representative before Contactor provides a bid. Owner expects that by accepting the Contractor's bid proposal that the Contractor has provided a competent bid for a complete solution.
- D. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of devices, typical installation details, and mounting details will be provided as an attachment to this document. The successful vendor shall meet or exceed all requirements for the systems described in this document.
- E. 271000 contractor shall be complete with work including all testing and labeling prior to 272000 contractor work start. Also the district requires minimum of 10 days to review test documents prior to network start up.
- F. 272000 contractor will require that 271000 is complete prior to work start. 272000 will need minimum of five day burn in of network equipment prior to turnover to district.
- G. Contractors who remove district equipment shall label each piece for replacement by either the removing contractor, other contractor or district. Equipment tags shall have school name, room name and cabinet name/#.

1.03 EXISTING CABLING AND SYSTEMS EQUIPMENT

- A. Demolition of cabling systems per CEC 2016
1. Remove all cabling defined for demolition per CEC 640.2, 640.6.C, 645.2, 645.5.F, 725.2, 725.25, 770.2, 770.25, 770.154.A, 800.2, 800.25, 800.154.A, 820.2, 820.25, 820.154, 830.2, 830.25,
 2. The owner shall be given "first right of refusal" for all decommissioned equipment and removed cable.
 3. The owner may wish to keep, recycle or destroy these items. If the items are refused by the owner the contractor may keep, recycle or destroy these items.
 4. Owner will establish a location for all materials it wishes to keep, recycle or destroy.
- B. Contractor SHALL NOT demo any existing analog telephone cables or outlets, except where complete reconstruction occurs. The existing telephone cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any telephone cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.
- C. Contractor SHALL NOT demo any existing intercom cables or outlets, except where complete reconstruction occurs. The existing intercom cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any intercom cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.
- D. Contractor SHALL NOT demo any existing coaxial CATV cables or outlets, except where complete reconstruction occurs. The cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.
- E. Contractor SHALL NOT demo any existing CCTV cables or outlets, except where complete reconstruction occurs. The existing cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.
- F. Contractor to coordinate with the Owner for the scheduled removal of any existing network equipment, such as, but not limited to, wireless access points, access point mounting brackets, network switches, and network routers. All equipment is to be labeled with the site name/room number it was removed from and returned to the district. The district has "first right of refusal" and any equipment deemed by the district as refused can be disposed of by the contractor.
- G. The district will update returned equipment and return it to the contractor for

installation. Prior to the installation, the Owner requires a minimum of ten days to review & approve testing documentation. After the approval the contractor may proceed with the installation and cross connection of equipment. Labor hours to install Owner provided equipment shall be based on the single line drawings and cable port counts equal to 1:1; including network switches, wireless access points, and patch cables (copper and fiber). Contractor to connect each device as requested by owner with a patch cord provided by owner. Contractor to provide sign in/out sheets for all equipment removed and installed. Contractor may be liable for lost, misplaced, or stolen equipment. Contractor to provide a line item cost on the schedule of values for the removal stolen equipment. Contractor to provide a line item cost on the schedule of values for the removal and replacement of Owner provided equipment.

1.04 REGULATORY REFERENCES

A. Contractor will comply will all Federal, State, Local Codes/Regulations and Industries Standards.

1. Federal:

- FCC - Part 15, Part 68
- ADA – Americans with Disabilities Act

2. State of California:

- CCR Part 2 - California Building Code 2016
- CCR Part 3 - California Electrical Code 2016
- Occupational Safety and Health Act (OSHA).
- Title 24, Building Standards, State of California.
- Title 19, California Code of Regulations.
- Title 8, Electrical Safety, State of California

3. ANSI Standards

- ANSI C2-2001 National Electrical Safety Code.
- ANSI C80.3 Specification for Zinc-coated Electrical Metallic Tubing.
- ANSI/UL 797 Electrical Metallic Tubing.
- ANSI/ICEA S-83-596-2001 - Fiber Optic Premises Distribution Cable Technical Requirements.

4. Industry Standards:

- Telecommunications Industry Associations/Electronics Industry Association (TIA/EIA)
TIA/EIA-568-C Commercial Building Telecommunications Cabling Standard
TIA/EIA-568-C.1 General Requirements
TIA/EIA-568-C.2 Balanced Twisted Pair Cabling Components Standard
TIA/EIA-568-C.3 Optical Fiber Cabling Components Standard
TIA/EIA-569-A Commercial Building Standard for Telecom Pathways and Spaces
TIA/EIA-606 Administration Standard for the

Telecommunications Infrastructure of Commercial Buildings
TIA/EIA-607 Commercial Building Grounding/Bonding Requirements

TIA/EIA-758 Customer-Owned Outside Plant
Telecommunications Cabling Standard

TIA/EIA-758-1 Addendum No. 1 to TIA/EIA-758, Customer-Owned Outside Plant Telecommunications Cabling Standard

- National Electrical Manufacturer's Association (NEMA)
- Institute of Electrical and Electronic Engineers (IEEE)
802.3 (Ethernet)
802.3ab (Gigabit Ethernet over 4-pair Category 5e, 6 & 6A or higher)
802.3Z (Gigabit Ethernet over optical fiber)
- Underwriters Laboratories Inc. (UL)
- International Organization for Standardization/International Electromagnetic Commission (ISO/IEC) ISO 11801 Generic Cabling for Customer Premises
- Building Industry Consulting Services International (BICSI)
Telecommunications Distribution Methods Manual (TDMM 12th Edition or latest).
- ASCII - American Standard Code for information Interchange
- ASTM - American Society for Testing and Materials

- B. If there is a conflict between applicable documents, 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.
- C. This document does not replace any code, either partially or wholly. The contractor must be aware of and comply with all local codes that may impact this project.

1.05 SAFETY/CONTRACTOR QUALIFICATIONS/QUALITY ASSURANCE

A. Safety and Indemnity

1. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of persons and property during performance of work.
2. The Contractor shall ensure that all personnel working in or anywhere on the site shall be provided a hard hat, safety shoes, a face shield or safety goggles, etc. for their protection.
3. No act, service, drawing review or construction observance by the owner's representative or any other party employed by the campus is intended to include review or approval of adequacy of the Contractor's safety measures, in, on or near the construction site.

B. Contractor Qualifications

1. Each low voltage contractor/sub-contractor shall submit their

qualifications to the district prior to award of contracts.

2. Contractor shall have been in business for no less than five (5) years and have installed of a minimum of 3 projects of similar size and scope.
3. A Manufacturer Certified Installer contractor shall complete the System installation. The contractor shall have completed standards based product and installation training. A copy of the Contractor's Manufacturer Certified Installer certificate shall be submitted with their submittal.
4. Sub-Contractor Qualifications
 - All Contractors shall submit a list of at least three (3) projects of similar dollar volume completed within the past 24 months for reference purposes.
 - The Contractor shall compile detailed information relating to similar work completed, including corporate references sufficient to enable the Owner to evaluate and agree to the Contractors' responsibility, experience and capacity to perform the work.
 - Each Contractor to perform telecommunications work on this project shall possess a C-10 or C-7 (formerly C-61) Limited Specialty License for Telecommunications and must be certified for the installation, termination, splicing, and testing of copper cables, fiber optic cable, riser cable, and inside wiring. The appropriate contractor's license for underground construction and conduit installation is also required.
 - An on-site Contractor superintendent must be available at all times. Contact can be by person or telephone.
5. Contractors who do not meet the minimum specified requirements will not be accepted.

C. Quality Assurance: Contractors are required to comply with the following without exception:

1. The winning Contractor will assign this project to a competent Project Manager who has demonstrated their ability to supervise a telecommunications project of the same size and scope.
 - The contractor will make this person available to the Owner/Owner's Representative before the start of this project for an interview. This person must be deemed acceptable by the Owner and/or their Representative before work can begin.
 - Project Manager will be required to be available for scheduled on site project meetings at no additional cost to the Owner.
 - Project Manager will be required to be available to meet on site with the Owner/Owner's representative with a minimum of 24 hours' notice for non- emergency issues, and a minimum of 4 hours for emergency issues at no additional cost to the Owner.
2. All material and equipment to be installed on this project shall be "new". If

the Owner/Owner's Representative discovers that "used" material or equipment has been installed on this project the Contractor will be required to replace said materials and/or equipment with "new" products at no additional cost to the Owner.

- "New" - Materials and products manufactured within one (1) year prior to installation, and meet or exceed the latest published specifications of the manufacture. Also these materials and equipment may not have been in use before installation on this project unless directed otherwise in the project documents.
3. Contractor must warranty all materials, equipment and labor for a minimum of one (1) year from the Owner's acceptance of the work.
- Warranty will provide repair/replacement of all defective or improperly installed materials at no additional cost to the Owner (including Labor, drive time, shipping, taxes, etc.).
 - Contractor is required to keep in stock replacement parts for all items covered in this specification and provide a competent service technician to be on site to repair/replace defective items no later than 24hours after receiving trouble call.
 - Warranty will cover normal Business hours, 8am – 5pm, Monday thru Friday. All calls received on a Friday or the day before a holiday will be held until the following regular business day.

1.06 SUBMITTAL DOCUMENTATION

- A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule
- B. The successful contractor shall provide three (3) copies of their submittal package.
- C. The Submittal Package will include:
1. All documentation given will be in a Bond Cover or in a Three (3) Ring Binder.
 2. A coversheet on the Contractor's Company Letterhead including:
 - Contractor's Name
 - Contractor's License Number
 - The Project Name
 - The Specification Number and Description
 - The date documentation was submitted.
 2. A spreadsheet with a full material list of products and equipment included in the Contractor's bid price. Spreadsheet will provide:
 - Manufacture Name
 - Part Number

- Description
 - Quantity to be installed for each part.
3. A legible copy of the Manufacturer's Catalog Cut sheet for each part included in the Contractor's bid.
 - The Catalog Cut sheets shall be placed in the same order as shown on the spreadsheet.
 4. Copies of the Manufacturer's Certification for a minimum of the Project Forman and 50% of the installation crew.
 5. Sample of Labeling Scheme. Contractor will provide a sample for each identifier to be used on this project.
- D. LEED/CHIPS/HPSA (when applicable to project provide additional submittal information)
1. Recycled content, segregated by pre- and post-consumer percentages.
 2. Rapidly renewable material content.
 3. VOC content
 4. Distances from site to follow material process locations.
 - Raw material harvest, collection or extraction
 - Product or component fabrication
 - Final material manufacture, if different than component fabrication

1.07 EQUIVALENT PRODUCTS

- A. Pre-Approved Equals:
1. All pre-approved products shall be listed in the relevant specification section.
- B. Contractors wishing to approve a system other than those specified in this document will be required to perform the following:
- Provide System specifications and cut sheets for all system components for the proposed new system(s).
 - Provide an itemized comparison to each of the system functions as described in this specification. Include in that document how the proposed system compares to the specified system described in this document on a line by line basis, using one of the following three criteria: "exceeds"/"matches"/"unequal".
- C. All other products than those specifically address in the bid document that the Contractor is seeking approvals for must be *received* by the Owner's Representative *no later than 5 business days before the bid date*. All Approved

Equals will be published in addendum form prior to the bid date.

- D. Failure to received written approval for product installed that deviates from the products called for in this specification and/or on the project drawings will result in the contractor having to replace the unapproved materials and equipment with the originally specified products at no additional cost to the Owner.
- E. All proposed system documentation must be sent to the Owner's Representative via one of the following; mail, fax or email. The Contractor will include the project name, their contact information, and the specification section number that the proposed system is comparable to.

1.08 ACCEPTANCE AND WARRANTIES

A. Project Acceptance

- 1. The Owner and the Contractor shall accept the project as complete based on the following criteria:
 - Before executing any performance testing, the Contractor shall present a test plan to the Project Engineer for their approval.
 - The Contractor has completed all testing and delivered copies of all test results to the owner's representative.
 - All test results have been examined and approved by the Contractor and the Project Engineer.
 - Copies of all documentation required by this section have been delivered to the Project Engineer.
 - All punch list items are completed to the satisfaction of the Inspector-of- Record.
 - Manufacturer Warranty Certification Certificates are provided to the Owner.
- 2. Following completion and/or compliance with the requirements listed above, the Contractor shall issue a Notice of Completion confirming that the project is complete. A 45-day acceptance period shall begin immediately following the issuance of the Notice of Completion.
- 3. Minor failures shall be responded to at the Owner's discretion or within one business day.

B. Manufacturer Warranties

- 1. The installed 271000 structured wiring (as applicable for given cable media) system, including both inter-building and intra-building sub-systems, shall be warranted by a manufacturer for a 15-year period or greater. Lifetime warranty is the warranty period preferred by the Owner.
- 2. The warranty certified systems will be a complete system comprised of products from a single solution manufacturer, warranted to operate as a guaranteed system for the entire channel (cords, telecommunications outlet/connectors, cables, cross-connects, patch panels, etc.). The

Solution Manufacturer shall administer a follow on program through the Vendor to provide support and service to the purchaser, and a single extended warranty point of contact. In the event that the certified system ceases to support the certified application(s), whether at the time of cutover, during normal use or when upgrading, the manufacturer and vendor shall commit to promptly implement corrective action.

3. The Contractor shall be responsible for correcting any problems and malfunctions that are warranty-related for the entire warranty period. In the event that a Contractor should not be in business at the time of an issue, the manufacturer shall be responsible for all corrections, if deemed the responsible party.
4. Copies of any extended material warranties shall be passed through to the Owner.
5. During the installation and up to the date of final acceptance, the Contractor shall protect all finished and unfinished work against damage and loss. In the event of such damage or loss, the Contractor shall replace or repair such work at no cost to the Owner or any other Trade Partnership working on the project.

END OF SECTION

SECTION 27 10 00
STRUCTURED CABLING

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing a Structured Cabling Plant.
- B. The Cabling System as described in this document is comprised of cabling, infrastructure and termination hardware to provide an approved TIA/EIA Data Networking and Voice Communication Structured Cabling System.
- C. Provide all labor, materials, tools and equipment required for the complete installation of work called for on the Construction Drawings and described in the Specifying Documentation.
- D. 271000 contractors shall be complete with work including all testing and labeling prior to 272000 contractor work start. Also the district requires minimum of 10 days to review test documents prior to network start up.

1.2 CONTRACTOR QUALIFICATIONS/QUALITY ASSURANCE

A. Safety and Indemnity

Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 A. Safety & Indemnity".

B. Contractor Qualifications

Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 B. Contractor Qualification".

C. Quality Assurance

Contractor shall comply with all requirements as specified in Section 270000 "1.5C Quality Assurance".

D. Warranty

- 1. Contractor shall comply with all requirements as specified in Section 270000 "1.8. Acceptance & Warranties".
- 2. The bid package shall be accompanied by a warranty commitment binding the awarded contractor and manufacturer to a Lifetime Structured Cabling Warranty with guaranteed performance criteria set forth in this document

and/or set forth by the Manufacturer. Contractor must be trained and certified in the installation of the Manufacturer system proposed. Contractor shall submit proof of current certification in the Certified Installer Program as a Premier or Authorized Network Installer in order to install and fully warrant the Cabling System. Copy of current Certificate must be included in Proposal if not already on file with Architect/Consultant/Owner.

3. A Lifetime warranty (or 25yr minimum) for the structured cabling system shall be provided for an end-to-end permanent link model installation which covers the performance of the cable, connecting hardware and the labor cost for the repair or replacement of the link.
4. Links failing test parameters or producing marginal pass results will be retested or replaced at Contractor expense until link test results passing TIA/EIA Standard parameters for the category rating or better are achieved.
5. Warranty application is to be submitted in advance of the project start, and full test reports shall be delivered to Manufacturer within 15 days of project completion. Lifetime Manufacturer warranty processing is to be completed by Contractor and warranty certificate delivered to owner upon project completion.

1.3 SUBMITTAL DOCUMENTATION

- A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule, and Section 270000 "1.6 Submittal Documentation".

1.4 EQUIVALENT PRODUCTS

- A. All Products Leviton, Berk-Tek, Superior Essex, and Chatsworth form the basis of design for this Specification. Part numbers, where provided, exemplify the feature set expected to be provided for this Structured Cabling Plant.
- B. Pre-Approved Equals:
 1. **None, all alternate materials must be submitted for approval prior to bid.**
- C. Structured cabling manufacturer system warranties shall be Limited Lifetime or 25year.
- D. Contractors wishing to approve a system other than those specified in this document shall do so in accordance with Section 270000 "1.7 Equivalent Products".

PART 2 – PRODUCTS

2.1 WORK AREA SUBSYSTEM

A. The Work Area shall consist of the connectivity equipment used to connect the horizontal cabling subsystem and the equipment in the work area. The connectivity equipment shall include the following options:

- Patch Cords
- Modular Inserts and Jacks
- Faceplates

B. Modular Inserts and Jacks

1. Category 6 Keystone Jack

- Jacks must exceed the Category 6 standard, and must be Component-Rated for performance.
- Jacks shall be 8-position 8-conductor RJ45-style and must have "retention- force technology" or equivalent feature to prevent time damage over the life of the jack regardless of use
- Jacks shall be 8 position un-keyed
- Jack shall be rear-terminated industry- standard 110 IDC. Lead-frame jacks shall not be used in this Cable Plant.
- Jacks shall have a designation indicating Category 6 on the nose which can be plainly seen from the front of the faceplate. Bottom of jack shall have date code.
- Jacks shall utilize a paired punch down sequence. Cable pair twists shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer.
- Jacks shall terminate 22-26 AWG stranded or solid conductors.
- Jacks shall be compatible with single conductor 110 impact termination tools.
- Jacks shall have an attached color coded wiring instruction label housed between the IDC termination towers.
- Jacks shall be manufactured in the USA
- Jacks shall be compatible with TIA/EIA 606 color code, and have removable high-visibility color labels designating pair locations. Split-colored T568A/B labels are not approved.
- Jacks shall utilize pair-separation towers for ease of untwisting pairs, and shall employ a snap-on rear termination cover designed for suppression and isolate of cross-talk of neighboring connectors.
- Jacks will be terminated according to the T568B wiring scheme.
- **Color:**
 - Data Jacks will be **BLUE**
 - Voice Jacks will be **WHITE** Wireless Jacks will be **YELLOW** A/V Jacks will be **GRAY** Camera Jacks will be **PURPLE**
- **Quantity:** Contractor will provide and install one jack for every outlet

cable shown on the drawings.

Part#:

Data Jacks will be 61110-RL6 Voice Jacks will be 61110-RW6
Wireless Jacks will be 61110-RY6 A/V Jacks will be 61110-RG6
Camera Jacks will be 61110-RP6

C. Wall Mount and Modular Furniture Faceplates

1. Wall Plates

- Faceplates shall be UL Listed and CSA Certified
- Faceplates shall be 2.75" W x 4.5" H (69.8 mm x 114.3 mm)
- Faceplates shall provide for TIA/EIA 606 compliant station labeling.
- Faceplates shall have plastic covers over the mounting screws that can be replaced with a clear plastic window over a printable paper insert.
- Faceplates shall have an industry-standard KEYSTONE opening style, and shall accept any Keystone modular insert.
- Faceplates shall be made in the U.S.A.
- **Color:** Faceplate to be **WHITE**
- **Quantity:** Contractor will provide and install one single gang faceplate for each outlet shown on the drawings.
- **Part#:**
6 Port Face Plate, PN# 42080-6WS
4 Port Face Plate, PN# 42080-4WS 2 Port Face Plate, PN# 42080-2WS

2. Blank Insert

- **Color:** Blank Insert to match device place or raceway.
- **Quantity:** Contractor will provide and install one insert for every unused port in a faceplate.
- **Part#:** 41084-B*B (*=W for **WHITE**, I for **IVORY**)

3. Blank Wall Plates

- Faceplate shall be constructed from stainless steel.
- Faceplates shall be UL Listed and CSA Certified
- Faceplates shall be 2.75" W x 4.5" H (69.8 mm x 114.3 mm) for single gang.
- **Color:** Faceplate to be **STAINLESS STEEL**
- **Quantity:** Contractor will provide and install one faceplate for each unused data/voice/video/intercom outlet shown on the drawings.
- **Part#:** 84014-40

4. Surface Mount Raceway Insert

Inserts for Wiremold's 4050, 5450 and 5550 Device Mounting Brackets

- Insert shall allow for two category 6 jacks to be mounted flush.

- Insert shall match the color of the Raceway installed.
- **Color:** Faceplate to be **IVORY**
- **Quantity:** Contractor will provide and install one 2-port insert for each outlet in the Surface Mount Raceway shown on the drawings.
- **Part#:** Equal to Wiremold, PN# 5507FRJ

2.2 HORIZONTAL DISTRIBUTION CABLING

The horizontal distribution cabling system is the portion of the telecommunications cabling system that extends from the Work Area (WA) telecommunications outlet/connector to the horizontal cross-connect in the Telecommunications Room (TR).

- Cabling Support System
- Copper Station Cabling
- Copper Cross-Connect Cabling

A. Copper Station Cable

1. Category 6 Unshielded Twisted Pair (UTP) Cable

- Cable will meet or exceed the proposed requirements of ANSI/TIA/EIA 568- C.2, 568-B.2 Addendum #1 and ISO/IEC 11801 Category 6 Cable Standard for: NEXT and ELFEXT (Pair-To-Pair and Power Sum), Insertion Loss (Attenuation), Return Loss, and Delay Skew.
- Cable shall be proven to support Gigabit Ethernet / 1000BASE-T / IEEE 802.3ab, ATM up to 155 Mbps, IEEE 802.3af Power Over Ethernet for VoIP, 100 Mbps Fast Ethernet / 100BASE-T / IEEE 802.3, ANSI.X3.263 FDDI TP- PMD, Ethernet / 10BASE-T / IEEE 802.3, 4 & 16 Mbps Token Ring / IEEE 802.5, T1/E1, xDSL, ISDN, 550 MHz Broadband Video and standards under development such as ATM at 622 Mbps, 1.2 and 2.4 Gbps.
- The cable shall consist of four unshielded twisted pairs of thermoplastic insulated bare copper enclosed in a thermoplastic jacket.
- All cable shall conform to the requirements for communications circuits defined by the California Electrical Code (Article 800) and the Canadian Building Code. Cable listed to CEC Article 800-51(a) will be used for "Plenum" installations. Cable listed to CEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor.
- Cable shall have been certified with the UL 1666 Vertical Tray Flame Test.
- Cable shall be available in a Plenum, Riser and Indoor/Outdoor rated jackets.
- Contractor will use the indoor/outdoor rated cable for all locations where the cable pathway goes underground and/or run in exterior conduit.
- Cables shall be made in the U.S.A.

- The listed Category 6 cables in this specification are manufactured by Berk-Tek unless otherwise noted.
- **Color:**
Data cable jacket will be **BLUE**
Data cable for Security Cameras will be **PURPLE**
- **Quantity:** See Drawing for quantity and installation details.
- **Part#:**
For Riser Application:
Berk-Tek PN# 10136339
For Plenum Application:
Berk-Tek PN# 10136226
For Indoor/Outdoor Application:
Mohawk CDT PN# M58772 (all cable jackets will be **BLACK**)

B. Horizontal Copper Cross-Connect Cabling

1. Voice Cross-Connect Cabling

- Cable shall meet and/or exceed the UL Listed Type CMR and the ANSI/ICEA S-80-576 standard.
- Cables shall be made in the U.S.A.
- Core Construction
 - Conductors: Solid-copper conductors, 24 AWG.
 - Insulation: Flame retardant semi-rigid PVC.
 - Core Assembly: Cable core will be made up of 100 pair units consisting of four (4) 25 pair sub-units. Each group individually identifiable by color coded unit binders.
- Jacket: Gray, flame retardant PVC jacket.
- **Color:** Voice cable jacket will be **GRAY**
- **Quantity:** See Drawing for quantity and installation details. The number of 25-pair cable between the MDF and the IDF shall be derived by multiplying the number of pairs required for the cross-connect by 1.25 to the nearest 25-pair increment.
- **Part#:**

Superior Essex Cable:	Berk-Tek:
25 pair = PN# 18-475-33	10032396
50 pair = PN# 18-579-33	10032471
100 pair = PN# 18-789-33	10032472

2.3 BACKBONE CABLING

The backbone cabling system is the portion of the telecommunications cabling system that extends from the Intermediate Distribution Frame (IDF) to the Main Distribution Frame (MDF).

A. Fiber Optic Backbone Cabling - Singlemode

1. Cable Construction:
 - a. Tight Buffered

- b. Dry water-blocking tape.
- c. Epoxy glass central strength member.
2. Jacket Material: Flame retardant UV stabilized , OFNP rated
3. Fiber Count: As indicated on Drawings (single mode/multimode).
4. Fiber Type:
 - a. Single-mode: 8.2/125.
 - b. Color coded 250 micron fibers.
5. Color Code: TIA/EIA-598-A, Optical Fiber Cable Color Coding.
6. Maximum Pulling Tension:
 - a. Up to 12 strand: 1335 N (300 lb/f) during installation, 400 N (90 lb/f) installed
 - b. 18 strand and above: 2670 N (600 lb/f) during installation, 801 N (180 lb/f) installed
7. Storage Temperature: -40 to +70 degrees C (-40 to +158 degrees F).
8. Installation Temperature: 0 to +60 degrees C (+32 to +140 degrees F).
9. Operating Temperature: -40 to +70 degrees C (-40 to +158 degrees F).
10. Cable shall be UL/cUL OFNP/OFN FTA (Plenum) rated and be Flame Resistant in accordance with the UL 1666.
11. Cable shall be constructed utilizing a loose tube design.
12. Cable will maintain the following:
 - a. Crush Resistance (EIA-455-41) = 2000 N/cm
 - b. Impact Resistance (EIA-455-25) = 2000 Impacts w/1.6 N-m
 - c. Min Bend Radius, Long Term - No Load = 15x Cable diameter; Short Term – Load = 20x Cable diameter
13. The Fiber Optic Cable in this specification is manufactured by Berk-Tek
14. Singlemode Fiber cables shall be pre-terminated in 12-strand MTP connectors, with factory-attached pulling head. Cables shall not be pulled through flooded or muddy conduits. Mandrel all conduits prior to pulling.
15. **Color:** Fiber Optic cable jacket will be **Aqua**
16. **Quantity:** See Drawing for quantity and installation details.

B. Fiber Optic Backbone Cabling - Multimode

1. Cable Construction:
 - a. Tight Buffered
 - b. Dry water-blocking tape.
 - c. Epoxy glass central strength member.
2. Jacket Material: Flame retardant UV stabilized , OFNP rated
3. Fiber Count: As indicated on Drawings (single mode/multimode).
4. Fiber Type:
 - a. Single-mode: 8.2/125.
 - b. Multimode: 50/125 Laser-Optimized OM3 capable of 1 Gigabit Ethernet Link at 1000m/600m (@850nm/1300nm) 10 Gigabit Ethernet Link at 300m/300m (@850nm/1300nm)
 - c. Color coded 250 micron fibers.
5. Color Code: TIA/EIA-598-A, Optical Fiber Cable Color Coding.
6. Maximum Pulling Tension:
 - a. Up to 12 strand: 1335 N (300 lb/f) during installation, 400 N (90 lb/f)

- installed
- b. 18 strand and above: 2670 N (600 lb/f) during installation, 801 N (180 lb/f) installed
 7. Storage Temperature: -40 to +70 degrees C (-40 to +158 degrees F).
 8. Installation Temperature: 0 to +60 degrees C (+32 to +140 degrees F).
 9. Operating Temperature: -40 to +70 degrees C (-40 to +158 degrees F).
 10. Cable shall be UL/cUL OFNR/OFN FTA (Riser) or OFNP (Plenum) rated and be Flame Resistant in accordance with the UL 1666.
 11. Cable shall be constructed utilizing a loose tube design.
 12. Cable will maintain the following:
 - a. Crush Resistance (EIA-455-41) = 2000 N/cm
 - b. Impact Resistance (EIA-455-25) = 2000 Impacts w/1.6 N-m
 - c. Min Bend Radius, Long Term - No Load = 15x Cable diameter; Short Term - Load = 20x Cable diameter
 13. The Fiber Optic Cable in this specification is manufactured by Berk-Tek
 14. **Color:** Fiber Optic cable jacket will be **Aqua**
 15. **Quantity:** See Drawing for quantity and installation details.

C. Fiber Optic Terminations – Trunk Cabling

1. Optical fiber cable trunks shall have a breakout of 3 feet. All fiber trunks shall utilize a heat shrink at the ends of all breakouts to create a smooth breakout of the fiber subunit legs
2. All Singlemode optical fiber cables shall utilize the 12-strand MTP connector. 24-strand cables shall have (2) 12-strand Singlemode MTP cables factory terminated at both ends.
3. All Multimode optical fiber cables shall utilize the 24-strand MTP connector.
4. Optical fiber trunks shall utilize female MTP connectors. Pinned and generic-style MPO connectors are not acceptable quality.
5. All Fiber Optic Trunks shall utilize Method B Polarity.
6. All optical fiber cabling trunks shall have a unique identifying label with a bar code for quick identification. The label shall state Manufacturer, trunk length and serial number.
7. A pulling eye shall be installed on all trunks to help facilitate installation of the trunk. Trunks over 125' shall be provided on wooden reels.
8. The contractor shall be responsible for the correct fiber trunk lengths, configuration, and ordering. Fiber Trunk part numbers shall be generated at www.Leviton.com/Configurator (Online) and must be verified by Manufacturer prior to ordering..

Approved Products:

Leviton Unity Part # FT-EB024JJ100F38C38CY-YYBS (sample part #, actual part # TDB as required)

Where:

FT	Fiber trunk
E	OM3 (use A for OS2 Singlemode)
B	Dry loose tube OFNP Plenum (use A for OFNR)
024	24-strand

JJ	Female 24-strand MTP on each end (use LL for 12-strand MTP breakout)
100F	100' (use 3-digit length and M for meters)
38	38" breakout
C	3mm jacketed fiber breakout leg
38C	same
Y	Pulling eye Yes (or N)
YY	staggered ends, 1st and 2nd end both (NN, YN, NY options)
B	Method B polarity
S	Standard labeling

D. Copper System Backbone Cabling

1. Voice System Backbone Cabling

- a. Cable shall meet or exceed those specified in RUS Bulletin 1753F-208 (REA PE-89)
- b. Cables shall be made in the U.S.A.
- c. Core Construction
 - Conductors: Solid, annealed copper, 24 AWG unless otherwise noted on design documents.
 - Insulation: Dual insulation consisting of an inner layer of foamed polyolefin skin, colored coded in accordance with industry standards
 - Core Assembly: Cables of 25 pairs and less formed by assembling pairs together in a single group. Cables of more than 25 pairs formed by twisted pairs arranged in groups with each group having a color coded unit binder.
 - Filling Compound: The entire core assembly completely filled with ETPR compound, filling the interstices between the pairs and under the core tape.
 - Core Wrap: Non-hygroscopic dielectric tape applied longitudinally with an overlap.
 - Sheath Construction
 - Aluminum Shield: Corrosion protected plastic coated, corrugated 0.008" aluminum tape.
- d. Jacket: Black, linear low-density polyethylene.
- e. **Color:** Voice cable jacket will be **BLACK**
- f. **Quantity:** See Drawing for quantity and installation details. The number of 25-pair cable between the MDF and the IDF shall be derived by multiplying the number of pairs serving the individual telephone handsets by 1.25 to the nearest 25-pair increment.
- g. **Part#:** Equal to Superior Essex Cable: 25 pair = PN# 09-097-02
 50 pair = PN# 09-100-02
 100 pair = PN# 09-104-02
 200 pair = PN# 09-108-02

2.4 TELECOMMUNICATION ROOM

The Telecommunication Room (TR) includes those products that terminate horizontal and backbone cabling subsystems and connect them to the network equipment.

- Patch Cords
- Horizontal Cabling Termination Equipment
- Backbone Cabling Termination Equipment
- Cabinets, Racks, and Enclosures
- Cable Support System

A. Patch Cords

1. Copper patch cords for CAT6 UTP user locations shall exhibit the following characteristics:
 - 26-gauge, unshielded, twisted pair, stranded conductor construction with a standard 8-position modular plug on both ends.
 - Plug contacts shall be plated with minimum of 50 micro-inches (μm) of gold
 - Slimline, integrated snag-less molded plug design with integrated strain relief, without incorporating the use of any secondary or 2-piece rubber over-boot.
 - Maximum Outer Diameter of 0.24"
 - Power over Ethernet (PoE and PoE+) compatible
 - Support 1 Gigabit applications over 90-meter permanent links with up to 10 meters of cordage
 - Meets all applicable standards and listings: ANSI/TIA-1096-A (formerly FCC Part 68), RoHS compliant, IEEE 802.3, PoE: IEEE 802.3at – 2012
 - Color: **White**
 - Provide 1 patch cord (length TBD) for each jack/outlet installed under this Specification.
 - **Part #:** Leviton Slimline CAT6 Component-rated Patch Cord, White, # 6D460-xxW (where xx = Length, in Feet)
2. Fiber Patch Cords
 - Fiber optic LC-LC patch cords, or jumpers, will make LC connections from the rack termination points to the equipment. The jumpers will meet the following requirements:
 - Factory-manufactured using Singlemode OS2 or Multimode OM3 optical fiber. Field terminations on fiber jumpers are not acceptable.
 - Shall utilize A-B polarity.
 - Shall exhibit <0.3 dB insertion loss and -25 dB return loss.
 - Shall be available in standard lengths of 1, 2, 3, 5 and 10 meters and custom-orderable up to any length of feet or meters
 - Provide factory assembled patch cords meeting or exceeding all criteria specified in the horizontal cabling standard subsection above, in the following quantities and/or as specified in Part 3:
 - (2) 2m LC duplex fiber jumper for each duplex port, or 1 patch cord per strand terminated in MDF.

- Verify lengths, quantities and configuration with owner prior to delivery.
- Part #: Leviton LC-LC SM duplex jumper, UPDLC-Sxx; LC-LC Multimode jumper, 5LDLC-Mxx (where xx = Length in Meters)

B. Horizontal Cable Termination Equipment

1. Copper Termination Equipment

a) Data Category 6 Patch Panels

- Panels shall be made of black 16-gauge steel in 24 port configurations.
- Panels shall have optional rear cable support bar for strain relief. Cable support bar shall attach to the rear of the patch panel itself without the use of additional fasteners or screws.
- Panels shall have write-on blocks and port numbers are silk-screened in white.
- Panels shall provide wiring identification & color code and maintain an in-line, paired punch down sequence that does not require the splitting of conductors from individual cable pairs.
- The panel shall accept all QuickPort modules and feature white write-on front labels.
- Panels shall be ANSI/TIA/EIA-568-C.1, C.2 and ISO/IEC 11801 category 6 compliant.
- Panels shall be UL LISTED 1863 and CSA certified.
- Panels shall be made by an ISO 9002 Certified Manufacturer.
- Panels shall be made in the U.S.A.
- **Color:** Patch Panel shall be **BLACK**
- **Quantity:** See Drawing for quantity and installation details. The number of patch panels to be supplied shall be derived by multiplying the number of data/voice cables being terminated at the individual TR by 1.25 and providing additional panels in the nearest 24 port increment.
- **Part#:**
Leviton 24-port Category 6 patch panel, angled recessed, **4W256-H24**

b) Voice Termination Block (Intercom Backbone and Intercom Devices)

- Pair Capacity 50
- Blocks shall be wall mounted.
- Terminates 22 - 26 AWG (0.81 - 0.41mm) solid insulated cable or 18 - 19 AWG (1.02 - 0.91mm) solid stripped cable
- Blocks shall have stand-off legs included for all locations; S89 series stand-off bracket
- Made from High impact flame retardant thermoplastic
- Height: 254mm (10 in.), width: 86.4mm (3.4 in.), depth: 30.5mm (1.2 in.)

- **Part#:** Leviton or equal Termination block, 40066-M50 Mounting bracket, 40089-00D

C. Backbone Cable Termination Equipment

1. Connectors

- a) Fiber Optic Connectors
- **Anaerobic & Mechanical terminations will not be accepted.**

2. MTP MODULES

- a) Fiber optic MTP-MTP configured trunks will land on a 24-strand (12 LC Duplex Port) MTP-LC Cassette module. The modules shall meet the following requirements:
- Insertable directly into fiber enclosure panel openings with a color-indicating push-on lockpin latch.
 - Rated for Laser Optimized Multi-mode OM4 optical fiber.
 - Shall utilize a male MTP connection.
 - Shall utilize Method B Polarity.
 - Shall require one Core module at one end of a fiber trunk segment, and one Edge module at the second end to maintain correct polarity across the system.
 - Core modules should be placed at the HDA, and Edge modules at the MDA and EDA for consistency of design.
 - **Part#:** Leviton FM-E024CDC0BC Core module, FM-F024CDC0BE Edge module (denotes Method B polarity, 24-fiber MTP, OM3)

3. Fusion-Fiber Pigtail Fusion Splice Module

- a) To be utilized only as approved in writing by Owner or Owner's representative, based on field conditions.
- Integrated module adapter bulkhead for 12 or 24 fibers with self-contained splice holders
 - Individual compartments provide slack storage and bend radius guides for respective backbone cable, 900µm tight buffer pigtails, and fusion spliced fibers
 - 12-fiber color-coded 900µm tight buffer pigtails 1.5m length are pre-loaded in module per specific configuration
 - Modular design allows for ease of maintenance of individual spliced fiber and allows for scaling up without impacting existing fibers
 - Included accessory kit consists of heat shrink style splice sleeves, tie wraps, and mesh sleeve
 - Installs in Leviton's Opt-X rack mount (Ultra, 1000i, and 500i) and wall mount fiber enclosures
 - Zirconia ceramic ferrules and sleeves used
 - 12-fiber splice module configurations will utilize duplex LC

adapters

- 24-fiber splice module configurations will utilize quad LC adapters
- ALL FIBER SHALL BE FUSION SPLICED
- **Quantity:** See Drawing for quantity and installation details.
- **Part #:** Leviton or equal
- 12-strand Singlemode, SPLCS-12L
- 24-strand Singlemode, SPLCS-24L
- 12-strand Singlemode Fusion Splice pigtail kit, UPPLC-KIT

4. Fiber Termination Panels

a) IDF Rack Mount Fiber Panel

- Fiber panels shall be constructed of durable polycarbonate plastic and black powder-coated 16-gauge steel
- Panel shall have a sliding tray which removes completely from enclosure to facilitate field terminations and splicing
- Sliding tray with front and rear stop shall glide forward and backward providing accessibility to front and rear of bulkhead after installation
- Panel shall have a 17" depth for high-density fiber termination and/or splicing
- Front saddles shall pivot for improved patch cord routing and organization
- Removable transparent hinged doors and slide-away covers shall allow for easy access during install and visibility of interior after install
- Panel shall employ patch cord bend radius guides to minimize macro bending
- Stackable and adjustable fiber rings simplify cable management
- Panel shall be no more than 1 rack unit in height and shall hold up to 3 adapter plates.
- Panel shall be Made in the U.S.A
- COLOR: black with translucent blue cover panels
- **Quantity:** See Drawing for quantity and installation details.
- **Part#:** Leviton Opt-X Ultra no exceptions
1U - 5R1UH-S03

b) IDF Wall Mount Fiber Panel

- Panels shall be constructed of cold rolled 16 gauge steel with a black powder paint finish and provide for fully enclosed fiber termination.
- Panel shall have a door design. One door shall be lockable for the "technician side" that secures the incoming and outgoing fiber cables. The second door shall be accessible to provide fiber patching as needed.
- Panels shall accept four adapter panels for 24 port configurations.
- Panels shall have a splice tray mounting stud incorporated into the base for mounting of mechanical or fusion splice trays.

- Panel shall have cable management anchor points and come with cable anchors allowing for the maintenance of the incoming cable with the proper minimum bend radius.
- Panels shall have cable entrance ports on the top and bottom with removable plastic dust covers.
 - **Color:** Fiber Panel will be **BLACK**
 - **Quantity:** See Drawing for quantity and installation details.
 - Part: 5W320-00N
- c) MDF Rack Mount Fiber Panel
- Fiber panels shall be constructed of durable polycarbonate plastic and black powder-coated 16-gauge steel
 - Panel shall have a sliding tray which removes completely from enclosure to facilitate field terminations and splicing
 - Sliding tray with front and rear stop shall glide forward and backward providing accessibility to front and rear of bulkhead after installation
 - Panel shall have a 17" depth for high-density fiber termination and/or splicing
 - Front saddles shall pivot for improved patch cord routing and organization
 - Removable transparent hinged doors and slide-away covers shall allow for easy access during install and visibility of interior after install
 - Panel shall employ patch cord bend radius guides to minimize macro bending
 - Stackable and adjustable fiber rings simplify cable management
 - Panel shall be 2 or 4 rack units in height and shall hold up to 6 or 12 adapter plates, respectively
 - Panel shall be Made in the United States
 - COLOR: black with translucent blue cover panels
 - **Quantity:** See Drawing for quantity and installation details.
 - **Part#:** **Leviton Opt-X Ultra no exceptions**
2U - 5R2UH-S06
4U - 5R4UH-S12
- d) Premise Splice Enclosures – Portable Classroom Distribution
- Modular wall-mount enclosures used to directly splice outside plant or intra- building cables
 - Four fusion/mechanical splice trays; 4" Standard Splice Tray, 4" x 11.75" x 0.25" # **T4LHS-P06**
 - Constructed of cold-rolled steel
 - ALL FIBER SHALL BE FUSION SPLICED
 - CPS-24, Customer Premise Splice Enclosure, empty (2 tray capacity)
 - **Part#:** CPS24-STD
- e) ~~Fiber Optic Adapter Plates~~
- ~~The Fiber adapter plate shall precision molded and compatible~~

with all approved panels and enclosures (rack or wall mount).

- ~~The adapter plate shall be offered in LC style in 12 or 24 fiber configurations per plate.~~
- ~~The adapter plate shall be compliant to TIA-568-C.3 (for performance) and respective TIA-604-X (for intermateability) standards.~~
- ~~Adapter plates shall use zirconia ceramic sleeves and be offered in standard fiber type colors pursuant to TIA-568-C.3 standards.~~
- ~~The adapter and plate shall be integrated using precision molded injection manufacturing methods, to eliminate "rattle" and loose fit.~~
- ~~Adapter plates shall be made in the United States of America.~~
- ~~Meets TIA-604-10B (LC) for connector intermateability~~
- ~~ALL FIBER SHALL BE FUSION SPLICED~~
- ~~COLOR: Aqua for Multimode, Blue for Singlemode, Black for blank plates~~
- ~~Part #:~~
~~6-port Duplex LC MM Adapter Panel, 5F100-2QL 6-port Duplex LC SM Adapter Panel, 5F100-2LL Blank Adapter Panel, 5F100-PLT~~

f) Fiber Optic OSP Splice Enclosures

- Used to directly splice outside plant or intra-building cables.
- Accommodates various splice tray designs, Maximum Capacity: 96 single fibers using 5" x 7" and 4" x 7" trays
- Enclosure made from 16-gauge steel, Hinges shall be Stainless steel
- Two-year limited product warranty.
- Durable powder-coat finish COLOR: Beige
 - Size 16" x 15" x 3.4"
- ALL FIBER SHALL BE FUSION SPLICED
- Part #: Leviton CPS Customer Premise Splice Enclosure, Single Door, 24 Fiber Trays # **CPS24-STD**
 Injection Molded Mini Splice Tray, Heat Shrink style (accepts standard sleeves), up to 12 fiber splicing # **T5PLS-12F**
 Splice Tray Mounting Hardware Kit # SPLMT-HKT
 Splice Sleeve, 40 mm # **FSSSD-040**
 Cable clamp kit # CPCSR-001 & CPCSR-002 Grounding kit # CPGRD-KIT
 Key Locking kit # CPLOK-KIT

5. Copper Termination Panels

a) OSP Protection Panels (Intercom Backbone Headend)

- 16 AWG Powder Coated Steel Construction
- Equipped with an Internal 26 AWG Fuse Link
- External Ground Connectors Accept 6 - 14 AWG Wire
- Industry Standard 5 Pin Design
- Exceeds UL497 Primary Protection Standards

- Stackable with Connection Grommets Included
 - 66 Block Accepts 22 - 26 AWG Wire/18 - 19 AWG Stripped Solid Copper Wire
 - **Color:** NA
 - **Quantity:** See Drawing for quantity and installation details.
Part#: Circa Enterprise inc.
25 pair block, PN# 1890ECT1-25 50 pair block, PN# 1890ECT1-50 100 pair block, PN# 1890ECT1-100
- b) OSP Protection Modules
- 240VDC (RUS Approved)
 - Nanosecond response time
 - External failsafe mechanism that permanently carbon arrestors grounds the module under sustained high current conditions
 - Integrated Test Points
 - UL & cUL listed
 - Designed to meet or exceed Telcordia standards
 - ISC 9002 Certified Manufacturer
 - **Color:** RED
 - **Quantity:** See Drawing for quantity and installation details.
Part#: Circa Enterprise inc. 4B1SF-240
**Provide 100% fuse density for all installed Protection Panels.*
- c) Voice Termination Block (Intercom Backbone building/TC and Intercom Devices)
- Pair Capacity 50
 - Blocks shall be wall mounted.
 - Terminates 22 - 26 AWG (0.81 - 0.41mm) solid insulated cable or 18 - 19 AWG (1.02 - 0.91mm) solid stripped cable
 - Blocks shall have stand-off legs included for all locations; S89 series stand- off bracket
 - Made from High impact flame retardant thermoplastic
 - Height: 254mm (10 in.), width: 86.4mm (3.4 in.), depth: 30.5mm (1.2 in.)
 - **Part#:**
Leviton Termination block, 40066-M50
Mounting bracket, 40089-00D

D. CABINETS, RACKS, AND ENCLOSURES

Contractor will provide the following 'IDF' Enclosures and components based on the number of cables to that will be terminated:

1. Remote Equipment Cabinet

- Remote equipment cabinets shall be manufactured from steel. Each cabinet shall have a rectangular body with a removable top panel and a hinged, locking front door. The door shall be solid (no window) and shall be reversible to open from the right or left side. Each

cabinet shall include two keys for the door.

- The cabinet shall be constructed to meet the requirements of a NEMA Type 2 Enclosure.
- The cabinet shall include a minimum of two pairs of 19" wide EIA-310-D compliant equipment mounting rails that can be mounted to the cabinet to align equipment with the top or front of the cabinet or at a 45° angle to the back of the cabinet. The mounting rails shall support 2, 4 or 6 RMU of equipment. The cabinet shall provide space for equipment up to 20" deep when aligned with the top of the cabinet or 4" (100 mm) deep when aligned with the front of the cabinet.
- The sides and bottom of the cabinet shall be pre-punched with combination 3/4" and 1-1/2" conduit knockouts for network cable access. The rear of the cabinet shall have a 4" x 6" opening located near the bottom center of the cabinet for through-the-wall network cable access. Cable tie points shall be located around the interior perimeter on the cabinet's rear panel.
- The sides of the cabinet shall have louvers to permit airflow into and through the cabinet. The bottom of the cabinet shall have a grill to allow the addition of an accessory ventilation fan.
- Rack shall provide for a grounding point per the TIA/EIA 607-A.
- The cabinet shall support 100 lb of equipment. Load bearing capacity shall be stated in the manufacturer's product literature.
- **Color:** Remote Equipment Cabinet will be **BLACK**
 - Finish shall be black epoxy-polyester hybrid powder coat paint.
 - Mounting rails are anodized aluminum.
- **Quantity:** See Drawing for quantity and installation details.
- **Part#:**
 - Remote Equipment Cabinet
Equal to CPI PN# 13050-723, ThinLine II Wall-Mount Cabinet, 26" Wide x 36" High x 12" Deep Exterior, 19" EIA x 6 RMU.
 - Fiber Optic Bracket
Equal to CPI PN# 12955-719
 - Fan Kit
Equal to CPI PN# 13051-001
 - 15amp Power Kit
Equal to CPI PN# 12934-001
 - 12-24 Rack Screws (bag of 50) Equal to CPI PN# 40605-005
 - Power Strip with Surge Suppression Leviton 5500-192

2. Wall-mounted cabinets

- Wall-mounted cabinets shall be manufactured from steel sheet.
- Each cabinet will have a rear panel that attaches to the wall, a hinged cabinet body that swings open from the rear panel providing easy access to the rear of equipment and a locking front door.
- The rear panel will provide cable access with pre-punched knockouts, up to 3", for conduit along the top and bottom edges of the panel. There will also be cutouts in the back of the rear panel so that cables

can enter the panel through the wall. The rear panel will provide attachment points for accessory equipment mounting brackets and cable tie points within the panel (cabinet).

- The cabinet body will include a single pair of vertical 19" EIA equipment mounting rails. The mounting rails will be EIA-310-D compliant with the Universal hole pattern. Mounting holes will have #12-24 threads.
- Mounting rails will be adjustable in depth so that they can be positioned at any point within the cabinet body. The design of all cabinets will allow an additional pair of mounting rails (for a total of two pairs of mounting rails per cabinet) to be added to the cabinet.
- The wall-mount cabinet shall provide a hinge design that attaches the cabinet body and the rear panel and allow the rear panel to be removed during installation. The hinge design will allow the cabinet body to open at least 90°. The hasp used to secure the rear panel and the cabinet body together will assist in drawing the components together during the locking action.
- The cabinet body will include vents that are designed to accept fan kits.
- The front door will be hinged and locking. The front door and rear panel will be keyed alike. The front door will have rounded edges and corners. The cabinet body will allow the front door to be attached so that it will swing open from the right or left. The cabinet manufacture shall provide an option for a solid or a tinted plexi-glass window front door. The plexi-glass in doors shall be bronze acrylic (not clear) with a UL flammability classification of 94HB or better.
- Finish shall be epoxy-polyester hybrid powder coat (paint).
- The cabinet shall have the option of being delivered fully assembled. All cabinets will include installation hardware (hex lag screws) for wood studs and 50 each #12-24 equipment mounting screws.
- Load bearing capacity for cabinets that wall-mount will be a minimum of 200 pounds per cabinet.
- Cabinets that are wall-mount only will be certified and UL Listed to standard UL 60950 under category NWIN.
- **CONTRACTOR TO INSTALL PROFESSIONALLY SO OWNER PROVIDED EQUIPMENT FITS IN THE RACK. VERIFY RAILS ARE PROPERLY ALIGNED SO ALL EQUIPMENT FITS (including cables/cords) AND DOORS CLOSE. VERIFY SPACING BETWEEN PANELS IS ADEQUATE FOR EQUIPMENT INSTALLATION.**
- **Color:** Wall Mount Cabinet will be **BLACK**
- **Quantity:** See Drawing for size, quantity and installation details.
- **Part#:**

Wall Mount Cabinet

12U Cabinet equal to Chatsworth Products, PN# 11900-724 18U Cabinet equal to Chatsworth Products, PN# 11900-736 26U Cabinet equal to Chatsworth Products, PN# 11900-748

**Contractor will provide an additional set of mounting rails for each wall mount cabinet, equal to Chatsworth Products PN# 12787-5xx.*

Wall/Floor Mount Cabinet

33U Cabinet equal to Chatsworth Products, PN# 13495-760 40U Cabinet equal to Chatsworth Products, PN# 13495-772

**Contractor will provide an additional set of mounting rails for each wall mount cabinet, equal to Chatsworth Products PN# 13276-7xx.*

Fan Kit/Filter Kit

Equal to Chatsworth Products Fan Kit, PN# 12804-701 Equal to Chatsworth Products Filter Kit, PN# 12805-701 Grounding Kit

Equal to Chatsworth Products, PN# 10610-019 Power Strip with Surge Suppression

Leviton 5500-192

3. Floor Mount 2-post Racks

- Each rack shall have two L-shaped top angles, two L-shaped base angles and two C-shaped equipment-mounting channels. The rack shall assemble with nut and bolt hardware. The base angles shall be pre-punched for attachment to the floor.
- Equipment mounting channels shall be 3" (76 mm) deep and punched on the front and rear flange with the EIA-310-D Universal hole pattern, 1-3/4" (44.45 mm) rack-mount spaces (U), to provide 45U, 52U or 58U for equipment. Each mounting space (U) shall be marked and numbered on the mounting channel.
- When assembled with top and bottom angles, equipment-mounting channels shall be spaced to allow attachment of 19" EIA rack-mount equipment. Equipment attachment points shall be threaded with 12-24 roll-formed threads. The rack shall include assembly and equipment-mounting hardware. Racks shall include 50 each combination pan head, pilot point mounting screws.
- The assembled rack shall measure 7' (2.1 m)/84" (2133 mm) high, 8' (2.4 m)/96" (2438 mm) high or 9' (2.7 m)/108" (2743 mm) high; 20.3" (515.9 mm) wide and 15" (381.0 mm) deep. The sides (webs) of the equipment-mounting channels shall be punched to allow attachment of vertical cable managers along the sides of the rack or for rack-to-rack baying.
- Assembly hardware shall electrically bond the top angles, side channels and base angles together when assembled, and there shall be a masked ground attachment point with 1/4-20 threaded studs spaced 5/8" apart on the inside of the side channel to attach a ground lug allowing easy attachment to the Telecommunications Ground.
- The rack shall be rated for 1,000 lb (453.6 kg) of equipment.
- Certifications: Communications Circuit Accessory, DUXR and DUXR7 category, file number 140851
- Material: Steel and aluminum extrusion
- Construction: Bolted assembly, Ships unassembled
- **Color: BLACK**
- **Quantity:** See Drawing for quantity and installation details.
- **Part#: Chatsworth Products Inc.**
Floor Mount 2-Post Rack CPI# 55053-703

Vertical Wire Managers

Equal to Leviton, PN# 8980L-VFR Power Strip with Surge Suppression Leviton 5500-192

4. Floor Mount 4-post Racks

- Four-post frame with threaded mounting holes used to support 19" wide rack- mount communications equipment and shelves
- For indoor use only, in environmentally controlled areas; may not be used outdoors, in industrial or harsh environments, or in plenum spaces
- Includes: (1) top pan, (1) bottom pan, (4) mounting channels, (2) base angles, (2) top angles
- Assembly hardware; (100) #12-24 equipment mounting screws
- Equipment Support: Front and rear pairs of 3" deep C-shaped equipment mounting channels, Fixed in place, 29" apart front-to-rear, 19" wide, EIA-310- D compliant hole pattern
- 1-3/4" high rack-mount units (RMU); RMU spaces are marked and numbered on the channels
- Universal hole pattern, 5/8"-5/8"-1/2" vertical hole spacing
- Threaded #12-24 equipment mounting holes, Includes 100 each #12-24 equipment mounting screws
- Load capacity: 2000 lb of equipment
- Material:; Aluminum extrusion, Aluminum sheet
- Construction: Bolted assembly, Ships unassembled
- **Color: BLACK**
- **Quantity:** See Drawing for quantity and installation details.
- **Part#: Chatsworth Products Inc. Floor Mount 4-Post Open Frame Rack CPI# 15053-703**
Grounding Kit 10610-019
Power Strip with Surge Suppression Leviton 5500-192

5. Floor Mount Cabinets

- Four-post frame with threaded mounting holes used to support 19" wide rack- mount communications equipment and shelves
- For indoor use only, in environmentally controlled areas; may not be used outdoors, in industrial or harsh environments, or in plenum spaces
- Includes: (1) top pan, (1) bottom pan, (4) mounting channels, (2) base angles, (2) top angles
- Assembly hardware; (100) #12-24 equipment mounting screws
- Equipment Support: Front and rear pairs of 3" deep C-shaped equipment mounting channels, Fixed in place, 29" apart front-to-rear, 19" wide, EIA-310- D compliant hole pattern
- 1-3/4" high rack-mount units (RMU); RMU spaces are marked and numbered on the channels
- Universal hole pattern, 5/8"-5/8"-1/2" vertical hole spacing
- Threaded #12-24 equipment mounting holes, Includes 100 each #12-

- 24 equipment mounting screws
- Load capacity: 2000 lb of equipment
- Material: Aluminum extrusion, Aluminum sheet
- Construction: Bolted assembly, Ships unassembled
- **Color: BLACK**
- **Quantity:** See Drawing for quantity and installation details.
- **Part#: Chatsworth Products Inc.**
Floor Mount Cabinet CPI# M1050-741
Grounding Kit 10610-019
Power Strip with Surge Suppression Leviton 5500-192

6. Outdoor Wireless Access Point Enclosure

- Non-glass-filled polyester material, UV resistance; Overlapping tongue-and-groove raised cover and gasket provide secure Type 4X seal
- Removable snap-hinge cover allows for easy access to cover and body for modifications
- Molded layout grid on inside of body and solid covers assists with component mounting
- Molded-in embosses for rear panel mounting
- Internal rail system and adjustable panel blocks allow
- UL 508A Listed, NEMA/EEMAC Type 4
- Material: Non-glass-filled polyester
- **Color: Light-Gray**
- **Quantity:** See Drawing for quantity and installation details.
- **Part#: Pentair**
- **Polypro Wifi, PN# D16148WF**

E. Cable Support System

1. Ladder Rack Cable Runway

- Stringers shall be fabricated from 16ga .375" x 1.5" Cold Rolled Steel tubing.
- Rungs shall be fabricated from 16ga .5" x 1.0" Cold Rolled Steel tubing
- Rungs shall be spaced at 9.0" center to center
- A straight length of ladder shall be capable of supporting 45 pounds per foot when a 10' length is tested according to NEMA VE-1.
- Ladder Rack shall have a powder coat finished.
- Ladder Rack shall be available in standard 6ft. and 10ft. lengths.
- Ladder rack shall be a part of a total system that includes: manufacture bends, wall supports, joining hardware, etc.
- Ladder Rack shall be grounding per the TIA/EIA 607-A.
- **Color:** Ladder Rack will be **BLACK**
- **Quantity:** See Drawing for quantity and installation details.
- **Part#:** Equal to Chatsworth Products Cable Raceway, PN# 11252-71X

2. Backbone Slack Loops

- Storage rings may be used to store coiled slack loops on backboard.
- Part #:
Fiber storage rings, Indoor fiber: 48900-IFR Fiber storage rings,
Outdoor fiber: 48900-OFR

PART 3 – EXECUTION

3.1 INSTALLATION

A. Work Area Outlets Installation

- No more than 12" of cable shall be stored in an outlet box, modular furniture raceway, or insulated walls.
- Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.
- The cable jacket shall be maintained to within 12.7mm (½ inch) of the termination point.
- All UTP cables shall have no more than 6.4mm (1/4 inch) of pair *untwisted* at the termination point.
- Data jacks, unless otherwise noted in drawings, shall be located in the top position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the left-most position(s).
- Voice jacks, unless otherwise noted in drawings, shall occupy the next position(s) below the data on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the position left of the data jack.
- Video jacks, unless otherwise noted in drawings, shall occupy the bottom position(s) on the faceplate. Video jacks in horizontally oriented faceplates shall occupy the position left of the data/voice jack.
- All faceplates installed shall be level.
- All outlets will be labeled according to the approved labeling scheme.
- Each faceplate shall be machine labeled. The labeling shall be placed on the faceplate so that the individual jack can be clearly identified by its associated label.
- Cables shall be identified by a self-adhesive label in accordance with the Identification and Labeling section of this specification and ANSI/TIA/EIA-606. The cable label shall be applied to the cable no further than 6" behind termination module, behind the faceplate on a section of cable that can be accessed by removing the cover plate.

B. Horizontal Distribution Cable Installation

- Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.
- Nylon or plastic locking cable ties, e.g. "Zip-Ties", shall not be used on this project.
- Contractor will provide a three foot "service loop" for all station cables. The

service loop will be coiled and secured using Velcro in the accessible ceiling at the conduit stub to the work area outlet box.

- Tie Wraps will not be allowed for supporting, bundling and/or dressing of any station cables on this project.
- Contractor will provide a three foot "service loop" for all station cables. The service loop will be coiled and secured using Velcro in the accessible ceiling at the conduit stub to the work area outlet box.
- A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in all "common" conduit runs. "Common" Conduit Runs are those that house more than one cable or set of cables that do not specifically feed a Work Station Outlet. Examples of "Common" Conduit Runs are: floor/ceiling penetrations, stub-throughs, distribution conduits, all conduits between J-boxes, etc.
- Cable raceways shall not be filled greater than the TIA/EIA-569-A maximum fill for the particular raceway type or 40%.
- Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
- The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
- Pulling tension on 4-pair UTP cables shall not exceed 25-lb for a four-pair UTP cable.
- The Cable Support System shall be installed in such a way that will allow for future cables to be added and to provide sufficient protection of all cable.
- For all installs where station cables are not installed in a continuous conduit run the following guidelines will apply. The Contractor will be responsible to reinstall all cables and pathways that do not meet with the following at no additional cost to the Owner:
 - J-hooks shall be installed to support all station cables every 14" – 28" inches.
 - All pathways shall be run at right angles. No diagonal pathways will be allowed unless otherwise noted on the drawings.
 - Horizontal cables shall be bundled in groups of no more than 25 cables per Caddy's CAT21 J-hook, no more than 40 cables per Caddy's CAT32 J-hook, and no more than 64 cables per Caddy's CAT64 J-hook.
 - A separate J-hook is used for each group of cable. Specifically, CAT6 cable, fiber cable, and fire alarm are to have their own J-hook.
 - At no point shall cable(s) rest on acoustic ceiling grids, acoustic panels, or lighting fixtures.
 - All cables will be installed so that there is a minimum of 3" of clearance above all ceiling grid and tiles.
 - All cables will be installed so that there is a minimum of 12" of clearance above all florescent lighting.
 - All cables will be installed so that there is a minimum of 6" of clearance from all fire alarm and electrical system conduits.
 - Cables shall not be attached to the ceiling grid or lighting fixture wires. The contractor will provide their own carriers wires to support their horizontal cabling.
 - All cables shall be installed above fire-sprinkler systems and plumbing system fixtures and devises. Cables shall not be attached to or supported by these fixtures and/or their 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.
- Contractor is responsible for sealing around all cables that penetrate fire rated barriers.
- 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.

C. Horizontal Cross-Connect Installation

- Cables shall be cleaned, dressed, and terminated in accordance with the recommendations made in the TIA/EIA-568-A standard, manufacturer's recommendations and best industry practices. Contractor to verify standard network equipment can be installed without any interference from the cables. Equipment typically is installed directly above and/or below the panel.
- The cable jacket shall be maintained to within 12.7mm (½ inch) of the termination point.
- All UTP cables shall have no more than 6.4mm (¼ inch) of pair untwist at the termination point.
- Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
- All cables shall be neatly bundled in groups of 24 and dressed continuously from the entrance point of the Telecommunications Room 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. Contractor will use Velcro strip to bundle cables together. The use of Tie –Wraps is not permitted.
- 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.

D. Backbone Cable Installation

- Backbone cables shall be installed separately from horizontal distribution cables.
- Each individual cable is to be labeled. See details sheets for labeling examples. Cable type and from/to are required. Each cable to be labeled at any accessible point, including, but not limited to, pull boxes, Christy boxes, junction boxes, and any pass through location.
- Where possible the backbone and horizontal cables shall be installed in separate conduits.
- Where possible backbone cables of the same type shall be combined in conduit runs to maximize conduit fill ratios.
- 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.

- Pulling tension on Backbone cables shall not exceed the manufacture's limitations.
- The minimum bend radius for all Backbone cables is 16 times the cable diameter or the manufactures specification, whichever is greater.
- Cable slack shall be provided in every pull box, junction box, cabinet, entry facility, telecom room and termination enclosure.
 - * 25 feet of slack per cable shall be mounted on a service ring inside the enclosure.
 - * Entry & telecom rooms & cabinets: Minimum 25' feet coiled in re-closeable storage ring.
 - * If 25' is not possible, contact the owner and discuss an agreeable amount of slack, followed up with an confirming RFI.
 - * Minimum of 25' of slack in each vault and a minimum of 15' of slack in any other type of box (pull box, Christy box, pass through space, etc).
- All OSP cables may not penetrate more than 50ft into the buildings before be terminated or splices to cable with a fire resistant jacket, unless the jacket is indoor/outdoor rated.
- A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
- All backbone cables shall be securely fastened to the sidewall of the TR on each floor.
- 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.
- 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.
- Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

E. Backbone Cross-Connect Installation

- Cables shall be cleaned, dressed, and terminated in accordance with the recommendations made in the TIA/EIA-568-C document, manufacturer's recommendations and best industry practices.
- Bend radius of the cable in the termination area shall not exceed 16 times the outside diameter of the cable.
- All cables shall be neatly bundled and dressed continuously from the entrance point of the Telecommunications Room to their respective panels or blocks.
- Contractor will provide a minimum of a 3 foot "service loop" for each backbone cable before terminating to allow future rearrangement. Cables will be coiled and secured above the ceiling where possible or to the Telco Backboard where entrance point is from the floor.
- Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame no less than 18" from the finished floor.
- Contractor shall provide a machine label 1ft. to 2ft. from the entrance point of the TR and 6in. to 12in. from the termination point on each backbone cable. Cable shall be easily identified and fully legible without removing the bundle support ties.

F. Cabinets, Racks, Enclosures and Ladder Rack Installation

- Wall Mount Racks/Cabinets shall be securely attached to the Telco Backboard using minimum 5/16" hardware or as required by local codes. Mounting rails shall be adjusted to the proper depth to allow for the closing of doors when populated with network electronics. Coordinate with Owner for final depth required.
- Floor Mount Racks/Cabinets shall be securely attached to the concrete floor using minimum 3/8" drop-in anchor hardware or as required by local codes.
- All Floor Mount Racks/Cabinets will be either; secured on one side to the wall or attached to the closest wall with ladder rack.
- All Racks/Cabinets shall be braced to meet Zone 4 seismic requirements.
- Contractor will maintain a minimum of 36 inches of clearance from the front of the all rack/cabinets and all other obstructions.
- Floor Mount Racks/Cabinets shall be installed to allow for a minimum of 36" from rear and all other obstructions.
- All racks shall be grounded to the telecommunications ground bus bar.
- 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.
- The plywood bottom edge shall be mounted vertically no less than 12" above the finished floor.
- Contractor will provide all cutouts for the Electrical Contractors expansion rings and electric receptacles as shown on the drawings.
- Ladder Rack must be securely attached to walls, backboards, and racks/cabinets to comply with all Zone 4 seismic requirements.
- Ladder rack shall be installed so that there is a minimum of 8" of unobstructed clearance above rack.
- Ladder Rack shall be installed so that there is a minimum of 12" of clearance from all: florescent lighting, electrical conduits/circuits, and fire alarm conduits/devices.

3.2 IDENTIFICATION AND LABELING

- A. The labeling scheme for CAT6 cable is as follows for classrooms (verify with Owner prior to printing the labels):

When entering the room (if the room has multiple doors, the door designated as the primary entry door), label numbering shall start a one (1) and then increment as data drops are added going around the room, then any drops in the ceiling, and then any drops in the floor. For each room, numbering starts over at one (1). Each jack color starts at one (1) and increments for each additional jack of the same color. Label designations are based on jack color:

Blue = **D#** White = **V#** Yellow = **W#** Gray = **A#** Purple = **C#**

Patch Panel Label Format: RM# -

The first part of the label shall be the room number the data drop is located in,

RM is part of the label, followed by the room number or room designation. The last part of the label shall be the type, as stated above based on jack color, then followed by the drop number. For example, RM3-D10 is room 3, data drop 10. RM3-V2 would be room 3, voice data drop 2.

The label format in the room: RM# - -

The first part of the label shall be RM, followed by the room number/ designation the cabinet/rack is located in.

The second part of the label shall be the patch panel the cable is terminated on. The top most panel is A and continues down with B, C, etc... If multiple panels span more than one rack/cabinet, when standing in front of the rack/cabinets, the top left panel shall be A.

The last part of the label uses the label based on jack color, as stated above, and the drop number. Example, RM3-A-D10: Indicates the other end of the cable is in the cabinet/rack in room 3, terminated on panel A, and the last portion, ie D10 in this example, was the tenth data drop in this room. The last portion, D10 in this example, would match the patch panel label, RM3-D10.

Label scheme for non-classroom buildings follows the above scheme, but the label number starts at 1 (one) for each type (D, V, W, A, C) and increments throughout the building and does not reset for each room/office. Start at one and do not repeat the number anywhere in the building (for each type).

- B. The approved system will comply with the TIA/EIA -606-A Class 2 designations and include at a minimum, identifiers for all major components of the system: telecommunication rooms, grounding bus bars, 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.
- C. All label printing will be machine generated or hand-held printers 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.
- D. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.
- E. All fiber cable labels are to include the type, count, from and to on each label. Any point the fiber is accessible shall be labeled. At a minimum, that would include the starting point, any Christy boxes, cabinets/racks, any rooms the cable passes through, and the ending point. Service loops provided and labeled at each location, a minimum of 25' in each vault and 15' minimum in a Christy box/any other box or pass through space.
- F. **Labels are to be verified by Owner prior to printing.** Labels are to include

building/room designations used by the site. Do NOT use building/room designations from the plans unless approved by Owner in writing.

3.3 TESTING AND ACCEPTANCE

A. General

1. The Owner reserves the right to be present during any & all types of tests being performed.
2. Contractor will notify the Owner/Owner's Representative 24 hours before commencement of testing.
3. Upon receipt of the test documentation, the Customer reserves the right to have the contractor perform a 10% witnessed "spot testing" of the cabling system to validate test results provided in the test document, at no additional cost. If a significant amount of cables are marginal and/or fail during the "spot test" Contractor will retest the entire cable plant at no additional cost.
4. Contractors shall provide proof of test equipment calibration prior to testing.
5. Test equipment shall have been factory calibrated within six months of project testing dates.
6. 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 TIA/EIA-568-C, TSB-67 and TSB-95. 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.
7. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the Manufacturer's Warranty guidelines 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 Cable Testing

1. Twisted Pair Cable

- All twisted-pair copper cable links (including backbone cables) shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below.
- 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.

- 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-A 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.

2. Category 6 Performance

- Follow the Standards requirements established in:
 - ANSI/TIA/EIA-568-C.0 Wire Map
 - Length Attenuation
 - NEXT (Near end crosstalk)
 - ANSI/TIA/EIA-568-C.2 Return Loss
 - ELFEXT Loss Propagation Delay Delay skew
 - PSNEXT (Power sum near-end crosstalk loss)
 - PSELFEXT (Power sum equal level far-end crosstalk loss)
- A Level III or better test unit is required to verify category 6 performances and must be updated to include the requirements of TSB-95 and Amendment 5. Testers will be equal to Fluke Network's DTX CableAnalyzer™ Series.
- All testers shall have been recalibrated within 6 months of use on this project. Contractor will be asked to provide proof of recalibration.
- Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the TIA/EIA Standard, and the result shown as pass/fail. The approved Level Three tester shall provide a printed document for each test that is also available in a downloadable file using an application from the test equipment manufacturer. The printed test results shall include a print out of all tests performed, and the individual test results for each cable.

C. Fiber Optic Cable Testing

1. Backbone Fiber

- Each fiber strand shall be tested for attenuation with an Optical Power Meter and light source and with an Optical Time Domain Reflectometer (OTDR) for actual length and splice/connector loss. Cable length shall be verified using sheath markings. The guidelines and procedures established for Tier 1 testing in TIA/TSB-140 shall apply.
- All fiber optic cables shall be tested from the site's MDF to each fiber terminals located in the IDF. The results of OTDR testing to define the length of each riser cable shall be documented. The Contractor shall conduct a power meter (loss) test of each fiber optic station and riser cable at both wavelengths, 850/1300nm for MM and 1310/1550nm

- for SM, A to B, B to A, and OSPL (OSPL is defined as $L_a + L_b$). No individual station or riser fiber link segment (including connectors) shall measure more than 2.0 dB loss.
- Tests shall be conducted using ANSI/EIA/TIA/EIA-526-14A, Method B. Test results evaluation for the panel to panel (backbone) shall be based on the values set forth in ANSI/TIA/EIA-568-C.2. The Contractor shall provide an electronic printout for each strand tested with the Power Meter and the OTDR.
 - Where concatenated links are installed to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. After the link performance test has been successfully completed, each link shall be concatenated and tested. The test method shall be the same used for the test described above. The evaluation criteria shall be established between the Owner and the Contractor prior to the start of the test.
 - All installed cables must meet or exceed the defined standards for performance. The Contractor shall take all steps necessary to repair or replace any optic not meeting the standard.
 - Fiber optic riser and station cable test results shall be provided in electronic format to the Owner.

3.4 SYSTEM CLOSEOUT AND AS-BUILT DOCUMENTATION

- A. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Owner's Representative/Engineer for approval. One (1) to be a hardcopy and two (2) to be electronic copies. 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. This is inclusive of all test results 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 calendar days of the completion of each testing phase. At the request of the Owner's Representative/Engineer, the telecommunications contractor shall provide copies of the original test results.
- C. The Owner's Representative/Engineer will 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.
- D. **Test Results** documentation shall be provided in two media, as listed above, one (1) hardcopy and one (1) on disk within three weeks after the completion of the project. The documentation 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, a bi-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.

- E. Printouts generated for each cable by the wire test instrument shall be submitted as part of the documentation package.
- F. 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.
- G. The **As-Built** drawings are to include cable routes, outlet locations and the approved labeling identifiers. Their sequential number as defined elsewhere in this document shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.
- H. Contractor will provide one laminated 11"x17" drawing at each IDF that includes the building layout for that IDF, along with the outlet locations and all of the approved labeling. The as-built/current layout is to be provided.
- I. Test results are to be submitted to the manufacturer and a copy of the warranty certification is to be provided to the owner.

END OF SECTION

PAGING SYSTEMS**SECTION 27 51 13****PART 1 – GENERAL****1.1 RELATED SECTIONS**

- A. Section 26 05 00 – Common Work Results for Electrical
- B. Section 27 00 00 – Communications
- C. Section 27 20 00 – Data Communications

1.2 REFERENCES

- A. The system shall be listed as a Power Limited Device and be listed under the standards in this section. Each system shall be supplied with complete details on all installation criteria necessary to meet all of the listings.
- B. California Code of Regulations
 - 1. Title 24, Part 3 – California Electrical Code
- C. National Fire Protection Association (NFPA)
 - 1. NFPA 70 – National Electric Code (NEC)
 - 2. NFPA 72 – Local Protective Signaling
 - 3. NFPA 72 – Remote Station Protective Signaling
 - 4. NFPA 72 – Proprietary Protective Signaling

1.3 SCOPE OF WORK

- A. Furnish, install, and program as shown on plans and as hereinafter specified all equipment, cabling, and terminations for a fully functional system.
- B. The contractor shall furnish complete shop drawings for review and approval.

1.4 SYSTEM DESCRIPTION

- A. The paging system shall be a highly configurable district wide system that runs on the District's wide area network (WAN) or virtual private network (VPN) by means of a single server application.
- B. The system shall be programmed, monitored, and controlled via a web based Graphical User Interface (GUI) provided by a factory designed server application running on a Microsoft Windows 2000 or 2003 server. The server to receive the application shall be designated by the District.
- C. The application shall support different levels of user privileges as designated by the paging system administrator.

- D. The GUI shall be accessible to all networked computer residing on the district's WAN or VPN. Access to the server shall be granted via login and authentication that supports the Secure Sockets Layer (SSL) / Transport Layer Security (TSL) protocol.
- E. The system shall automatically recognize all system speakers connected to the District's WAN or VPN. Paging options shall be universally configurable to include district wide all page, specific campus all page, campus zone paging, etc.
- F. The number of configurable zones shall be unlimited. A zone may be as small as one speaker or as large as all of the speakers. Each speaker may be assigned to an unlimited number of zones.
- G. In addition to live and ad hoc paging, the system shall support playback of recorded messages stored as .wav files, to include the program bell tone, daily announcements, lockdown alert, evacuation alert, etc. The system shall allow a different tone or message for each zone. The system shall also be able to broadcast messages to computer screens running a client application.
- H. The system shall support special calendar schedules to adjust for special events, holidays, etc. The system shall support multiple simultaneous schedules on the same facility (e.g., one schedule for grades 1-6, another for kindergarten, etc.) The system shall be able to automatically compensate for daylight savings time and automatically synchronize the system time with internet time servers.
- I. The system shall log all events that occur and trigger and alarm for any errors or changes (e.g. message send failure, speaker failure, new speaker connected to network, etc.).
- J. The system shall receive voice input from SIP softphones installed on designated computers. The system shall also be capable of interfacing with any analog PBX or VoIP communications system to provide paging from telephone system handsets.
- K. The system shall be capable of initiating sounding specific messages or sending text messages to designate computers as triggered by other systems (e.g., fire alarm, security, etc.) via analog to digital zone controllers.
- L. The system shall be capable of interfacing with any legacy paging system to provide paging features inherent to the legacy system.
- M. Paging system speakers shall connect to the school LAN via CAT6 data cabling and IEEE 802.11af compliant power over ethernet (POE) switches located in data distribution frames. Each speaker shall be individually addressable via dynamic host control protocol (DHCP) addressing. The number of supported speakers shall be limited only by the number of available IP addresses. Speaker operation shall be accomplished by individual amplifiers on each speaker.
- N. The system shall support synchronized digital wall clocks as an integral component of the speaker.
- O. Stand-alone clocks shall be installed and connected to the master clock. Provide master clock at each building IDF where stand-alone clocks are used.

PART 2 – PRODUCTS**2.1 MANUFACTURER**

- A. Atlas Sound
4545 E. Baseline Road, Phoenix, AZ 85042
Phone (800) 876-3333. FAX (800) 765-3435. Website: www.atlassound.com
- B. Sapling, Inc.
1633 Republic Road, Huntingdon Valley, PA 19006
Phone (215) 322-6063. FAX (215) 322-8498. Website: www.sapling-inc.com
- C. The manufacturer shall have at least twenty-five (25) years of experience in the role of public address system manufacturing, and a proven track record of forward and backward compatibility for a minimum of twenty (20) years for its product's auxiliary devices, including speakers, amplifiers, and paging equipment.
- C. The manufacturer shall make its hardware products freely available through most distribution channels. Hardware products shall not be exclusive to specific dealers by region or any other basis.
- D. Provide updated products where these have been replaced.

2.2 HEAD END

- A. Syn-Apps "SA-Announce" Server Application

2.3 IP SPEAKERS

- A. Suspended Ceiling Mount: Atlas Sound #I128SYS
- B. Wall Mount: Atlas Sound #I8S speaker and #FEST-I8S (flush mount) or #SEST-I8S (surface mount) enclosure
- C. Exterior Vandal Resistant Speaker: Atlas Sound #IH-VP speaker and #FEST-IH (flush mount) or #SEST-IH (surface mount) enclosure

2.4 IP SPEAKER / CLOCKS

- A. Wall Mount: Atlas Sound #I8SC speaker/clock and #FEST-I8SC (flush mount) or #SEST-I8SC (surface mount) enclosure

2.5 WIRELESS ANALOG CLOCKS

- A. Wall Mount: Sapling #SBD-004-254-1 wall clock
- B. Clock Master: Sapling #SSM-100-0-1 IP synchronized master clock

PART 3 – EXECUTION**3.1 INSTALLATION**

- A. Horizontal cabling jackets, patch cable jackets, and modular RJ-45 jacks serving the Paging System shall be green in color. All cabling shall be installed and labeled in accordance with 27 20 00.
- B. Provide rack mounted, IP zone amplifiers for exterior speaker runs and corridors with more than 3 speakers only. All other speakers and speaker/clocks shall be individually addressed IP units.
- C. Install SA-Announce software on a server designated by the district and configure per specifications and owner direction for bell schedule.
- D. Program three (3) extensions on the existing VoIP managed communications system and interface with the Atlas IP system. The three extensions shall be 1) indoor speakers, 2) outdoor speakers, and 3) both indoor and outdoor speakers (all call).
- E. Provide one dedicated handset in administration that dials directly to All Call.

END OF SECTION

ELECTRONIC SAFETY AND SECURITY**SECTION 28 00 00****PART 1 – GENERAL****1.01 RELATED SECTIONS**

- A. Section 01 33 00 – Submittal Procedures
- B. Section 26 00 00 – Electrical
- C. Section 27 20 00 – Structured Cabling

1.02 SCOPE

- A. This section provides the minimum requirements for Electronic Safety and Security Systems. Additional requirements are to be found in subsections of this specification.

1.03 SUBMITTALS

- A. General Requirements
 - 1. All submittals shall be made in accordance with section 01 33 00.
- B. Licensure
 - 1. Submit proof of possession of a valid C-7 California State Contractor's License in good standing.
- C. System Submittals and Shop Drawings
 - 1. Submit a complete list of equipment and materials proposed for the system with catalog cuts, technical data, manufacturer's Specifications and detail drawings.
 - 2. Submit a complete set of detailed, scaled Shop Drawings of all racks, cabinets, and equipment, with all designations, dimensions, color, controls, wiring, and schematic diagrams of all circuits. Show interfaces to all equipment furnished, including equipment furnished by other contractors, identifying numbers of wires, termination requirements, voltages and other pertinent details. Include front elevations, cabinet dimensions, types of mounting, door barriers, catalog number of locks and finishes of terminal cabinets.
- D. Spare Parts Data
 - 1. After shop drawings are approved, and not later than thirty (30) calendar days prior to the date of beneficial occupancy, a list of spare parts data for each item of specified materials and equipment shall be submitted. The data shall include a complete list of parts and supplies with current unit prices and source of supply.

- E. Operating and Maintenance Documents
1. The contractor shall furnish to the architect (3) copies of operating and maintenance instructions.
 2. Documentation shall outline the step-by-step procedures required for system start-up, operation, and shutdown.
 3. Documentation shall list routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides.
 4. Documentation shall be submitted at least thirty (30) calendar days prior to acceptance test. The instructions shall include the manufacturer's name, system model number, service manual, parts list, and a description of all equipment and their basic operating features.
- F. Warranty
1. A copy of the manufacturer's warranty for all equipment and materials shall be provided.
- G. Close-Out Documents
1. Upon completion of the installation, the contractor shall provide four copies (one hard copy and three electronic copies) of Project Close-Out Documents to the District. Documentation shall include the items detailed below.
 2. As-Built Drawings
 - a. The contractor shall provide a complete set of as-built drawings for the entire system upon installation completion.
 - b. These drawings shall include, but not be limited to, the exact locations of all equipment, connections between all equipment, and wiring for all equipment as the system is installed.
 - c. printout of configuration
 3. All System source codes and passwords (e.g., fire alarm configuration and passwords) must be handed over to, and become property of the District upon completion of this project.
- H. All submittals called for shall be instruments of the Contractor, even though they may have been prepared by a subcontractor, supplier, dealer, manufacturer, or by any other person, firm or organization. Prior to submission, the Contractor shall undertake its own review and stamp with its acceptance prior to submittal.

1.04 SCOPE OF WORK

- A. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction is required to accomplish work indicated or specified in this or other sections, it shall be the responsibility of the Contractor to provide all materials and equipment which is usually furnished with such systems in order to complete the installation, whether or not specifically mentioned herein.

1.05 APPROVAL

- A. Installation of the system shall not commence until all approvals are granted by the Division of the State Architect (DSA).

- B. Installation of the system shall not commence until all shop drawings and submittals are approved by the School District, Architect of Record, and Engineer of Record.

1.06 QUALITY ASSURANCE

- A. Contractor Qualifications
 1. Must hold a valid State of California C-7 license in good standing;
 2. Must have completed at least three (3) projects of equal scope within the last three (3) years;
 3. Must maintain a service office within 50 miles of the project;
 4. Must be bonded to assure performance and satisfactory service during the guarantee period;
 5. Contractor must be registered with BICSI and have at least one RCDD on staff;
 6. Must have personnel fluent in the use of Computer Aided Design and possess and operate CAD software using .DWG or .DXF format.
- B. All equipment and wiring shall be furnished and installed by the authorized factory distributor of the equipment. The manufacturer's representative of each system shall provide a letter from the manufacturer of all major equipment with submittals stating that he is the representative and that the manufacturer will have a service representative assigned to this area for the life of the equipment.
- C. The Contractor shall furnish a letter from the manufacturer of the equipment specified, which certifies that the equipment has been installed according to factory recommended practices and that the system is operating satisfactorily.
- D. The Contractor shall provide not less than sixteen (16) hours of instruction to personnel in the operation, programming, and maintenance of each system. This instruction time shall be divided up as directed by the District.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials from damage during handling and installation.

1.08 COORDINATION

- A. Coordinate the Work of this section with the Work of other sections, including sprinkler systems, fire alarm systems, HVAC systems, security systems, etc., as applicable.

1.09 WARRANTY

- A. The entire system shall be guaranteed free of mechanical or electrical defects for a period of one year after final acceptance of the installation. Any material showing mechanical or electrical defects shall be replaced promptly at no expense to the District. Guarantee period shall begin from the date of final acceptance by the District.

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. References to manufacturer's model numbers and other information is intended to establish minimum standards of performance, function, and quality. Equivalent equipment from the specified manufacturer's may be substituted for the specified equipment, as long as the minimum standards are met.

PART 3 – EXECUTION

3.1 GENERAL

- A. All Work described in this specifying documents and on the Project drawings shall be performed in accordance with the acknowledged Professional and industry standards and practices. All installed equipment shall meet or exceed the specified manufactures regulations.
- B. Materials shall be installed in strict compliance with all local, state, county, province, district, federal and other applicable building, safety, and fire standards, laws, codes, regulations, and guidelines including, but not limited to, all appendices and amendments and the requirements of the local authority having jurisdiction (AHJ).
- C. Examine areas and surfaces to receive each system.
 - 1. Notify Architect of conditions that would adversely affect installation or subsequent use.
 - 2. Do not begin installation until unacceptable conditions are corrected.
- D. The Contractor shall maintain a competent Supervisor and Manufacturer Certified Technicians assigned to this installation for the duration of the Project.
- E. Furnish and install all materials, devices, components and equipment required for a complete and operational system.
- F. It is the Contractor's responsibility and obligation to coordinate with all necessary trades to ensure that the integrity of and compliance with Manufacturer and industry standards are met during the duration of the installation.

3.2 INSTALLATION

- A. Furnish control panels, components, devices, cabinetry, wire, connectors, materials, parts, equipment, labor, etc. necessary for the complete installation of the systems in full accordance with the recommendations of the equipment manufacturers and the requirements of the drawings and specifications.
- B. Coordinate the required space in Data equipment frames with this and other network based Communications systems that may share rack space. Provide racks with sufficient space to accommodate patch panels, switches, power supplies, etc. for all network interfaced systems.
- C. Installations shall follow standard wiring and installation practice, and shall meet or exceed industry standards of such work.
- D. Wire not installed in equipment racks, not portable, in unrated ceiling space, or not installed in conduit shall be fire rated and meet all applicable codes.
- E. Wire and cable for all other devices shall be supplied in accordance with the recommendations of the device manufacturer, CEC, and NEC.
- F. Equipment shall be held firmly in place with proper types of mounting hardware. All equipment affixed to the building structure must be self-supporting with a safety factor of at least three. All equipment shall be installed so as to provide reasonable safety to the operator. Supply adequate ventilation for all enclosed equipment items which produce heat.
- G. Furnish each system to facilitate expansion and servicing using modular, solid-state components. All equipment shall be designed and rated for continuous operation and shall be UL listed, or manufactured to UL standards.
- H. Shields of audio cables shall be grounded at one end only, at the input side of all equipment items in the system.
- I. Observe proper circuit polarity and loudspeaker wiring polarity. No cables shall be wired with a polarity reversal between connectors with respect to either end. Special care shall be taken when wiring microphone cables, to insure that constant polarity is maintained.
- J. Route cables and wiring within equipment racks and cabinetry according to function, separating wires of different signal levels (data, fire alarm SLC, fire alarm NAC, speaker, intrusion, etc.) by as much physical distances possible. Neatly arrange and bundle all cables loosely with Velcro cable ties. Cables and wires shall be continuous lengths without splices.
- K. All cables in conduits shall be insulated from each other and from the conduit the entire length and shall not be spliced. All cables and wires are to be continuous lengths without splices.
- L. Mechanical connections shall be made using approved connectors of the correct size and type for the connection. Wire nuts will not be accepted.

- N. Label all wires in racks and console as to destination and purpose. Clearly and permanently label all jacks, controls, and connections. All labeling shall be completed prior to final system inspection.

3.3 PROGRAMMING

- A. Contractor shall provide all necessary programming to provide complete operating systems.
- B. Contractor shall include in their bid one (1) four (4) hour planning meeting with the District and their Representatives for each system to outline all specific programming issues for each system, as well as, but limited to:
 - 1. Contractor will be informed of any specific requirements for use of the system.
 - 2. Contractor will provide overview of system capabilities.
 - 3. Contractor will address all concerns of the District and their Representatives.
- C. Contractor shall include in their bid one (1) four (4) hour planning meeting with the District and their Representatives for each system, scheduled at least six (6) months after job final, to review the system performance and modify programming as needed. Programming modifications shall be provided at no cost to the District.

3.4 TESTING

- A. Completed systems shall be physically inspected by the District's representative to assure that all equipment is installed in a neat and professional manner and in accordance with these Specifications.
- B. Final systems testing and commissioning shall be performed after all installation and initial testing has been completed by the Installer, but prior to any use of the systems.
- C. The Contractor, prior to requesting systems testing and demonstration to the District's representative, shall ensure that all systems are in first-class working condition and free of shorts, ground faults/loops, parasitic oscillations excessive hum and noise, RF interference, or instability of any form.
- D. The Contractor shall be responsible for properly performing all setup and alignment of the systems, and all assembly and setup of portable equipment.

3.5 COMMISSIONING

- A. All testing documentation shall be supplied with the as-built documentation.
- B. The Contractor will include in their bid price six (6) hours for onsite commissioning and will provide the installation technician who was responsible for this project to be present at the system commissioning to tune, fix, repair,

and/or replace all system components that do not operate within the tolerance as set forth in the specifications, project documents, and industry standards.

- C. The final acceptance of the system by the District will be based upon the report of its representative following inspection, testing, and commissioning. A list of items in need of completion or correction shall be generated the District, which must be corrected by the Installer before final acceptance will be granted.

END OF SECTION

INTRUSION DETECTION**SECTION 28 16 00****PART 1: GENERAL****1.1 RELATED SECTIONS**

- A. Section 26 05 00 – Common Work Results for Electrical
- B. Section 27 20 00 – Structured Cabling
- C. Section 28 00 00 – Electronic Safety and Security

1.2 REFERENCES

- A. The system shall be listed as a Power Limited Device and be listed under the standards in this section. Each system shall be supplied with complete details on all installation criteria necessary to meet all of the listings.
- B. Underwriters Laboratories (UL):
 - 1. UL 365 Police Connect Burglar
 - 2. UL 609 Local Burglar
 - 3. UL 1023 Household Burglar Alarm System Units
 - 4. UL 1076 Proprietary Burglar
 - 5. UL 1610 Central Station Burglar Alarm Units
 - 6. UL 1635 Digital Burglar Alarm Communicator System Units
 - 7. UL 864 Control Units for Fire Protective Signaling Systems
 - 8. UL 985 Household Fire Warning
 - 9. UL 294 Access Control System Units
- C. California Code of Regulations
 - 1. Title 24, Part 3 – California Electrical Code
- D. National Fire Protection Association (NFPA)
 - 1. NFPA 70 National Electric Code (NEC)
 - 2. NFPA 72 Local Protective Signaling
 - 3. NFPA 72 Remote Station Protective Signaling
 - 4. NFPA 72 Proprietary Protective Signaling
 - 5. NFPA 72 Household Fire Warning
- E. U.S. Government Standards / Listings
 - 1. DCID 6/9
 - 2. DoD/NIST SCIF Standards

1.3 SCOPE OF WORK

- A. Furnish and install a complete Intrusion Detection / Access Control system with the performance criteria detailed in this specification.

- B. This specification document provides the requirements for the installation, programming, and configuration of a complete Command Processor Panel. This system shall include, but not be limited to:
1. Control panel
 2. System cabinet
 3. Power supply
 4. Keypad bus
 5. Batteries
 6. Wiring
 7. Conduit
 8. Associated peripheral devices

1.4 SYSTEM DESCRIPTION

- A. General:
1. The system areas and zones shall be programmable, and the system shall store, log, display, and transmit specific custom designations for system areas, zones, and user names.
 2. To ensure continued, one-call support, the system shall be constructed of sensing components provided directly by the system manufacturer, such as power supplies, motion detectors, door and window position switches, glass break detectors, or other sensing devices that the manufacturer offers.
 3. The system controller, user interfaces, zone input devices, relay output devices, and the system signal receiving equipment shall be engineered, manufactured, assembled, and must be distributed from a location within the United States of America.
 4. The system shall support user interaction by way of a keypad, web browser, system software, key switch, or radio frequency wireless control, using integrated or auxiliary devices provided by the system manufacturer.
 5. The system shall support controller zone input connections, system keypads, system zone expansion modules, and wireless zone input modules, and must support zone input connections by way of at least two competitive products. The system shall offer a seamless integrated compatibility with hard-wire and/or wireless zone expansion equipment for at least 200 wireless zones and/or a maximum of 574 hardwired zones.
 6. The system shall be capable of offering at least five zone expansion buses, each of which can support the connection of up to 15,000 feet of four-wire cable. Zone expansion and keypad data buses that exceed 2,500 feet of cable must include splitter/repeater modules to boost data voltage and maintain data integrity.
 7. The system shall provide a seamless capability to provide a minimum of 500 addressable relays, which can be located at any connection location upon a zone expansion bus.
 8. System relay outputs shall have the capability of being triggered as a result of a command from the user interface, changes in system status, changes in zone status, or by a programmable schedule.
 9. System relay output states shall be programmable for momentary, maintained, pulsed, or must follow the state of an associated system zone input.

10. The system shall be completely programmable either locally from a keypad or remotely through a standard dial-up, and network connections by way of a LAN, WAN, and/or by way of the Internet.
11. The control unit shall be completely programmable remotely using remote annunciators, and/ or using upload/ download software that communicates using SDLC 300 baud, 2400 baud, or IP Addressed data network. On-site programming from a personal computer shall also be permitted.
12. The control unit shall be equipped with an anti-reversing circuit breaker to prevent damage due to accidental reversal of battery leads.
13. The master control unit shall be connected to expansion modules via fiber optic cables and transceivers on the data network. There will be no separate copper cable runs across the site for the intrusion system.

B. Input/Output Capacity:

1. This system shall be capable of monitoring a maximum of 574 individual zones and controlling a maximum of 502 output relays.
2. The control panel shall have, as an integral part of the assembly, 2 SPDT Form C relays rated at 1 Amp at 30 VDC and four open collector 12 VDC outputs rated at 50mA each. It shall also have the capacity of a maximum of 125 output expander modules with 500 switched ground, open collector outputs, 50mA maximum and 502 auxiliary relays (Form C rated at 1.0 Amp at 30 VDC).
3. The panel shall also provide 100 programmable output schedules, and include an integral bell alarm circuit providing at least 1.5 Amps of steady, pulsed, or temporal bell output. Output type shall be programmable by zone type. Relays and voltage outputs shall be capable of being independently programmed to turn on and/or off at selected times each day.

C. User/Authorization Level Capacity:

1. The system shall be capable of operation by 10,000 unique Personal Identification Number (PIN) codes with each code having one (1) of ninety-nine (99) custom user profiles. This allows for limitation of certain functions to authorized users. The operation of all keypads shall be limited to authorized users.

E. Zone Configuration:

1. A minimum of 4 Class B ungrounded zones shall be available at each keypad or zone expander on the system. The system shall have the capacity for a maximum of sixteen (16) keypads and a maximum of 125 four (4) zone expanders or 500 single zone expanders. It shall also have the capacity of a maximum of 125 supervised relay output expanders. All Class B zones shall be 2-wire, 22 AWG minimum, supervised by an end-of-line (EOL) device and shall be able to detect open and short conditions in excess of 500ms duration.
2. Each zone shall function in any of the following configurations: Night, Day, Exit, Fire, Supervisory, Emergency, Panic, Auxiliary 1, Auxiliary 2, Fire Verification, Cross Zone, Priority, and Key Switch Arming.
3. The keypad bus shall be able to operate at a maximum wiring distance of 2500 feet from the control panel on unshielded, non-twisted cable. This

distance may be extended to a total of 15,000 feet when bus repeater modules are installed.

4. The system shall have the capability to incorporate up to 200 zone expander POPIT™ points.
5. Each zone shall function in any of the following configurations:

Night	Supervisory	Auxiliary 1	Cross-Zone
Day	Emergency	Auxiliary 2	Priority
Exit	Panic	Fire Verification	Arming
Fire			

F. Communication:

1. The system shall be capable of signaling to as many as 8 remote monitoring station receivers. Seven (7) of the eight (8) paths shall be capable of being assigned as either a "primary" or "backup" path. In such a manor the system shall have multiple primary paths to multiple remote monitoring stations as well as multiple backup paths to multiple monitoring stations.
2. The system shall be capable of signaling to two remote monitoring station receivers, four telephone numbers of 32 digits each using two separate switched telephone network lines such that if two unsuccessful attempts are made on the first line to the first number, the system shall make two attempts on first line to the second number. If these two attempts are unsuccessful, the system shall make two further attempts on the first line of the first number. After the tenth unsuccessful attempt, dialing shall stop and the alphanumeric keypad shall display trouble. Should another event occur that requires a report to be transmitted, the dialing sequence shall be repeated. The system shall have a programmable option to dial a second set of telephone numbers after the first ten attempts using the same sequence.
3. The system shall be capable of communication using the IBM Synchronous Data Link Control format, and at least two other standard industry formats.
4. The system shall be capable of supporting Network communication with digital dialer backup, existing Ethernet data networks, satellite communication, fiber optic networks, local area networks, wide area networks, cellular communication, and retail data networks.

G. Network Communication:

1. The control panel shall be capable of asynchronous network communication with a retry time between 3 and 15 seconds for a total of one (1) minute. If communication is unsuccessful the control panel shall be capable of attempting backup communication through any of the available communication methods to the same receiver or a backup receiver.
2. The control panel shall employ adaptive communication technology. Adaptive Technology allows a Backup communication path programmed to use Network or Cellular to automatically ADAPT to the faster check-in rate of the Primary path should the Primary path become unavailable, creating a seamless transition for communication of messages. Select Adapt when programming the Checkin option. This allows a system to be

fully supervised even if a path fails, while also keeping wireless charges low when the network is good.

3. Network communication between the control panel and the receiver shall be in a proprietary communication format.
4. The control panel shall be capable of supporting Dynamic Host Communication Protocol (DHCP) Internet Protocol (IP) addressing.
5. Underwriters Laboratories (UL) shall list network communication by the control panel for Grade AA High-Line Security.
6. The control panel shall be capable of two-way network communication using standard Ethernet 10BaseT in a LAN, WAN, or Internet configuration.
7. The control panel shall be capable of communication by means of a 128 Bit AES Rijndael Encryption process certified by NIST (National Institute of Standards and Technology) to an SCS-1R receiver with a built-in Encryption Alarm Router.
8. The control panel shall be capable of meeting DCID 6/9 and UL 2050 standards.

H. TCP/IP Network Trapping:

1. The control panel shall be capable of having communication set to Network operation. When a trap is set in Remote Link, the software shall be capable of sending a panel trap message with the panel account number to the SCS-101 installed in an SCS-1R receiver.
2. The receiver SCS-101 shall store the trap and monitor the panel for the next message. When the panel sends its next message, the receiver SCS-101 shall then send a message to the panel to contact Remote Link at the IP address contained in the original trap message.
3. The trap message shall be stored in the receiver SCS-101 for up to four hours. If the trap message is not sent to the panel within the four-hour window, the panel trap message shall be discarded and a new trap message must be sent from Remote Link.
4. The user shall be able to view the trap status in the receiver SCS-101 in Remote Link using the Trap Query function.

1.5 SUBMITTALS

- A. Provide the following items in addition to the basic submittal requirements of Section 28 00 00.
 1. Licensure
 2. Submit proof of possession of a valid California Alarm Company Operator's License in good standing with the California Bureau of Security and Investigative Services.

PART 2: PRODUCTS

2.1 MANUFACTURER

- A. Digital Monitoring Products, Incorporated (DMP)
2500 N. Partnership Boulevard, Springfield, MO 65803
Phone (417) 831-9362. FAX (417) 831-1325. Website: www.dmp.com

- B. The manufacturer shall have at least twenty-five (25) years of experience in the role of fire and security control manufacturing, and a proven track record of forward and backward compatibility for a minimum of twenty (20) years for its product's auxiliary devices, including system keypads, annunciation devices, zone expansion modules, and addressable detection devices.
- C. The manufacturer must also manufacture receiving equipment that is compatible with standard dial-up telephone lines and network monitoring equipment that is compatible with a LAN, WAN, and the Internet. The receiving equipment shall be capable of receiving all status and alarm messages generated by the system. The receiving equipment shall be capable of updating the panel operating program and the system date and time.

2.2 CONTROL PANEL

- A. DMP Command Processor™ Panel
 1. The system shall be inclusive of all necessary function, monitoring, and control capability as detailed herein and on accompanying shop drawings.

2.3 GENERAL COMPONENT REQUIREMENTS

- A. Component Enclosure
 1. Housings; power supply enclosures, terminal cabinets, control units, and other component housings, collectively referred to as enclosures shall be so formed and assembled as to be sturdy and rigid. If sheet steel is used in the fabrication of enclosures, it shall be not less than an 18 gauge door with a 20 gauge box frame. Where exposed pins, the hinges shall be of the tight pin type or the ends of hinge pins shall be tack welded to prevent ready removal. Doors having a latch edge length of less than 24 inches shall be provided with a single lock. Where the hinged door latch edge is 24 inches or more in length, doors shall be provided with three-point latching device with lock; or alternatively with two locks, one located near each end. For SCIF and High Security applications an attack proof enclosure with proper tamper UL listed for use with the XR500/XR500N/XR500E shall be used.
- B. Electronic Components
 1. All system electronic components shall be solid-state type, mounted on printed circuit boards. Light duty relays and similar switching devices shall be solid-state type or electromechanical.
 2. The panel shall have an over current notification LED that lights when devices connected to the Keypad Bus and LX-Bus(es) draw more current than the panel is rated for. When the over current LED lights, the LX-Bus (es) and Keypad bus are shut down.
- C. Control Unit
 1. A battery test shall be automatically performed to test the integrity of the standby battery. The test shall disconnect the standby battery from the charging circuit and place a load on the battery. This test shall be performed no more than every 180 seconds.

2. The control unit shall be capable of operating and supervising notification appliance devices as well as addressable initiating detection devices and an integrated supervised dual line digital communicator.
3. Control unit must be "Flash ROM" updatable, and program must be held in non-volatile RAM. The panel shall be able to function while the update is in process.
4. Control unit shall be capable of operating using an optional built in Encrypted Alarm Router for SCIF (Sensitive Compartmented Information Facility) applications that is certified by NIST (National Institute of Standards and Technology) for 128 Bit AES Rijndael Encryption communications.
5. The optional built-in Encrypted Alarm Router shall be capable of compliance with DCID 6/9 and UL 2050 standards.

D. Remote Annunciators

1. The system shall support a maximum of sixteen (16) supervised remote annunciators with the identical capabilities, functions and display layout. Operation of the remote annunciators shall be limited to authorized users by the use of a code or key.
2. The remote annunciators shall be capable of operating at a maximum wiring distance of 15,000 feet from the control unit on unshielded, non-twisted cable.

E. Control Designations

1. Controls shall be provided to ensure ease of operation of all specified characteristics. Where applicable, clockwise rotation of controls shall result in an increasing function. Controls, switches, visual signals and indicating devices, input and output connectors, terminals and test points shall be clearly marked or labeled on the hardware to permit quick identification of intended use and location.

F. Test Modes

1. The system shall include a provision that permits testing from any alphanumeric keypad. The test shall include standby battery, alarm bell or siren, and communication to the central station.
2. The system shall include a provision for an automatic, daily, weekly, thirty (30) day, or up to sixty (60) day communication link test from the control panel installation site to the central station.
3. The system shall include a provision for displaying the internal system power and wiring conditions. Internal monitors shall include the bell circuit, AC power, battery voltage level, charging voltage, panel box tamper, phone trouble line 1, phone trouble line 2, transmit trouble, and network trouble.

G. Serial Interface

1. The control panel shall be capable of a serial interface to output information to a standard serial printer or serial interface to a communication port on a standard computer. Through control panel programming the system shall include a provision to allow the selection of which reports are to be output.

H. Power Supplies

- 1. Power supplies for the control unit shall operate from 120 VAC, supplied at the respective protected areas. Standby batteries shall be supplied to power the system in the event of a utility power failure. Batteries shall be sized to provide 105% capacity for eight hours. Standby batteries shall be sealed lead-acid. Power supplies shall be all Solid State.
- 2. Controls shall be designed to maintain full battery charge when alternating current is available. Batteries shall be recharged to 85% capacity within 24 hours from battery use. The system shall be automatically transferred to battery power upon loss of alternating current power and return to alternating current power upon restoration. Intrusion alarms shall not be initiated during switch over; a signal shall be initiated upon failure of battery or alternating current power.
- 3. Approved power supplies shall meet or exceed the following power supply model specifications:
 - a. UL Listed DMP 505-12: 12VDC 5 amp with transformer and enclosure.
 - b. UL Listed DMP 504-24: 24 VDC 4 amps with transformer and enclosure.

I. Software

- 1. The system shall interface with computer software with the capability to fully program the panel by connecting to the panel through:
 - a. Direct cable connection interface card
 - b. Receiver phone line connection
 - c. Standard phone line connection
 - d. Ethernet network connection
 - e. Network connection across the Internet
- 2. The system shall interface with computer software capable of locking down all controlled doors.
- 3. The system shall interface with computer software capable of monitoring and logging all events.
- 4. The system shall interface with computer software capable of exporting reports in the following file formats:

Excel spreadsheet (*.xls)	Text (*.txt)
Rich Text (*.rtf)	Comma-separated (*.csv)
Windows Metafile (*.wmf)	HTML document (*.htm)
QuickReport (*.qrp)	

- 5. The system shall interface with computer software capable of printing custom, filtered reports including:

All Events	Door Access Granted
Zone Action	Door Access Denied
Arming/Disarming	Opening/Closing Schedule Changes
Area Late to Close	System Monitors
User Code Changes	System Events

J. Control Panel Capability

- 1. The basic control panel shall provide:
 - a. Expansion to a total of at least 10,000 user codes with 99 user profile definitions.

- b. Sixteen (16) independent door/keypad addresses, each with four zones.
 - c. Twenty (20) Holiday Dates for custom holiday scheduling by area.
 - d. A total door access granted event buffer of at least 10,000 events.
 - e. Anti-passback access control selectable by area and user.
 - f. Four (4) shift schedules per area.
 - g. A total of at least 100 programmable output relay schedules.
 - h. Thirty-two (32) individual reporting areas.
 - i. Built-in bell and telephone line supervision.
2. The networked control panel shall provide:
- a. All of the above features.
 - b. Require two-man access code or credentials.
 - c. Support programming to require the same or different access code entered within a programmed delay time of 1 to 15 minutes after disarming before activating a silent ambush alarm.
 - d. Support area programming that disables schedule and time-of-day changes while system is armed so that area can only be disarmed during scheduled times.
3. The encrypted control panel shall provide:
- a. All of the basic and network features listed above.
 - b. Built-in Encrypted Alarm Router.
 - c. Certified operation that meets 128 Bit AES Rijndael Encryption communications.
 - d. Certified operation that meets SCIF (Sensitive Compartmented Information Facility) application needs.
 - e. Certified operation that meets NIST (National Institute of Standards and Technology) standards.
 - f. Certification that encrypted panel is capable of meeting DCID 6/9 standards.
 - g. Certification that encrypted panel is capable of meeting UL 2050 standards.

2.4 INTEGRATED INTRUSION ALARM AND ACCESS CONTROL OPERATION

A. Access Authority Levels

- 1. The system shall be capable of programming access credentials authority levels to check whether the user has access to a specific area and also has the authority to disarm or arm the area. If the user access credential has access and disarm/arm authority the system shall provide the user the option to disarm the area simultaneously upon opening the door, or to open the door and begin an entry delay timer. With the timer option the user then disarms the area using an intrusion control keypad inside the area. If the user only has access authority to the area and the area is in an armed condition, the user is denied access to the area.

B. Door Open Schedule Override

- 1. The system shall be capable of programming certain area doors to be scheduled to unlock and lock at specific times of the day or night. The lock/unlock function shall be capable of an override option depending upon the area armed/disarmed status. If the area remains in an armed status at the scheduled unlock time the armed status overrides the unlock schedule

ensuring the doors remain locked and armed in situations where the business might open late, close early, is affected by inclement weather, or another emergency.

- C. Common Area
 - 1. The system shall be capable of programming a common area to be armed when the last area in the system is armed and disarmed when the first area in the system is disarmed. To ensure the common area works properly it shall not have any user codes assigned to the common area. The system shall also be capable of programming multiple common areas.

- D. Early Morning Ambush (XR500N and XR500E only)
 - 1. The system shall be capable of programming an area to require two user codes be entered within a programmed number of minutes to prevent an ambush message from being sent to the Central Station Receiver. If both user codes are not entered within the time an ambush message is sent to the central station receiver.
 - 2. Both user codes shall have the authority to disarm the specific area and must be entered at the same keypad or reader. The keypad shall not display any indication that the ambush timer is running.
 - 3. The system shall be capable of programming an output to provide an external indicator that an ambush situation is taking place.

- E. Two-Man Rule (XR500N and XR500E only)
 - 1. The system shall be capable of programming an area to require two separate user codes be entered in order to disarm and/or allow access to a specific area. Both required codes shall have at least the same or greater authority level. Both required codes shall be entered within 30 seconds or an alarm shall activate.

- G. Panic Button Summary Test (XR500N and XR500E only)
 - 1. The system shall have the ability to test panic buttons without sending a panic alarm to the Central Station Receiver.
 - 2. The system shall also have the ability to send panic zone test verification and failure results to the Central Station Receiver.
 - 3. During the test, each time a panic zone trips, the display number shall increment and the keypad buzzer sound for two seconds.
 - 4. The number of panic zones tripped shall constantly display until the test ends or no panic zone activity has occurred for 20 minutes.
 - 5. When the Panic Zone Test ends and a zone failed (did not trip) during the test, the keypad shall be able to display the zone name and number and have the buzzer sounds for one second. Additional zone failed zones shall display when a button is pressed.

2.5 FALSE ALARM REDUCTION FEATURES

- A. The system shall be capable of providing false alarm reduction features, functions, capabilities, or processes that either require alarms be verified or potential alarms be corrected before a system or zone can be placed into an armed state.

- B. Exit Error Alert and Reporting
 - 1. The panel shall be able to provide an automatic function to prevent a false alarm from occurring if an exit door does not properly close after the system is armed.
- C. Entry and Exit Delay Annunciation
 - 1. When arming, the system shall provide clear annunciation indicators to the user about the need to exit the premises prior to the exit delay time expiring.
 - 2. When disarming, the system shall notify the user the need to disarm the system prior to the entry delay time expiring.
- D. Remote Annunciation
 - 1. The system shall be able to provide entry and exit delay time period notification. This notification can be from DMP keypads, remote annunciators, or bell tests.
- E. Abort Reporting
 - 1. The system shall be capable of sending an Abort report to the central station if the system is disarmed while the alarm is still sounding. The Abort report shall be sent after the alarm report to notify the central station that an authorized user has cancelled the alarm.
- F. System Testing
 - 1. The system shall offer testing features that are simple, quick, and complete and provide the highest measure of safety by ensuring that alarm conditions are detected and communicated to the proper authorities in a timely manner and on a regularly scheduled basis.
- G. Ambush Code
 - 1. The system shall offer ambush codes for those dangerous encounters where the user is instructed to either arm or disarm the system under threat of harm. The duress code shall disarm the system without giving local indication of an alarm that might put the user well-being in jeopardy.
- H. Two-Button Panic Feature
 - 1. The system shall support DMP keypads that provide the option to use only two-button panic codes. The user shall be required to press and hold two designated keys for approximately two seconds before the system generates a panic alarm.
- I. Cross-Zoning Protection
 - 1. The system shall support cross-zoning as a means of requiring two device trips to occur within a short period of time before sounding an alarm and sending an alarm report to the central station. Supported device trips shall be from one device that trips two times, or from two devices that each trip once.
- J. Swinger Zone Bypassing

1. The system shall be capable of automatically bypassing a zone if it goes into an alarm or trouble condition a specified number of times within a one-hour period. The panel shall be able to track the number of times the zone trips while armed and compare that against a programmed number. When that number is reached, the panel shall be able to automatically bypass the zone. The panel shall be capable of resetting the zone when the area to which it is assigned disarms, is manually reset from the keypad or remotely, or remains normal for one hour.
- K. Recently Armed Report
1. The system shall be capable sending a System Recently Armed report, along with a zone alarm report, to the central station any time an alarm occurs within five minutes of the system arming. The System Recently Armed report allows the central station operator to follow a "call the subscriber first" procedure instead of immediately dispatching the police to what could be a false alarm.
- L. Transmit Delay
1. The system shall be capable of programming the panel to wait up to 60 seconds before sending burglary alarm reports to the central station. If an alarm is accidental, the user shall be able to disarm the system within the programmed Transmit Delay time. An Abort report shall be sent in place of an alarm report after the system disarms. During the alarm, sirens and panel relay outputs shall not be delayed and shall still provide local condition annunciation.
- M. Call Waiting Cancel
1. The system shall be capable of being programmed to cancel call waiting any time the panel dials the receiver number to send a report.
- N. Cancel/Verify
1. The system shall be capable of sending either a Cancel Report or Verify Report to the Central Station to signify that the end user has Canceled an Alarm or Verified an Alarm condition.

2.6 BURGLARY CONTROL

- A. Area System
1. The system user shall be capable of selectively arming and disarming any one or more of 32 areas within the intrusion detection system based on the user PIN code and/or keypad used. Each of the 574 zones shall be able to be assigned to any of the 32 available areas. The system shall be capable of having up to a sixteen (16) character length name programmed for each area.
 2. The system user shall be capable of assigning an opening and closing schedule to all areas or to each of the 32 areas separately. Each area shall be able to arm or disarm automatically by a schedule. The system shall have the capacity for common areas that automatically disarm when any other area disarms and that automatically arm when all others areas arm.

3. The networked system shall have the ability to comply with Bank Safe & Vault application. The networked system shall also have the ability to use a two-man rule for disarming or allowing door access to an area. The system shall have the ability to operate a Common Area application.

B. Zones

1. The system shall have a minimum of eight (8) grounded burglary zones available from the control panel.

C. Burglary Equipment

1. Burglary detection equipment shall communicate to the system by way of the control panel loop expansion bus or 900MHz receiver.

2.7 ACCESS CONTROL

A. Keypad

1. The system shall display a message at any keypad when any system area remains disarmed past the scheduled closing time. The message shall be displayed at one minute past the scheduled closing time. A pre-warn tone shall also begin sounding. If the system is not armed or a schedule extended within ten minutes past the scheduled closing time, the system shall provide the option of sending a Late To Close report to the central station.
2. The keypad shall include a door strike relay capable of sending a report to the central station when activated.
3. The keypad shall be capable of proximity arming and disarming functions.

B. Area Access Control

1. The system shall be capable of integrating area access control capability where specified into the same control panel with the ability to have up to 10,000 user credentials. User access is limited to custom profiles and/or schedules. Anti-passback shall be available. The networked version shall support a Two-Man Rule feature. The system shall support up to sixteen (16) access doors, connected to the system using a manufacturer-approved interface module.
2. Area door access products shall meet or exceed features offered by the following products:
3. Keypad reader/administration device – DMP Model 7063/7063A, 7073/7073A, 7163, 7173
4. Wiegand Interface – DMP Model 733, 734
5. Reader – DMP Model PP-6005B, Model PR-5455, Model MP-5365
6. Cards or credentials – DMP Model 1326, DMP Model 1306P, DMP Model 1346, DMP Model 1386

C. Access Control Equipment

1. Access Control equipment shall communicate to the system by way of the control panel keypad bus.

2.8 COMPILED DETECTION EQUIPMENT LISTING

A. Hard-wired

1. Hard-wired detection equipment shall communicate to the system by way of the control panel loop expansion bus. The equipment shall have a three (3) year warranty as stated in the current DMP Product Catalog and meet or exceed features offered in the following products:
 - a. Motion Detector – DMP Model 6155LX (wall mount with built-in zone expander)
 - b. Motion Detector – DMP Model AP669 (ceiling mount 360' – requires DMP zone expander)
 - c. Glass Break Detector – DMP Model 5845LX (includes built-in zone expander)
 - d. Door Contact – DMP Model SD70 (concealed applications – requires DMP zone expander)
 - e. Bus Splitter/Repeater Module – DMP Model 710
 - f. Door Contact – DMP Model SM20WG (surface applications – requires DMP zone expander)
 - g. Output Expansion Module - DMP Model 716
 - h. Graphic Annunciator Module - DMP Model 717

- B. Wireless
 1. Wireless detection equipment shall communicate to the system by way of a compatible 900MHz receiver utilizing two way communications, capable of receiving up to 500 wireless zones. The wireless system shall be programmed directly from the control panel, and shall not require a separate device programmer. The wireless detection equipment shall have a one (1) year warranty. It shall be capable of sending transmitter and battery status to the control panel's compatible receiver up to once every 60 seconds and must meet or exceed the following products:
 - a. Input transmitter – DMP Model 1101, 1102
 - b. Pendant Panic Transmitter – DMP Model 1147, 1146, 1145
 - c. Panic Transmitter – DMP Model 1142
 - d. Wireless Receiver – DMP Model 1100X, 1100XI, 1100XH

- C. Notification Devices
 1. Notification equipment shall be control panel activated by way of the supervised bell output module. The equipment shall have a three (3) year warranty as stated in the current DMP Product Catalog and meet or exceed features offered in the following products:
 - a. Bells – Wheelock Model MB-G6-12, MB-G10-12, MB-G6-24, MB-G10-24
 - b. Horns – Wheelock Model MT-12/24, NH-12/24, MIZ-24, AH-24, AH-24WP
 - c. Strobe – Wheelock Model RSS-121575W, RSS-24MCW
 - d. Horn Strobe – Wheelock Model MTWP=2475W, NS-121575W, NS-24MCW, AS-24MCW
 - e. Notification Modules – DMP Models 865, 866, 867,
 - f. Notification/Synchronization Modules – DMP Models 831, 832

- D. Power Supplies and Transformers
 1. Power supply, transformer, and battery devices shall maintain system operation. The batteries shall be checked and replaced every three to five years. The equipment shall have a three (3) year warranty as stated in the

current DMP Product Catalog and meet or exceed features offered in the following products:

- a. Power Supply – DMP Model 505-12, 115 VAC, 12 VDC
 - b. Power Supply – DMP Model 505-12LX, 115 VAC, 12 VDC
 - c. Transformer - DMP Model 327, 16.5 VAC 50 VA, Plug-in
 - d. Transformer - DMP Model 322, 16.5 VAC 56 VA, Wire-in
 - e. Transformer - DMP Model 323, 16.5 VAC 56 VA, Wire-in
- E. Access Control Equipment
1. Access control equipment shall provide access control functions between the panel and controller door access points. The equipment shall have a three (3) year warranty as stated in the current DMP Product Catalog and meet or exceed features offered in the following products:
 - a. Interface Module – DMP Model 734, Wiegand
 - b. Egress Module – DMP Model PB-2 REX Button
 - c. Reader – DMP Model PP-6005B Proxpoint Plus©
 - d. Reader – DMP Model MP-5365 Miniprox©
 - e. Reader – DMP Model MX-5375 Maxi-Prox™
 - f. Reader – DMP Model TL-5395 Thinkline II™
 - g. Door Controller – DMP Model 1306P Prox Patch™
 - h. Door Controller – DMP Model 1306PW Prox Patch™
 - i. Access Card – DMP Model 1351 ProxPass© Card
 - j. Access Card – DMP Model 1326 Proxcard II© Card
 - k. Access Device – DMP Model 1346 Proxkey II™ Keyfob, 1386 Isoprox II©

PART 3: EXECUTION

3.1 INSTALLATION

- A. Integration with Access & Security Management Software
 1. Provide all licensing, modules, programming, configuration, graphical backgrounds, etc. as required to integrate with the District's WAN access & security management software and support all utilized features.
 2. Provide any available software updates to the access & security management software.
- B. Connection of master control unit to expansion modules shall be accomplished via the fiber optic cables common to the data network. There will be no separate OSP copper cabling allowed for the intrusion system.
- C. Each intrusion device (door/window magnetic switch, glass break sensor, motion sensor, etc.) shall be connected to a dedicated zone. Provide zone expansion modules as needed.
- D. Provide all wiring to devices and components in accordance with the manufacturer's recommendation.

FIRE DETECTION AND ALARM**SECTION 28 31 00****PART 1 – GENERAL****1.1 RELATED SECTIONS**

- A. Section 21 00 00 – Fire Suppression.
- B. Section 26 00 00 – Electrical
- C. Section 27 10 00 – Structured Cabling System

1.2 REFERENCES

- A. Electrical Industries Association (EIA):
 - 1. EIA-232-D – Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange
 - 2. TIA-485-A – Electrical Characteristics of Generators and Receivers for Use in Balanced Multipoint Systems
- B. California Code of Regulations
 - 1. Title 24, Part 3 – California Electrical Code (CEC)
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 12 – Standard on Carbon Dioxide Extinguishing Systems.
 - 2. NFPA 13 – Installation of Sprinkler Systems.
 - 3. NFPA 15 – Standard for Water Spray Fixed Systems for Fire Protection.
 - 4. NFPA 16 – Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.
 - 5. NFPA 16A – Standard for the Installation of Closed Head Foam-Water Sprinkler Systems.
 - 6. NFPA 70 – National Electrical Code (NEC)
 - 7. NFPA 72 – National Fire Alarm Code.
 - 8. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems.
 - 9. NFPA 101 – Life Safety Code.
 - 10. NFPA 750 – Standard on Water Mist Fire Protection Systems.
 - 11. NFPA 5000 – Building Construction and Safety Code.
- D. Underwriters Laboratories (UL):
 - 1. UL 268 – Standard for Smoke Detectors for Fire Alarm Signaling Systems.
 - 2. UL 864 – Standard for Control Units and Accessories for Fire Alarm Systems.
 - 3. UL 1971 – Standard for Signaling Devices for the Hearing Impaired.

1.3 SCOPE OF WORK

- A. Furnish all labor, equipment, and materials for, and comply with the performance requirements of the Fire Alarm System indicated in the drawings and specified herein.
- B. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction is required to accomplish work indicated or specified in this or other sections, it shall be the responsibility of the Contractor to provide all materials and equipment which is usually furnished with such systems in order to complete the installation, whether or not specifically mentioned herein.

1.4 SYSTEM DESCRIPTION

- A. A new, intelligent reporting, Style 7 networked, fully peer-to-peer, microprocessor-controlled fire detection and notification system shall be installed in accordance with the specifications and as indicated on the Drawings.
- B. Basic Performance:
 - 1. Network Communications Circuit Serving Network Nodes: Connected using approved fiber optic cable between nodes in Class A configuration (NFPA Style 7).
 - 2. Signaling Line Circuits (SLC) Serving Addressable Devices: Wired Class B.
 - 3. Initiation Device Circuits (IDC) Serving Non-addressable Devices Connected to Addressable Monitor Modules: Wired Class B.
 - 4. Notification Appliance Circuits (NAC) Serving Strobes and Horns: Wired Class B.
 - 5. Alarm Signals Arriving at Control Panel: Not lost following primary power failure until alarm signal is processed and recorded.
 - 6. Network Noce Communications:
 - a. Communicated between panels on Style 7 connected fiber optic cables.
 - b. To enhance system survivability, ability to operate on loss of Command Center, short or open of entire riser at Command Center shall be demonstrated at time of system acceptance testing.
 - c. Systems that are not capable of providing true Style 7 riser performance shall not be acceptable.
 - 7. Signaling Line Circuits (SLC):
 - a. SLC modules shall operate in peer-to-peer fashion with all other panels in system.
 - b. On loss of Command Center, each remaining panel shall continue to communicate with remainder of system, including all SLC and control functions. Systems that provide a "Degraded" mode of operation upon loss of Command Center or short in riser shall not be acceptable.
 - c. Limit the number of devices to 80% of the maximum allowed of each type on SLC circuits.

8. Notification Appliance Circuits (NAC):
 - a. Arranged such that loss of any 1 NAC circuit will not cause loss of any other NAC circuit in system.
 - b. Electrically supervised for open and short circuit conditions.
 - c. If short circuit exists on NAC circuit, it shall not be possible to activate that circuit.
 - d. Voltage drop is not to exceed 10% at the furthest point on any NAC circuit.
9. Emergency Voice/Alarm Communications (EVAC):
 - a. Arranged such that loss of any 1 EVAC amplifier or branch will not cause loss of any other EVAC circuit in the system.
 - b. Electrically supervised for open and short circuit conditions.
 - c. If short circuit exists on NAC circuit, it shall not be possible to activate that circuit.
 - d. Voltage drop is not to exceed 10% at the furthest point on any NAC circuit.
10. Standby Power:
 - a. Provide a minimum of 20% spare battery capacity above calculated requirements.

C. Sequence of Operations:

1. General Alarm: Upon alarm activation of any area smoke detector, duct smoke detector, heat detector, manual pull station, or sprinkler water flow switch, the following functions shall automatically occur:
 - a. The internal audible device shall sound at the control panel or command center.
 - b. The LCD Display shall indicate all applicable information associated with the alarm condition including zone, device type, device location and time/date.
 - c. All system activity/events shall be documented on the system printer.
 - d. Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.
 - e. The following notification signals and actions shall occur simultaneously:
 - i. A signal shall be sounded on fire floors (zones). The signal shall be a Temporal 3 tone.
 - ii. Activate visual strobes on the fire floors (zones). The visual strobe shall stop operating when the "Alarm Silence" is pressed.
 - iii. Transmit signal to the building automation system (if applicable) and/or shutdown all HVAC units serving the floor of alarm.
 - iv. Transmit signal to the central station with point identification.
 - v. Activate automatic smoke control sequences (if applicable).
 - vi. All stairwell/exit doors shall unlock throughout the building.
 - vii. All self-closing fire/smoke doors held open shall be released.
 - viii. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.
2. Elevator Lobby / Equipment Room Detectors: Upon alarm activation of any elevator lobby smoke detector or equipment room detector the following functions shall automatically occur:
 - a. Perform general alarm sequence above.
 - b. Elevator Lobby smoke detectors shall recall the elevators to primary floor

- c. Elevator Lobby smoke detectors located on the primary recall floor shall recall the elevator the alternate floor.
 - d. Equipment room smoke detectors shall recall the elevator to the primary floor.
 - e. Activation of the Equipment room heat detector shall initiate the shunt trip in the associated elevator equipment room.
3. Supervisory Operation: Upon supervisory activation of any sprinkler valve supervisory switch, fire pump off-normal, clean agent fire suppression system trouble, the following functions shall automatically occur:
 - a. The internal audible device shall sound at the control panel or command center.
 - b. The LCD display shall indicate all applicable information associated with the supervisory condition including; zone, device type, device location and time/date.
 - c. All system activity/events shall be documented on the system printer.
 - d. Any remote or local annunciator LCD/LED's associated with the supervisory zone shall be illuminated.
 - e. Transmit signal to the central station with point identification.
 4. Trouble Operation: Upon activation of a trouble condition or signal from any device on the system, the following functions shall automatically occur:
 - a. The internal audible device shall sound at the control panel or command center.
 - b. The LCD keypad display shall indicate all applicable information associated with the trouble condition including; zone, device type, device location and time/date.
 - c. All system activity/events shall be documented on the system printer.
 - d. Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.
 - e. Transmit signal to the central station with point identification.
 5. Monitor Operation: Upon activation of any device connected to a monitor circuit (fire pump/emergency generator status), the following functions shall automatically occur:
 - a. The LCD display shall indicate all applicable information associated with the status condition including; zone, device type, device location and time/date.
 - b. All system activity/events shall be documented on the system printer.
 - c. Any remote or local annunciator LCD/LED's associated with the status zone shall be illuminated.
- D. Fire Alarm System Functionality:
1. Provide complete, electrically supervised distributed, networked analog/addressable fire alarm and control system, with analog initiating devices.
 2. Fire Alarm System:

- a. Incorporate E3 Series multiprocessor-based control panels, with Intelligent Loop Interface (ILI-MB-E3), and RPT-E3 repeater modules communicating over peer-to-peer token ring network with capacity of up to 64 nodes.
3. Each ILI-MB-E3 Node: Incorporate 2 Signaling Line Circuits (SLC), with capacity to support up to 159 analog addressable detectors and 159 addressable modules per SLC.
4. All data transmits over single pair of wires or fiber optic cable.
5. Each Network Node: Incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
6. Control Panels: Capability to accept firmware upgrades via connection with laptop computer, without requirement of replacing microchips.
7. Network:
 - a. Based on peer-to-peer token ring technology operating at 625 K baud, using Style 7 configuration.
 - b. Capability of using twisted-pair wiring, pair of fiber optic cable strands up to 200 microns, or both, to maximize flexibility in system configuration.
8. Each Network Node:
 - a. Capability of being programmed off-line using Windows-based software utilized by fire alarm system manufacturer. Capability of being downloaded by connecting laptop computer into any other node in system. Systems that require system software to be downloaded to each transponder at each transponder location shall not be acceptable.
 - b. Capability of being grouped with any number of additional nodes to produce a "Region", allowing that group of nodes to act as 1, while retaining peer-to-peer functionality. Systems utilizing "Master/Slave" configurations shall not be acceptable.
 - c. Capability of annunciating all events within its "Region" or annunciating all events from entire network, on front panel LCD without additional equipment.
9. Each SLC Network Node: Capability of having integral DACT (digital alarm communicator transmitter) that can report events in either its region, or entire network to single central station monitoring account.
10. Each Control Panel: Capability of storing its entire program, and allow installer to activate only devices that are installed during construction, without further downloading of system.
11. Password Protection: Each system shall be provided with 4 levels of password protection with up to 16 passwords.

1.5 SUBMITTALS

- A. Comply with Section 01 33 00 – Submittal Procedures.

- B. Include sufficient information, clearly presented, to determine compliance with the specifications and the Drawings. Insufficiently detailed submittals shall be rejected.
- C. Equipment Submittals:
1. Cover Page: Indicate the following:
 - a. Project name and address.
 - b. Engineered systems distributor's name and other contact information.
 - c. Installing contractor's name and other contact information.
 - d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
 2. Table of Contents: Lists each section of equipment submittal.
 3. Scope of Work Narrative: Detail indented scope of work.
 4. Sequence of Operations: Use matrix or written text format, detailing activation of each type of device and associated resulting activation of the following:
 - a. Control panel.
 - b. Annunciator panels.
 - c. Notification appliances.
 - d. Building fire safety functions, including elevator recall, elevator power shutdown, door lock release, door holder release, HVAC unit shutdown, smoke evacuation system activation, and stair pressurization fan activation.
 5. Bill of Material: Indicate for each component of system the following:
 - a. Quantity.
 - b. Model number.
 - c. Description.
 6. SLC Circuit Schedule: Detail address and associated description of each addressable device. Clearly provide information that indicates number of both active and spare addresses.
 7. Battery Calculations: Show load of each of, and total of, components of system along with standby and alarm times that calculations are based on. Show calculated spare capacity and size of intended battery.
- D. Shop Drawings:
1. Cover Page: Indicate the following:
 - a. Project name and address.
 - b. Engineered systems distributor's name and other contact information.
 - c. Installing contractor's name and other contact information.
 - d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
 2. Floor Plans:
 - a. Provide separate floor plan for each floor.

- b. If a floor plan must be split using match lines to fit on the page, provide match lines and match line references that refer to sheet number that shows area on opposite side of match line.
 - c. Prepare using CAD program capable of producing AutoCAD compliant DXF (Drawings Exchange Format) files.
 - d. Prepare to scale no smaller than 1/8 inch = 1'-0", unless otherwise required by the Architect or Engineer.
 - e. Show equipment and device locations.
 - f. Show wiring information in point-to-point format.
 - g. Show conduit routing, if required by the AHJ.
 3. Title Block: Provide on each sheet and include, at a minimum, the following:
 - a. Project name.
 - b. Project address.
 - c. Sheet name.
 - d. Sheet number.
 - e. Scale of drawing.
 - f. Date of drawing.
 - g. Revision dates, if applicable.
 4. Control Panel: Provide sheet that details exterior and interior views of control panel and clearly shows associated wiring information.
 5. Annunciator Panels: Provide sheet that details exterior and interior views of annunciator panels and clearly shows associated wiring information.
 - E. Certification: Submit with equipment submittals and shop drawings, letter of certification from major equipment manufacturer, indicating proposed engineered system distributor is an authorized representative of major equipment manufacturer.
 - F. Project Record Drawings:
 1. Submit complete project record drawings within 14 calendar days after acceptance test.
 2. Project record drawings shall be similar to shop drawings, but revised to reflect changes made during construction.
 - G. Operation and Maintenance Manuals:
 1. Submit complete operation and maintenance manuals within 14 calendar days after acceptance test.
 2. Operation and maintenance manuals shall be similar to equipment submittals, but revised to reflect changes made during construction.
 3. Include factory's standard installation and operating instructions.
- 1.6 APPROVAL
- A. All Fire Alarm System components are required to be listed with the California State Fire Marshal (CSFM).
 - B. Installation of the Fire Alarm System shall not commence until all approvals are granted by the California State Fire Marshal (CSFM), Division of the State Architect (DSA), and any other Authorities Having Jurisdiction (AHJ).

- C. Installation of the system shall not commence until all shop drawings and submittals are approved by the School District, Architect of Record, and Engineer of Record.

1.7 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. NFPA: System shall comply with all applicable NFPA codes and standards:
 - 2. ADA: System shall conform to American with Disabilities Act (ADA).
- B. To ensure reliability and complete compatibility, all items of fire alarm system, including control panels, power supplies, initiating devices, and notification appliances, shall be listed by Underwriters Laboratories Inc. (UL) and shall bear the "UL" label.
- C. Fire Alarm Control Panel Equipment: UL-listed under UL 864 Ninth Edition.
- D. Equipment, Programming, and Installation Supervision:
 - 1. The contractor is required to hold a C-10 license and any other certifications required by the Authority Having Jurisdiction.
 - 2. The contractor is required to be an approved engineered systems distributor of Gamewell-FCI for equipment, programming, and installation supervision.
 - 3. Proof of factory training shall be delivered within 14 calendar days of award of the Contract.
- E. Software Modifications:
 - 1. Provide services of Gamewell-FCI factory-trained and authorized technician to perform system software modifications, upgrades, or changes.
 - 2. Provide use of all hardware, software, programming tools, and documentation necessary to modify fire alarm system software on-site.
 - 3. Modification includes addition and deletion of devices, circuits, zones, and changes to system operation and custom label changes for devices or zones.
 - 4. System structure and software shall place no limit on type or extent of software modifications on-site.
 - 5. Modification of software shall not require power-down of system or loss of system fire protection while modifications are being made.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials from damage during handling and installation.

1.9 COORDINATION

- A. Coordinate the Work of this section with the Work of other sections, including sprinkler systems, elevators, HVAC systems, and security/door locking systems, as applicable.

1.10 WARRANTY

- A. Warranty Period for System Equipment: 1 year from date of final acceptance.
- B. Trouble Calls: The contractor shall guarantee on-site service for the Fire Alarm System within 24 hours of the receipt of a trouble call.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Gamewell-FCI, Honeywell Fire Systems
12 Clintonville Road, Northford, Connecticut 06472. Phone (203) 484-7161. Fax (203) 484-7118. Website: www.gamewell-fci.com
 - 1. NO SUBSTITUTION.
- B. System Sensor
3825 Ohio Avenue, St. Charles, Illinois 60174.
Phone (630) 377-6580. Fax (630) 377-6495. Website: www.systemsensor.com

2.2 DISTRIBUTED NETWORKED FIRE ALARM SYSTEM

- A. Distributed Networked Fire Alarm System: Gamewell-FCI E3 Series Expandable Emergency Evacuation Fire Alarm System.

2.3 CONTROL PANEL HARDWARE

- A. Intelligent Control Panel: Supply user interface, including LCD or touch-screen 1/4 VGA display Intelligent Loop Interface Modules (ILI-MB-E3), manual switching, Control Panel shall consist of the following units and components:
 - 1. System Cabinet (B-, C-, or D-Size Cabinet) with associated inner door.
 - 2. Power Supply Module (PM-9) with batteries.
 - 3. 80-Character LCD Display (LCD-E3).
 - 4. Intelligent Loop Main Board Interface (ILI-MB-E3).
 - 5. Intelligent Loop Supplemental Interface (ILI-S-E3).
 - 6. FocalPoint Gateway (FPT-GATE-E3).
 - 7. Optional DACT (DACT-E3).
 - 8. Optional Network Repeater (RPT-E3).
 - 9. Optional 1/4 VGA touch-screen display (NGA).
 - 10. Optional Auxiliary Switch Module (ASM-16).
- B. System Cabinet:
 - 1. Surface or semi-flush mounted with texture finish.
 - 2. Consist of back box, inner door, and door.
 - 3. Available in at least 3 sizes to best fit project configuration.
 - 4. Houses 1 or more PM-9 Power Supply Modules, 1 or more ILI-MB-E3 or ILI-S-E3 assemblies, and other optional modules as specified.
 - 5. Construction: Dead-front steel construction with inner door to conceal internal circuitry and wiring.

- a. Fire Alarm System: Connect via Digital Alarm Communicator Transmitter (DACT) and telephone lines to central station or remote station. Panel shall contain disconnect switch to allow testing of system without notifying fire department.
12. Central Station Option: Fire alarm control panel shall provide Digital Alarm Communicator Transmitter (DACT) for signaling to central station. DACT shall contain "Dialer-Runaway" feature preventing unnecessary transmissions as result of intermittent faults in system and shall be Carrier Access Code (CAC) compliant, accepting up to 20-digit central station telephone numbers. Fire department shall be consulted as to authorized central station companies serving municipality. Fire alarm system shall transmit both alarm and trouble signals, with alarm having priority over trouble signal. Contractor shall be responsible for all installation charges and Owner will be responsible for line lease charges.
13. Network Annunciator Option: Each ILI-MB-E3 and associated display shall provide option of being configured as network annunciator. Options for annunciation shall default as regional annunciator with capability of selecting global annunciation to provide system-wide protection and Acknowledge, Silence, and Reset capabilities.
14. Redundant History Log: Each ILI-MB-E3 shall contain full 4100 event history log supporting local and network functions. If a main processor or network node is lost the entire log shall be accessible at any other Loop Interface board. This shall be demonstrated by removing power from Command Center followed by extraction of history log from any loop driver location, including Command Center or Transponder.
15. LEDs Indicator and Outputs: Each ILI-MB-E3 Loop Interface shall incorporate as a minimum the following diagnostic LED indicators:
 - a. Power: Green.
 - b. Alarm: Red.
 - c. Supervisory: Yellow.
 - d. General Trouble: Yellow.
 - e. Ground Fault: Yellow.
 - f. Transmit: Green.
 - g. Receive: Green.
16. Auxiliary Power Outputs: Each ILI-MB-E3 Loop Interface shall provide the following supply outputs:
 - a. 24 VDC non-resettable, 1 amp. maximum, power limited.
 - b. 24 VDC resettable, 1 amp. maximum, power limited.
17. Microprocessor: Loop interface shall incorporate 32-bit RISC processor. Isolated "watchdog" circuit shall monitor microprocessor and upon failure shall activate system trouble circuits on display. Microprocessor shall access system program for all control-by-event (CBE) functions. System program shall not be lost upon failure of both primary and secondary power. Programming shall support Boolean logic including AND, OR, NOT, TIME DELAY functions for maximum flexibility.
18. Auto Programming: System shall provide for all SLC devices on any SLC loop to be pre-programmed into system. Upon activation of auto programming, only devices that are present shall activate. This allows for system to be commissioned in phases without need of additional downloads.
19. Environmental Drift Compensation: System shall provide for setting Environmental Drift Compensation by device. When detector accumulates dust in chamber and reaches unacceptable level but yet still below allowed limit, control panel shall indicate maintenance alert warning. When detector accumulates dust in chamber above allowed limit, control panel shall indicate maintenance urgent warning.

20. NON-FIRE Alarm Module Reporting: Non-reporting type ID shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display message at panel LDC. Activation of NON-FIRE point shall activate control by event logic, but shall not cause indication on control panel.
 21. 1-Man Walk Test:
 - a. System shall provide both basic and advanced walk test for testing entire fire alarm system. Basic walk test shall allow single operator to run audible tests on panel. All logic equation automation shall be suspended during test and while annunciators can be enabled for test, all shall default to disabled state. During advanced walk test, field-supplied output point programming shall react to input stimuli, such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch input. Advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device, and wiring operation/verification.
 - b. Test feature is intended to provide for certain random spot testing of system and is not intended to comply with requirements of testing fire alarm systems in accordance with NFPA 72, as it is impossible to test all functions and verify items such as annunciation with only 1 person.
 22. Signaling Line Circuits: Each ILI-MB-E3 module shall provide communication with analog/addressable (initiation/control) devices via 2 signaling line circuits. Each signaling line circuit shall be capable of being wired Class B, Style 4 or Class A, Style 6. Circuits shall be capable of operating in NFPA Style 7 configuration when equipped with isolator modules between each module type device and isolator sensor bases. Each circuit shall communicate with a maximum of 159 analog sensors and 159 addressable monitor/control devices. Unique 40-character identifier shall be available for each device. Devices shall be of the Velocity series with capability to poll 10 devices at a time with a maximum polling time of 2 seconds when both SLCs are fully loaded.
 23. Notification Appliance Circuits: 2 independent NAC circuits shall be provided on ILI-MB, polarized and rated at 2 amperes DC per circuit, individually over current protected and supervised for opens, grounds, and short circuits. They shall be capable of being wired Class B, Style Y or Class A, Style Z.
 24. Alarm Dry Contacts: Provide alarm dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system alarm occurs.
 25. Supervisory Dry Contacts: Provide supervisory dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system supervisory condition occurs.
 26. Trouble Dry Contacts: Provide trouble dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system trouble occurs.
- H. Auxiliary Switch Module (ASM-16):
1. Each ASM-16 has 16 programmable push-button switches.
 2. Each push-button switch has 3 associated status LEDs (red, yellow, and green), configurable to indicate any combination of functions.
 3. Flexible switch configurations to allow auxiliary functions.
 4. An insertable label to identify function of each switch and LEDs combination.
 5. Provide capability to communicate with up to 16 ASM-16 modules locally, or up to 3,000 feet from the Control Panel

- I. Network Repeater Module RPT-E3:
 1. Intelligent Network Interface shall provide interconnection and protection of remote Control Panels. Repeater shall regenerate and condition token passing, 625 K baud signal between units. Repeater shall be available in wire, fiber, or wire/fiber configurations as determined by field conditions.
 2. Fiber configurations shall use "ST"-type connectors and be able to operate with up to 200-micron multi-mode fiber, but optimize for 62.5/125. Interface shall have jumper to allow selection of ground detection of wiring when used in wire mode. Interface shall have integral LEDs to display current status of board.

- J. Network Graphic Annunciator (NGA): Networked, 1/4 VGA, touch-screen annunciator with the following characteristics:
 1. Custom Graphics: Panel shall permit uploading of custom bit-mapped graphic to display screen. Graphic shall display when all systems are normal.
 2. Intuitive Functions: In alarm or trouble condition, annunciator shall display only information pertaining to event, including control switches.
 - a. Trouble Condition: Display shall indicate cause of trouble. Only controls available to operator shall be Acknowledge and Reset functions.
 - b. Alarm Condition: Display shall indicate cause of alarm. Only controls available to operator shall be Acknowledge, Silence, and Reset functions.

2.4 SUPPLEMENTAL NOTIFICATION APPLIANCE CIRCUIT (HPF24)

- A. Supplemental Notification Appliance Circuit (HPF24) shall be either Model HPF24S6 or HPF24S8, as indicated on drawings, offering up to 6.0 amps (4.0 amps continuous) or 8.0 amps (6.0 amps continuous), respectively, of regulated 24-volt power. HPF24 shall include the following features:
 1. Integral Charger: Charge up to 18.0 amp-hour batteries and support 60-hour standby.
 2. 2 Input Triggers. Input trigger shall be Notification Appliance Circuit (from fire alarm control panel) or relay.
 3. Surface-mount back box.
 4. Ability to delay AC fail delay in accordance with applicable NFPA requirements.
 5. Power limited circuitry in accordance with applicable UL standards.
 6. Operates as sync follower or a sync generator

2.5 SYSTEM PERIPHERALS

- A. Addressable Devices – General:
 1. Provide address-setting means using rotary-decimal switches.
 2. Use simple to install and maintain decade-type (numbered 0 to 15) address switches by using standard screwdriver to rotate 2 dials on device to set address. Devices which use binary address set via dipswitch packages, handheld device programmer, or other special tools for setting device address shall not be acceptable.
 3. Detectors: Analog and addressable. Connect to fire alarm control panel's Signaling Line Circuits.
 4. Addressable Thermal and Smoke Detectors: Provide 2 status LEDs. Both LEDs shall flash under normal conditions, indicating detector is operational and in regular communication with control panel, and both LEDs shall be placed into steady illumination by control panel, indicating alarm condition has been detected. If

required, flashing mode operation of detector LEDs can be programmed off via fire control panel program.

5. Fire Alarm Control Panel: Permit detector sensitivity adjustment through field programming of system. Sensitivity can be automatically adjusted by panel on time-of-day basis.
 6. Using software, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. Detectors shall be listed by UL as meeting calibrated sensitivity test requirements of NFPA 72, Chapter 7.
 7. Detectors shall be ceiling-mounted and shall include separate twist-lock base with tamper-proof feature.
 8. Following bases and auxiliary functions shall be available:
 - a. Standard base with remote LED output.
 - b. Sounder base rated at 85 dBA minimum.
 - c. Form-C relay base rated 30 VDC, 2.0 A.
 - d. Isolator base.
 9. Detectors shall provide test means whereby they will simulate alarm condition and report that condition to control panel. Such test shall be initiated at detector itself by activating magnetic switch or initiated remotely on command from control panel.
 10. Detectors shall store internal identifying type code that control panel shall use to identify type of device (PHOTO, THERMAL).
- B. Addressable Manual Stations (MS-7AF):
1. Manual Fire Alarm Stations: Non-code, non-break glass type, equipped with key lock so they may be tested without operating handle.
 2. Operated Station: Visually apparent, as operated, at a minimum distance of 100 feet (30.5 m) from front or side.
 3. Stations shall be designed so after actual activation, they cannot be restored to normal except by key reset.
 4. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on cover. The word FIRE shall appear on front of stations in raised letters, 1.75 inches (44 mm) or larger.
 5. Addressable manual stations shall, on command from control panel, send data to panel representing state of manual switch and addressable communication module status.
- C. Intelligent Thermal Detectors (ATD-L2F, ATD-HL2F): Intelligent addressable devices rated at 135 degrees F (58 degrees C) and 190 degrees F (73 degrees C), respectively. Connect via 2 wires to fire alarm control panel signaling line circuit.
- D. Intelligent Photoelectric Smoke Detectors (ASD-PL2F): Use photoelectric (light-scattering) principal to measure smoke density and shall, on command from control panel, send data to panel representing analog level of smoke density.
- E. Intelligent Duct Smoke Detectors (ADPF):
1. In-Duct Smoke Detector Housing: Use on-board intelligent photoelectric detector, which provides continuous analog monitoring and alarm verification from panel.
 2. When sufficient smoke is sensed, alarm signal is initiated, and appropriate action taken to shut down or change over air handling systems to help prevent rapid distribution of toxic smoke and fire gases throughout areas served by duct system.

3. Duct Smoke Detectors Mounted Above Ceiling or Otherwise Obstructed from Normal View: Provide with remote alarm indicator.
 4. Each Detector: Install in either supply side or return side duct in accordance with local mechanical code.
- F. Addressable Dry Contact Monitor Modules (AMM-2F):
1. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
 2. Mount in standard deep electrical box.
 3. IDC Zone: Suitable for Style B operation.
- G. Addressable Dry Contact Monitor Modules (AMM-4F):
1. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
 2. Mount in 4-inch (102-mm) square, 2-1/8-inch (54-mm) deep electrical box.
 3. IDC Zone: Suitable for Style D or Style B operation.
 4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- H. Addressable Dry Contact Monitor Modules (AMM-2IF):
1. Provide to connect 2 supervised IDC zones of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
 2. Mount in 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box.
 3. IDC Zones: Suitable for Style B operation.
 4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- I. Addressable Dry Contact Monitor Modules (MMI-10F):
1. Provide to connect 10 supervised Style B IDC zones or 5 supervised Style D IDC zones of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
 2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
 3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- J. 2-Wire Detector Monitor Modules (AMM-4SF):
1. Provided to connect 1 supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
 2. Mount in 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to optional surface-mounted back box.
 3. IDC Zone: Wired for Class A or B (Style D or Style B) operation.
 4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- K. 2-Wire Detector Monitor Modules (MMI-6SF):
1. Provided to connect 6 supervised Class B IDC zones of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
 2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
 3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

- L. Addressable Control Modules (AOM-2SF):
1. Provide to supervise and control operation of 1 conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
 2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.
 3. Control Module NAC: Wire for Style Z or Style Y (Class A/B) with up to 1 amp of inductive signal or 2 amps of resistive signal operation. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
 4. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.
- M. Addressable Control Modules (MMO-6SF):
1. Provide to supervise and control operation of 1 conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
 2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
 3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
 4. Control module NAC: Wire for Style Z or Style Y (Class A/B) with up to 1 amp of inductive signal or 2 amps of resistive signal operation. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
 5. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.
- N. Addressable Relay Modules (AOM-2RF):
1. Available for HVAC control and other building functions. Relay shall have 2 Form C sets of contacts that operate in tandem and are rated for a minimum of 2.0 amps resistive or 1.0 amps inductive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
 2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.
- O. Addressable Relay Modules (MMO-6RF):
1. Available for HVAC control and other building functions. Relay shall be Form C and rated for a minimum of 2.0 amps resistive or 1.0 amps inductive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
 2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
 3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- P. Isolator Modules (M500X):
1. Provide to automatically isolate wire-to-wire short circuits on SLC Class A or Class B branch. Isolator module shall limit number of modules or detectors that may be

- rendered inoperative by short-circuit fault on SLC loop segment or branch. At least 1 isolator module shall be provided for each floor or protected zone of building. No more than 25 devices shall be connected to 1 isolator module.
2. If wire-to-wire short occurs, isolator module shall automatically open-circuit (disconnect) SLC. When short-circuit condition is corrected, isolator module shall automatically reconnect isolated section.
 3. Does not require address-setting, and its operations shall be totally automatic. Not necessary to replace or reset isolator module after normal operation.
 4. Mount in standard 4-inch (101.6-mm) deep electrical box or in surface-mounted back box.
 5. Single LED: Flash to indicate isolator is operational and illuminate steadily to indicate short-circuit condition has been detected and isolated.
- Q. Addressable Projected Beam Detectors (ABD-2F):
1. Single-ended, reflective design.
 2. Six user-selectable sensitivity levels.
 3. Operates in range from 16 feet to 328 feet.
 4. Temperature Range of Device: Minus 22 degrees F to 131 degrees F.
 5. Beam Detector: Automatic gain control to compensate for gradual signal deterioration from dirt accumulation on lenses.
 6. UL Listed.
 7. Ability to be tested using calibrated test filters or magnet-activated remote test station.
- R. Sprinkler Waterflow Switches (provided and installed by the sprinkler contractor):
1. Integral, mechanical, non-coded, non-accumulative retard type.
 2. Alarm transmission delay time conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30 to 45 seconds.
 3. Single manufacturer and series.
 4. Where possible, locate waterflow switches a minimum of 1 foot from fitting which changes direction of flow and a minimum of 3 feet from valve.
 5. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.
- S. Sprinkler and Standpipe Valve Supervisory Switches (provided and installed by the sprinkler contractor):
1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with supervisory switch. Standpipe hose valves, test valves, and drain valves shall not be equipped with supervisory switches.
 2. PIV (Post Indicator Valve) or Main Gate Valves: Equip with supervisory switch.
 3. Mount not to interfere with normal operation of valve and adjust to operate within 2 revolutions toward closed position of valve control, or when stem has moved no more than one-fifth of distance from normal position.
 4. Contain in weatherproof aluminum housing, which shall provide 3/4-inch (19-mm) conduit entrance and incorporate necessary facilities for attachment to valves.
 5. Switch Housing Finish: Red baked enamel.
 6. Entire Installed Assembly: Tamper proof and arranged to cause switch operation if housing cover is removed or if unit is removed from mounting.
 7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.

- T. Graphic Annunciator (Uses ANU-48 Serial Driver Board):
1. Communicate to fire alarm control panel via EIA-485 (multi-drop) 2-wire communications loop. Up to 16 annunciator drivers, each configured up to 48 points, shall be connected per ILI-MB-E3.
 3. ANU-48: Provide interface to approved UL-listed graphic-style annunciator and provide each of the features specified.
- U. Remote LCD Display Annunciator:
1. Furnish and install as indicated on the Drawings a remote serial annunciator, Model LCD-7100. Annunciator shall provide 80-character display, which shall duplicate all information on basic system display, including any network nodes its host panel is annunciating, with exception of menus. Contain the following function keys:
 - a. Alarm Acknowledge.
 - b. Trouble Acknowledge.
 - c. Signal Silence.
 - d. System Reset/Lamp Test.
 - e. System Drill Test.
 2. Key Lock: Enable switches only when placed in "ON" position, with exception of Trouble Acknowledge, which is used to silence local trouble audible sounder. Annunciator shall contain the following LEDs:
 - a. Alarm.
 - b. Supervisory.
 - c. System Trouble.
 - d. Power Fault.
 - e. System Silenced.
 3. Mount on standard 3-gang surface or flush electrical box.
 4. Each ILI-MB-E3: Accommodate up to 5 remote LCD-7100 annunciators which shall be located up to 3,000 feet from control panel.
- V. Notification Appliances: Wheelock Exceeder Series, ET1010 Series
1. Operate on 24 VDC
 2. Interior speakers shall have selectable output options of 1/8, 1/4, 1/2, 1, and 2 watts continuous power.
 3. Exterior speakers shall have additional selectable outputs of 4 and 8 watts.
 4. Strobe Maximum Pulse Duration: 0.2 second.
 5. Strobe Intensity: UL 1971.
 6. Flash Rate: UL 1971.
 7. Strobe Candela Rating: Determine by positioning selector switch on back of device.

2.6 WIRING

- A. Raceways:
1. EMT: Allied Tube & Conduit "Fire Alarm Red" steel EMT conduit, or equivalent.
 2. Other raceways, junction boxes, etc.: Where fire alarm raceway is not buried underground, it shall be painted red.
- B. Cables & Conductors:
1. Optical Fiber Network Cable: 6-Strand Cable, as per data specification.

2. Signaling Line Circuit Cable:
 - a. OSP: West Penn #AQ225 (Black Jacket)
 - b. ISP: West Penn #D980 (Red Jacket)
3. Notification Appliance Circuit Cable:
 - a. OSP: West Penn #AQ227 (Black Jacket)
 - b. ISP: West Penn #974 (Red Jacket)
4. Voice Evacuation Speaker Cable:

As per notification appliance manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine areas and surfaces to receive fire alarm system.
 1. Notify Architect of conditions that would adversely affect installation or subsequent use.
 2. Do not begin installation until unacceptable conditions are corrected.

3.2 INSTALLATION

- A. Install fire alarm system in accordance with NFPA 72, NFPA 70, state and local codes, manufacturer's instructions, and as indicated on the Drawings.
- B. Smoke detectors shall neither be installed within 36 inches of any HVAC supply or return air grille, to include air handling light fixtures, nor within 12 inches of any wall.
- C. Smoke detectors shall not be installed before system programming and test period. If construction is ongoing during this period, take measures to protect smoke detectors from contamination and physical damage.
- D. Wall mounted notification appliances shall be installed not lower than 80 inches and not higher than 96 inches, above finished floor. Devices shall be not be mounted within 6 inches of the ceiling.
- E. All fire alarm devices shall be accessible for periodic maintenance. Should a device location indicated in the Contract Documents not meet this requirement, it shall be the responsibility of the Contractor to bring it, in writing, to the attention of the Engineer.
- F. Flush-mount fire detection and alarm system devices, control panels, and remote annunciators in finished areas. Flush-mount or surface-mount fire detection and alarm system devices, control panels, and remote annunciators in unfinished areas.
- G. Ensure manual stations are suitable for surface mounting or semi-flush mounting as indicated on the Drawings. Install stations at 48 inches above finished floor, measured to operating handle.
- H. End of Line Resistors shall be furnished as required by the manufacturer. Devices containing end-of-line resistors shall be appropriately labeled so as not to require removal to identify the EOL device.

- I. Addressable modules shall be mounted within 36 inches of the monitored or controlled point of termination. This shall include, but is not necessarily limited to, fan shutdown, elevator recall, shunt trip, sprinkler status points, or door release. Label all addressable modules as "FIRE ALARM SYSTEM" and to their function, e.g., "FAN F-1 SHUTDOWN".
 - J. Conduit/Raceways, Junction Boxes:
 - 1. All systems and system components listed to UL864 Control Units for Fire Protective Signaling Systems maybe installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.
 - 2. The fire alarm system cabling / wiring shall be installed in RED color conduit, minimum size 3/4". In upgrade projects, existing fire alarm system conduit may be reused, if serviceable. Paint existing conduits red to match new.
 - 2. All junction box covers shall be painted red.
 - 2. Minimum conduit size shall be 3/4" trade size.
 - 3. Conceal conduit, junction boxes, and conduit supports and hangers in finished areas. Conceal or expose conduit, junction boxes, and conduit supports and hangers in unfinished areas. Concealed installation is preferred wherever possible.
 - K. Cables & Conductors:
 - 1. Cables & conductors shall be labeled at both ends as to their origin and destination; e.g. "FACP - i1-1" indicates the origin as the FACP and the destination as initiation device "i1-1". Utilize Panduit labels (or equivalent), size MP-150c through MP-350, as required by the amount of information on the label.
 - 2. Splices in wiring are permitted only at terminal cabinets, or locations specifically approved by the Engineer. Do not splice in conduit, pull boxes, inaccessible locations, etc.
 - L. Terminal Cabinets:
 - 1. Wiring shall be neatly bundled, fanned, tagged, and laced. Leave minimum three inches fan space between terminal block connection and vertical wiring. Incoming wiring shall terminate on the left, outgoing on the right.
 - 2. Wire terminations at devices and terminal strips shall be "spade" type terminal connections, Sta-Kon, or equivalent.
 - 3. Terminal barrier strips shall be Cinch 142 series (or equivalent) with minimum six points. Leave minimum two space separation between types of system cables. Provide minimum four spare termination points.
 - M. Coordinate the required space in the Data equipment frames with this and other network based systems. Provide racks with sufficient space to accommodate all systems.
- ### 3.3 SYSTEM UPGRADES
- A. When upgrading an existing system, the existing fire alarm shall be tested in the presence of an assigned representative of Central Unified School District prior to any work being started by a contractor. Upon completion of testing, it shall be the contractor's responsibility to note any discrepancy with the existing system. It will be contractor's responsibility to provide and complete a working system, minus any discrepancies noted.

- B. When upgrading an existing system, all end of line resistors shall be changed out to meet the manufacturer's specifications for each fire panel. Install the latest software updates on existing equipment to be reused.
- C. When specifications call for the removal of existing equipment, that equipment shall be returned to the District.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide service of competent, factory-trained technician authorized by manufacturer to technically supervise and participate during pre-testing and acceptance testing of system.
- B. Testing:
 - 1. Conduct complete visual inspection of control panel connections and test wiring for short circuits, ground faults, continuity, and insulation before energizing cables and wires.
 - 2. Close each sprinkler system control valve and verify proper supervisory alarm at Control Panel.
 - 3. Verify activation of flow switches.
 - 4. Open initiating device circuits and verify that trouble signal actuates.
 - 5. Open signaling line circuits and verify that trouble signal actuates.
 - 6. Open and short notification appliance circuits and verify that trouble signal actuates.
 - 7. Ground initiating device circuits and verify response of trouble signals.
 - 8. Ground signaling line circuits and verify response of trouble signals.
 - 9. Ground notification appliance circuits and verify response of trouble signals.
 - 10. Check installation, supervision, and operation of intelligent smoke detectors.
 - 11. Introduce on system each of the alarm conditions that system is required to detect. Verify proper receipt and proper processing of signal at Control Panel and correct activation of control points.
 - 12. Consult manufacturer's manual to determine proper testing procedures when system is equipped with optional features. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality, and similar.
- C. Acceptance Testing:
 - 1. The contractor's job foreman and an assistant, in the presence of a representative of the manufacturer, an assigned representative of Central Unified School District, and the assigned inspector of the AHJ, shall perform a test of the system. All attending personnel shall be given reasonable notice so as to make themselves available for the test.
 - 2. Operate every installed device to verify proper operation and correct annunciation at the control panel.
 - 2. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.
 - 3. Completely disconnect main Control Panel from rest of network. Activate initiating device. All control outputs supported by transponder SLC circuits shall operate under project programming mode. Default or degrade mode programming shall not be acceptable.
 - 4. Complete any additional testing required by the AHJ.

5. When testing has been completed to satisfaction of both Contractor's job foreman, representatives of the manufacturer and Owner, and the inspector of the AHJ, a notarized letter co-signed by each attesting to satisfactory completion of said testing shall be forwarded to the Owner and fire department.
6. Leave fire alarm system in proper working order and, without additional expense to Owner, replace defective materials and equipment provided within 1 year (365 days) from date of final acceptance by the owner.

3.5 DEMONSTRATION

- A. Provide instruction as required for operating fire alarm system.
- B. Provide hands-on demonstrations of operation of fire alarm system components and functions.

END OF SECTION

SECTION 31 11 00**SITE CLEARING, STRIPPING, AND GRUBBING****PART 1 GENERAL****1.1 SUMMARY****A. Section includes:**

1. Clearing, stripping, and grubbing
2. Removing surface debris.
3. Removing designated paving, concrete slabs, curbs, gutters and fencing.
4. Removing designated trees, shrubs, and other plant life.
5. Removing abandoned utilities.
6. Excavating topsoil.

B. Related Sections include but are not necessarily limited to:

1. Section 31 23 00 – Earthwork.
- 2.

C. Measurement and Payment

1. The contract lump sum price shall include full compensation for all costs and work involved with site clearing, stripping, and grubbing.

1.2 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures for general submittal requirements and content.

B. Product Data: Submit data for herbicide. Indicate compliance with applicable codes for environmental protection.

1.3 DESCRIPTION**A. Clearing:**

1. Remove and dispose of concrete curbs, gutter and slabs; asphalt concrete pavement and other hardscape improvements as shown on the plans.
2. Remove and dispose of trees, snags, stumps, shrubs, brush, limbs, sticks, branches and other vegetative growth.
3. Remove and dispose of rocks, tiles, trash piles, rubbish, and fencing.
4. Protect structures and piping above and below ground, trees, shrubs, vegetative growth and fencing not designated for removal.
5. Contractor to destruct existing on-site water well per Fresno County requirements. Contractor must have C-57 license and obtain permit from County prior to commencing well destruction.

B. Stripping:

1. Remove and dispose of organic sod, topsoil to a minimum depth of 2-inches, grass and grass roots, and other objectionable material.

C. Grubbing:

1. After clearing and stripping, remove and dispose of wood or root matter, including stumps, logs, trunks, roots, or root systems greater than 1.5 inches in diameter or thickness to a depth of 3-feet below the ground surface.

1.4 QUALITY ASSURANCE

- A. Conform to School District Standards

PART 2 PRODUCTS

2.1 MATERIALS

- A. Trees and Shrubbery: Existing trees, shrubbery and other vegetative material may not be shown in the plans. Inspect the site as to the nature, location, size and extent of vegetative material to be preserved or removed, as specified herein.

PART 3 EXECUTION

3.1 PREPARATION

- A. Call Local Utility Line Information service at 811 not less than three working days before performing Work.
- B. Verify location of existing utilities and benchmarks before starting work.
- C. Verify existing plant life designated to remain is tagged or identified.

3.2 PROTECTION

- A. Protect existing trees and other vegetation to remain against damage.
1. Do not smother trees by stockpiling construction materials or excavated materials within drip line.
 2. Avoid foot or vehicular traffic or parking of vehicles within drip line.
 3. Provide temporary protection as required.
- B. Repair or replace trees and vegetation damaged by construction operations.
1. Repair to be performed by a qualified tree surgeon.
 2. Remove trees that cannot be repaired and restored to full-growth status and replace with new trees of minimum 4-inch caliper.
- C. Protect utilities, benchmarks, and survey control points from damage or displacement.

3.3 SITE CLEARING

- A. Topsoil Removal:
1. Strip topsoil to depths encountered.
 - a. Remove heavy growths of grass before stripping.

- b. Stop topsoil stripping sufficient distance from such trees to prevent damage to main root system.
 - c. Separate from underlying subsoil or objectionable material.
 2. Stockpile topsoil where directed by Engineer.
 - a. Construct storage piles to freely drain surface water.
 - b. Seed or cover storage piles to prevent erosion in compliance with SWPPP.
 3. Do not strip topsoil in wooded areas where no change in grade occurs.
 4. Borrow topsoil: Reasonably free of subsoil, objects over 2-inch DIA, weeds and roots.
- B. Clearing and Grubbing:
 1. Clear from within limits of construction all trees not marked to remain.
 - a. Include shrubs, brush, downed timber, rotten wood, heavy growth of grass and weeds, vines, rubbish, structures and debris.
 2. Grub (remove) from within limits of construction all stumps, roots, root mats, logs and debris encountered.
 - a. Totally grub under areas to be paved.
 - b. Grubbing in lawn areas: totally grub.
- C. Disposal of Waste Materials:
 1. Do not burn combustible materials on site.
 2. Remove all waste materials from site and dispose in a legal manner.
 3. Do not bury organic matter on site.

3.4 ACCEPTANCE

- A. Upon completion of the site clearing, obtain Engineer's acceptance of the extent of clearing, depth of stripping and rough grade.

END OF SECTION

SECTION 31 23 00**EARTHWORK****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Materials, testing, and installation for excavations, fills, and backfills.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 31 11 00 – Site Clearing, Stripping and Grubbing.
 - 2. Section 31 23 16 – Trenching, Backfilling and Compacting.
- C. For additional information, refer to the Geotechnical Investigation Report (GIR) by Salem Engineering Group, Inc. dated October 31, 2016.
- D. Measurement and Payment:
 - 1. The contract lump sum price shall include full compensation for all costs and work involved with earthwork.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. D1556 – Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 2. D1557 – Standard Test Methods for Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18-Inch Drop.
 - 3. D2167 – Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 4. D2487 – Standard Test Method for Classification of Soils for Engineering Purposes.
 - 5. D2488 – Practice for Description and Identification of Soils (Visual-Manual Procedure).
 - 6. D2937 – Test Method for Density of Soil in Place by the Drive-Cylinder Method.
 - 7. D2974 – Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
 - 8. D6938 – Standard Test Methods for Density and Moisture Content of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).
 - 9. E699 – Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM.
- B. California Department of Transportation Standard Specifications, current edition (current edition):
 - 1. CTM 216 Dry – California Test Method for Relative Compaction of Treated and Untreated Soils.

2. CTM 301 – California Test Method for the Determination of the Resistance “R” Value of Treated and Untreated Bases, Sub-bases, and Basement soils by the Stabilometer.

1.3 DEFINITIONS

- A. Excavation consists of removal of material encountered during stripping and as required for removal of existing underground facilities indicated. It also includes disposal or temporary stockpile of material removed.
- B. Unauthorized excavation consists of removal of materials beyond indicated elevations or dimensions without specific direction of the Contract Administrator. Unauthorized excavation, as well as remedial work directed by the Contract Administrator, shall be at Contractor's expense.
 1. Under footings, foundation bases, fill-authorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to the ENGINEER.
 2. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of the same classification, unless otherwise directed by the ENGINEER.
- C. Additional Excavation:
 1. When excavation has reached required subgrade elevations; notify the ENGINEER who will make an inspection of conditions. If the ENGINEER determines bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by the ENGINEER.
 2. Removal of unsuitable material that is unknown and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.
- D. Subgrade: The undisturbed earth or the compacted soil layer immediately below granular subbase, drainage fill, or topsoil materials.
- E. Structure: Foundations, slabs, tanks, vaults, or other man-made stationary features occurring above or below ground surface.
- F. Stripping: Removal of the top soil, surface vegetation and any miscellaneous obstructions prior to site grading.
- G. Over-excavation: Over-excavation is generally reserved for soils that in their natural state will not provide adequate bearing capacity for structures.
- H. Engineered Fill: Fill Material upon which the geotechnical engineer have made sufficient tests and observations to enable them to issue a statement that, in their opinion, the fill has been placed and compacted in accordance with the specification requirements and to the satisfaction of the Engineer.

- I. Trench Backfill: Trench backfill shall consist of material placed between the pipe zone backfill/bedding and subgrade in paved areas or to the top of the trench in unpaved areas, unless otherwise shown or specified in the Contract.

1.4 SUBMITTALS

- A. See Section 01 33 00 – Submittal Procedures for general submittal requirements and content.
- B. Submit excavation and shoring drawings for worker protection in accordance with the General Provisions.
- C. Submit six copies for materials acceptance reports from an approved testing laboratory verifying that the material meets the project requirements at least two weeks prior to use.
- D. Furnish copy of dust control permit to Construction Manager prior to earthwork.

1.5 QUALITY ASSURANCE

- A. Testing and Inspection Services: School District will employ and pay for a qualified independent geotechnical testing and inspection laboratory to perform soils testing and inspection services during earthwork operations.
- B. Determine the density of soil in place by the sand cone method, ASTM D1556 or by nuclear method, ASTM D6938. Additional sand cones and densities will be required if the backfill material is visually variable. The minimum depth for the sand cone test hole shall be 12-inches. The minimum size shall be 8 inches, and size 16/30 or 10/20 silica sand shall be used. Compaction tests will be performed for each lift or layer.
- C. Determine laboratory moisture-density relationship of soils per ASTM D1557 or Cal 216 Dry test methods. If nuclear methods are used for in-place density determination, the compaction test results for maximum dry density and optimum water content shall be adjusted in accordance with ASTM D4718. This will be required for determination of percent relative compaction and moisture variation from optimum.
- D. Determine the relative density of cohesion-less soils per ASTM D4253 and D4254.
- E. Sample materials per ASTM D75.
- F. "Relative compaction" is the ratio, expressed as a percentage, of the in-place dry density to the laboratory maximum dry density.
- G. Compaction shall be deemed to comply with the specifications when no more than one test of any three consecutive tests falls below the specified relative compaction. The one test shall be no more than three percentage points below the specified compaction percentage and shall be within two percentage points of the optimum moisture as determined by the optimum moisture-density relationship of soils test method. The Contractor shall pay the costs of any retesting of work not conforming to the specifications.

1.6 DISPOSAL OF EXCESS MATERIALS

- A. Excess materials and waste from earthwork operations shall be disposed of off-site by the Contractor at his expense. The District has not determined or secured any sites or permits for disposal of excess material or waste.

1.7 MATERIAL AVAILABILITY

- A. Sufficient earthwork material to complete the work is available at the site. Excess material haul-off is required.

PART 2 PRODUCTS

2.1 ENGINEERED FILL

- A. Engineered Fill is material to be placed beneath structures or pavements to the limits indicated on the drawings.
- B. Engineered Fill material shall be free of organics and other debris and less than 3-inches in maximum dimension. Native soils may be used if they contain objects less than 3-inch in maximum dimension and contain less than 3 percent organic materials by weight (ASTM D2974).
- C. Import Fill to be used as Engineered Fill shall be non-hazardous, non-corrosive, be derived from a single, consistent source and meet the following criteria in geotechnical report.
 1. Gradation (ASTM C136)
 2. Expansion index (ASTM D4829)
 3. Plasticity (ASTM D4318)
 4. Organic Content (ASTM D2974)
 5. Corrosivity Potential (pH, Minimum resistivity (ohm-cm), Soluble Sulfate (ppm), Soluble Chloride (ppm))
 6. Resistance Value (CTM 301)

2.2 ENGINEERED BACKFILL

- A. Engineered Backfill is material to be placed adjacent to and around piping, structures, and areas not subject to adjacent structure foundation loading (areas not subject to adjacent structure foundation loading are areas from a distance 5-feet beyond the edge of structural slab or footing).
- B. Engineered Backfill and Imported Fill to be used as Engineered Backfill shall comply with the requirements of Engineered Fill.

2.3 FILL

- A. Fill material is material that is to be placed in locations that are not to be constructed as engineered fill or backfill. Fill material may be native material.
SEE SALEM GEOTECH REPORT.

2.4 SAND

- A. Sand is granular material free from clay balls, organic matter, and other deleterious substances.
- B. Sand shall be of such size that 90 percent to 100 percent will pass the number 4 sieve and not more than 5 percent will pass the number 200 sieve per Caltrans Sand bedding specification.
- C. Sand shall have a minimum sand equivalent of 30 per ASTM D2419.

2.5 SAND-CEMENT SLURRY BACKFILL

- A. See Section 31 23 24 – Controlled Low Strength Material.

2.6 WATER FOR COMPACTION

- A. Water shall be free of organic materials and shall have a pH of 7.0 to 9.0, a maximum chloride concentration of 500-mg/L, and a maximum sulfate concentration of 500-mg/L. Provide all water needed for earthwork. Provide temporary piping and valves to convey water from the source to the point of use. Provide any meters if the water is taken from a city, water district, or agency pipeline.

2.7 AGGREGATE BASE

- A. Use ¾-inch maximum, Class 2 Aggregate base material per Caltrans' Standard Specifications, Section 26 and Section 32 11 23 – Aggregate Base Courses.

PART 3 EXECUTION

3.1 DEWATERING

- A. Provide and operate equipment adequate to keep excavations and trenches free of water. Dewater subgrade to a minimum of 3-feet below bottom of excavation. Remove water during period when concrete is being deposited, when pipe is being laid, and during the placing of backfill. Avoid settlement or damage to adjacent property. Dispose of water in a manner that will not damage adjacent property. When dewatering open excavations, dewater from outside the structural limits and from a point below the bottom of the excavation. Obtain and comply with discharge permit from the City of Fresno.

3.2 EXCAVATION

- A. General over-excavation below the footprint of the Buildings required to a minimum depth of 3-feet below present site grade or 2-feet below proposed footing bottom. The over-excavation shall extend laterally 5-feet beyond the perimeter of improvements. The resulting excavation shall be observed and approved by a representative of the Geotechnical Engineer prior to proof rolling, scarification, placing of fill, and compaction.

- B. Excavation is unclassified. Perform excavation regardless of the type, nature, or condition of the material encountered to accomplish the construction. Do not operate excavation equipment within 5-feet of existing structures or newly completed construction. Excavate with hand tools in these areas.
- C. After the required excavation has been completed, the ENGINEER will observe the exposed subgrade to determine the need for any additional excavation. It is the intent that additional excavation is to be conducted in all areas within the influence of the structure where unacceptable subgrade materials exist at the exposed subgrade. Over-excavation shall include the removal of all such unacceptable material that exists directly beneath the structure or within a zone outside and below the structure from 5-feet outside the bottom edge of the footing. Refill the over-excavated areas with Engineered Backfill Material.
- D. The Contractor will not receive any additional payment for refill material used for his convenience.
- E. Excavations shall have sloping, sheeting, shoring, and bracing conforming with 29CFR1926 Subpart P-Excavations, CAL/OSHA requirements, and the General Provisions.

3.3 LIMITS OF FOUNDATION EXCAVATION

- A. Excavate to the depths and widths needed to accomplish the construction. Allow for forms, working space, engineered backfill, and site grading. Do not excavate for footings, slabs, or conduits below elevations indicated. Unless unacceptable material is encountered and over-excavation is authorized by the Owner, backfill over-excavations with compacted Engineered Backfill material. Correct cuts below grade by benching adjoining areas and creating a smooth transition. The Contractor shall bear all costs for correcting unauthorized over-excavated areas.

3.4 PREPARATION FOR PLACING FILL OR BACKFILL

- A. Remove foreign materials and trash from the excavation before backfilling.
- B. Scarify the final subgrade surface to a depth of 12-inches, uniformly moisture condition to or above optimum moisture content, proof-roll to detect soft areas, and compact to 95% relative compaction beneath structures, vaults, and equipment pads.

3.5 PLACING AND COMPACTION FILL AND ENGINEERED FILL

- A. Excavated material may be used for fill and engineered fill providing materials meet the specified requirements for structure fill, backfill, and fill material.
- B. Place in maximum 8-inch lifts, moisture condition to 2% of optimum, and compact each lift to 95% relative compaction.
- C. Where fill is to be constructed on slopes steeper than 5:1, bench the fill into competent undisturbed materials as the fill progresses up the slope. Benches shall

be sloped at least 2% into the slope and shall be of a width at least equal to the height of fill lift.

3.6 PREPARATION OF FOUNDATION SUBGRADE

- A. The finished subgrade for foundations and equipment slabs shall be within a tolerance of ± 0.08 of a foot of the grade and cross section indicated, shall be smooth and free from irregularities, and shall be at the specified relative compaction.
- B. Compact the top 12-inches of the subgrade to 95% relative compaction unless noted otherwise on the drawings. Recomaction will not be required if rock is exposed at final subgrade.
- C. Remove soft material encountered and replace with engineered backfill. Fill holes and depressions to the required line, grade, and cross sections with engineered backfill.
- D. If rock is encountered at final grade, over-excavate to a depth of 6-inches and place engineered backfill to establish final grade.

3.7 MOISTURE CONTROL

- A. During the compacting operations, maintain optimum practicable moisture content required for compaction purposes in each lift of the material. Maintain uniform moisture content throughout the lift. Insofar as practicable, add water to the material at the site of excavation. Supplement by sprinkling the material. At the time of compaction, the water content of the material shall be at optimum water content or within 2 percentage points above optimum. Aerate material containing excessive moisture by blading, discing, or harrowing to hasten the drying process.

3.8 SITE GRADING

- A. Perform earthwork to the lines and grades shown in the drawings. Remove exposed roots and loose rocks exceeding 1/4-inches in diameter. Neatly and smoothly trim rounded surfaces.

3.9 PLACING AND COMPACTING AGGREGATE BASE FOR STRUCTURES

- A. Material excavated beneath the structure that is not to be replaced with concrete backfill shall be replaced with aggregate base material.
- B. Place the aggregate base in 6 to 8-inch lifts and compact to 95% relative compaction unless otherwise noted on the drawings.

3.10 MAINTENANCE

- A. Protection of Graded Areas: Graded areas shall be protected and kept free of trash and debris.
- B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

- C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape and compact to required density prior to further construction.
- D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact and replace surface treatment. Restore appearance, quality and condition of surface or finish to match adjacent work and eliminate evidence of restoration to greatest extent possible.
- E. Maintain dust control on a continuous basis in accordance with the Standard Specifications.

3.11 EXCAVATION NEAR EXISTING UTILITIES AND STRUCTURES

- A. As the excavation approaches pipes, conduits, or other underground structures, not designated for demolition or specifically designated to preserve, discontinue digging by machinery and excavate by means of hand tools. Such manual excavation is incidental to normal excavation and is included in the work to be done under items involving normal excavation.
- B. Where determination of the exact location of a pipe or other underground structure is necessary for doing the work properly, excavate test pits to determine such locations. Such test pits are incidental to other excavation, and the work is understood to be included as a part of the excavation.
- C. Existing Structures: Support and protect from damage all existing pipes, poles, wires, fences, guard rails, curbing, catch basins, manholes, property line markers, and other structures which do not require temporary or permanent relocation.
- D. Restore or replace damaged items, without compensation, to the condition in which they were found immediately before the work under this project was begun.
- E. Survey Monuments: Replace survey monuments that are disturbed or removed. Work shall be performed by a Licensed Land Surveyor at the Contractor's expense.

3.12 CARE AND RESTORATION OF PROPERTY

- A. General: Do not operate tractors, bulldozers or other power-operated equipment on paved surfaces if the treads or wheels of the equipment are so shaped as to cut or otherwise injure the surfaces.
- B. Restore all surfaces, including planted areas, which have been injured by the Contractor's operations, to a condition at least equal to that in which they were found immediately before the work was begun. Use suitable materials and methods for such restoration. Maintain all restored plantings by cutting, trimming, fertilizing, etc., until acceptance. Restore existing property or structures as promptly as practicable and do not leave until the end of construction period.

3.13 EROSION CONTROL

- A. Comply with the requirements of the Owner's SWPPP. See Section 01 41 00 – Permits, Fees and Regulations for additional information,

3.14 DUST CONTROL:

- A. Obtain a dust control permit from the San Joaquin Valley Air Pollution Control District, (559) 230-5900, prior to performing earth disturbing activities. Prevent a dust nuisance from originating from the site of the work as a result of his operations, or the traveling public, during the effective period of this contract.
- B. Take preventative measures to control dust emissions including but not limited to the following:
 - 1. Apply water to all unpaved areas as required to prevent the surface from becoming dry enough to permit dust formation.
 - 2. Keep paved surfaces over which vehicular traffic is permitted to travel free of dirt. In residential areas, use a self-contained, pick-up type, power broom with water distribution system.
- C. Temporary suspension of the work, either as a result of order by the Engineer, or as a result of conditions beyond the control of the Contractor shall not relieve the Contractor from his responsibility for dust control as set forth herein.

3.15 COMPACTION:

- A. Comply with the compaction requirements are shown on the plans and specified herein.

END OF SECTION

SECTION 31 23 16**TRENCHING, BACKFILL, AND COMPACTION****PART 1 GENERAL****1.1 DESCRIPTION**

- A. Section includes:
 - 1. Trenching, backfilling, and compacting for utilities.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 31 11 00 – Site Clearing, Stripping, and Grubbing
 - 2. Section 31 23 00 – Earthwork.
 - 3. Section 31 23 24 – Controlled Low Strength Material
- C. For additional information, refer to the Geotechnical Investigation Report (GIR) by Salem Engineering Group, Inc., dated October 31, 2016.
- D. Measurement and Payment:
 - 1. The contract lump sum price shall include full compensation for all costs and work involved with trenching, backfilling, and compaction.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. C33– Standard Specification for Concrete Aggregates.
 - 2. D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 3. D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 4. D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - 5. D2922 – Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. D3017 – Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 7. D4253 – Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - 8. D4254 – Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
- B. Cal-OSHA – Standards and Requirements for Trench Bracing and Shoring.

1.3 DEFINITIONS

- A. Pipe Base: The trench area between the bottom of the trench and the bottom of the pipe. Extend full width and length of trench.

- B. Pipe Zone: Area of trench between the bottom of the pipe and a minimum of 12-inches above the pipe, unless otherwise indicated. Extend full width and length of trench.
- C. Backfill Zone: Area above Pipe Zone.
- D. Relative Compaction: Field-measured dry weight expressed as a percent of maximum dry density of same soil determined in accordance with ASTM D1557.
- E. Unclassified Excavation: Nature of materials to be encountered is not identified or described.

1.4 DESCRIPTION

- A. Provide materials, services, and equipment required for trenching, backfilling and compaction.
- B. Trenching and backfilling shall have the approval of the Engineer. Work shall be done only under the general observation and, where required, the detailed inspection of the Engineer. Do not backfill until each specific location is approved.
- C. Owner to retain an independent soils laboratory to conduct in-place moisture-density tests for backfilling to assure that all work complies with this Section.

1.5 SUBMITTALS

- A. See Section 01 33 00 – Submittal Procedures for general submittal requirements and content.
- B. Test Reports: Submit results of independent testing and laboratory specified tests.

PART 2 PRODUCTS

2.1 PIPE BASE AND PIPE ZONE BACKFILL MATERIAL

- A. Use sand conforming to ASTM C33 for PVC pipe, polyethylene encased ductile iron pipe, and conduit less than 3-inch diameter.
- B. Use crushed, partially crushed, or naturally occurring granular material, free from organic and inorganic debris, liquid limit less than 25, and plasticity index less than 9, that meets the following requirements for underground piping 3-inch or larger diameter, unless otherwise indicated:

Sieve Size	%Passing
Passing 1 inch	100%
Passing ¾ inch	90-100%
Passing ½ inch	30-60%
Passing ⅜ inch	0-20%
Passing No. 4	0-5%

2.2 TRENCH BACKFILL MATERIAL

- A. Native material free from organic and inorganic debris and of 3-inch maximum size meeting the requirements of Engineered Backfill specified in Section 31 23 00 – Earthwork.

2.3 CONCRETE FOR TRENCH BACKFILL

- A. See Section 31 23 24 – Controlled Low Strength Material.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that native excavated material to be reused as backfill is acceptable to the District Representative.
- B. Identify lines and grades.

3.2 REMOVAL OF WATER

- A. At all times, provide and maintain means and devices to remove and dispose of water entering trench during preparations for and during pipe laying, and until backfill of the pipe is complete.

3.3 TRENCH EXCAVATION

- A. Excavate depth and width as shown or as directed. Allow for cover and pipe base under pipe. Remove loose matter.
- B. Comply with CAL-OSHA requirements regarding trench bracing and shoring.
- C. If CONTRACTOR elects to slope top of trench in lieu of trench bracing, the trench width shall be maintained at least 2-feet above top of pipe before sloping begins. Sloping, unless otherwise approved by the ENGINEER, shall not be steeper than 1(H):1(V).

3.4 PIPE BASE

- A. Provide pipe base for supporting pipe for full width of trench. Unless shown otherwise, minimum depth of pipe base below pipe shall be 4-inches and not less than 3-inches under pipe bell.
- B. Hand-grade trench ahead of pipe laying. Provide a firm, unyielding base.
- C. If trench is excavated below required depth for pipe base, fill the excess depth with pipe base to proper subgrade. Place pipe base for full width of trench in layers not exceeding 6 inches deep and compact until material does not yield or move.

3.5 PIPE ZONE

- A. Use pipe zone material except where concrete-encased or otherwise indicated to be backfilled. Place material simultaneously on both sides of pipe in a manner approved by the ENGINEER. Lifts not to exceed 6-inches.
- B. "Walk-in" each lift of backfill. Slice with a shovel or tamp with J-bars or similar devices so that all voids around pipe are filled.
- C. Give particular attention to zone from bottom of pipe-to-pipe springline. Ensure firm support to prevent lateral movement or pipe deflection during final backfilling.

3.6 BACKFILL ZONE

- A. Place moisture-conditioned backfill material in lifts not exceeding 6-inches for hand operated mechanical compactors and not exceeding 8-inches for heavy equipment compactors.
- B. Compact backfill as recommended by the Geotechnical Engineer of the Record.
- C. Ponding or jetting will not be permitted.

3.7 TESTING FOR COMPACTION

- A. The OWNER will test for compaction as described in Section 31 23 00.
- B. Where compaction tests indicate a failure to meet the specified compaction, the OWNER will take additional tests every 15-feet in each direction until the extent of the failing area is identified. Rework the entire failed area until the specified compaction has been achieved.

3.8 FIELD QUALITY CONTROL

- A. Perform field testing under provisions of Division 1 – General Requirements.
- B. Perform testing as recommended by Geotechnical Engineer.
- C. If tests indicate work does not meet specified requirements, remove work, replace, and test.

3.9 COMPLETION REQUIREMENTS

- A. Excess materials and waste from earthwork operations shall be disposed of offsite. The OWNER has not determined or secured any sites or permits for disposal of excess material or waste.

END OF SECTION

SECTION 31 23 24**CONTROLLED LOW STRENGTH MATERIAL****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Controlled Low Strength Material (CLSM).
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 31 23 00 – Earthwork
 - 2. Section 31 23 16 – Trenching, Backfilling, and Compacting
- C. Measurement and Payment:
 - 1. The contract lump sum price shall include full compensation for all costs and work involved with furnishing and placing controlled low strength material.

1.2 REFERENCES

- A. American Concrete Institute (ACI) Standards:
 - 1. 229 – Controlled Low Strength Materials
 - 2. 232 – Fly Ash/Other Pozzolans in Concrete
- B. American Society For Testing And Materials (ASTM) Standards:
 - 1. C31 – Practices for Making and Curing Concrete Test Specimens in the Field.
 - 2. C33 – Specification for Concrete Aggregates.
 - 3. C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 4. C94 – Specification for Ready-Mix Concrete.
 - 5. C150 – Specification for Portland Cement.
 - 6. C260 – Specification for Air-Entraining Admixtures for Concrete.
 - 7. C494 – Specification for Chemical – Admixtures for Concrete.
 - 8. C618 – Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Filler in Portland Cement.

1.3 DEFINITIONS

- A. Controlled Low Strength Material (CLSM): A mixture of Portland cement, fly ash, aggregates, and admixtures proportioned to provide a non-segregating, self consolidating, free flowing and hand-excavatable material that will result in a hardened, dense, non-settling fill.

1.4 DESCRIPTION

- A. Provide all material, equipment, and labor for the proportioning, mixing, transporting, placing, consolidating, finishing, and curing of a hand-excavatable CLSM mixture.

- B. Provide temporary controls to prevent flotation or displacement of pipelines and structures during placement.

1.5 SUBMITTALS

- A. See Section 01 33 00 – Submittal Procedures for general submittal requirements and content.
- B. Product Data:
 - 1. Acknowledgement that products submitted meet requirements of standards referenced.
 - 2. Mix Design: Submit CLSM mix designs showing the proportions and gradations of all materials proposed for each class and type of CLSM specified herein.
- C. Placement Procedures:
 - 1. Submit placement procedures and calculations showing that the pipelines and/or structures will not be floated or displaced during placement of CLSM.
- D. Quality Assurance/Control:
 - 1. Test Reports:
 - a. Provide the services of an independent testing laboratory to test for the mixture properties specified herein.

1.6 SITE CONDITIONS

- A. Minimum Conditions:
 - 1. The mixtures shall not be placed on frozen ground.
 - 2. The placed mixtures shall be protected from freezing.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Pozzolanic International
 - 2. Flowable Compacting Fill by RMC Lonestar
 - 3. Or approved equal.

2.2 MATERIALS

- A. General
 - 1. Prepare CLSM in accordance with ASTM C94. CLSM shall be a mixture of cement, pozzolan, coarse and fine aggregate, water, and admixtures as necessary to meet specified requirements batched by a ready-mix concrete plant and delivered to the Work by means of standard transit mixing trucks. The mixture shall produce a cementitious hand-excavatable material.
 - 2. Compressive strength shall be determined in accordance with ASTM C39.
 - 3. The actual mix proportion, slump, and water reducing agent shall meet the uses specified herein.

4. The entrained air content shall be a minimum of 8 percent and a maximum of 20 percent as required to meet the uses specified herein.

B. Cement

1. Cement shall be Type II in accordance with the requirements of ASTM C150.

C. Pozzolan

1. Pozzolan shall be Type F in accordance with the requirements of ASTM C618 and shall be added to improve the flowability.

D. Aggregate

1. Aggregate shall conform to ASTM C33. Coarse aggregate shall consist of a well-graded mixture of crushed rock, or sand with a maximum size aggregate of 3/8 inch. One hundred percent shall pass the 1/2-inch sieve. Not more than 30 percent shall be retained by the 3/8-inch sieve and not more than 12 percent shall pass the number 200 sieve. All material shall be free from organic matter and not contain more alkali, sulfates, or salts than the native materials at the site Work.

E. Water

1. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts, and other impurities.

F. Admixtures

1. An air-entraining admixture may be added to improve the workability and shall be in accordance with the requirements of ASTM C260.
2. A water reducing agent may be added to improve the workability and shall be in accordance with the requirements of ASTM C494.

2.3 COMPRESSIVE STRENGTH

- A. The minimum 28-day compressive strength shall be 50-psi.
- B. The maximum 28-day compressive strength shall be 150-psi.
- C. The minimum 12-hour compressive strength shall be 20-psi.

PART 3 EXECUTION

3.1 PLACING

- A. CLSM shall be used where indicated on the drawings.
- B. Deliver CLSM in place by means of tailgate discharge, conveyor belts, pumped in place, or by other means acceptable to the ENGINEER.
- C. Consolidate CLSM to ensure no voids. Care shall be taken to avoid over consolidation of the material separating the large and fine aggregate and to prevent flotation of piping, utilities, etc.

- D. Continuously place CLSM against fresh material unless otherwise approved by the Engineer. Where new CLSM must be placed against existing CLSM, the placement shall be clean of all loose material. No standing water will be allowed before starting placement of fresh CLSM.

3.2 FINISHING

- A. The finish surface of CLSM shall be smooth and graded to prevent water from ponding. Finish by wood float, steel trowel, or other similar methods is not required.

3.3 PROTECTING CLSM

- A. CLSM shall be protected from running water, rain, freezing or other conditions that could damage the material until the material has been accepted and final fill complete.

3.4 TRENCH BACKFILL

- A. Based upon the mix design submitted by the Contractor, the ENGINEER shall determine the minimum initial set time. No backfill shall be placed during the initial set time.
- B. No equipment or machinery shall be allowed on the CLSM until the surface of the CLSM is able to withstand a 20 psi load without displacement or damage. If necessary, provide steel trench plates that span the excavation until the CLSM has reached the required strength.

3.5 FIELD TESTING

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample and test CLSM.
- B. Sample CLSM in accordance with ASTM C94 or C685. At a minimum, make and cure test specimens from each 150 cubic yards or fraction thereof for each day's placement. Tests shall include four compressive strength cylinders. Compressive strength testing shall conform with ASTM D4832 with one sample tested at 12-hours, two samples at 28 days, and one held at from each batch.

END OF SECTION

SECTION 32 11 23**AGGREGATE BASE COURSES****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Aggregate base.
 - 2. Aggregate base surfacing.

- B. Related Sections include but are not necessarily limited to:
 - 1. Section 31 11 00 – Site Clearing, Stripping and Grubbing
 - 2. Section 31 23 00 – Earthwork.
 - 3. Section 31 23 16 – Trenching Backfilling and Compaction.
 - 4. Section 32 12 16 – Asphalt Paving.

- C. Measurement and Payment:
 - 1. The contract lump sum price shall include full compensation for all costs and work involved with furnishing and placing aggregates base courses.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - 2. D2167 – Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 3. D2922 – Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 4. D2940 – Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
 - 5. D3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 - 6. D1557 – Test Methods for Moisture – Density relations of soils and soil-aggregate mixtures, using 10-pound rammer and 18-inch drop.

- B. Caltrans Test Methods:
 - 1. 216 – Relative Compaction of Untreated and Treated Soils and Aggregates.
 - 2. 217 – Method of Test for Sand Equivalent.
 - 3. 229 – Method Test for Durability Index.
 - 4. 301 – Method Test for R-value Stabilometer.

- C. Caltrans Standard Specifications:
 - 1. Caltrans Standard Specification, Section 26 “Aggregate Base.”

1.3 SUBMITTALS

- A. See Section 01 33 00 – Submittal Procedures for general submittal requirements and content.
- B. Product Data:
 - 1. Submit data for herbicide.
- C. Materials Source: Submit name of aggregate materials suppliers.
- D. Manufacturer's Certificate: Certify Products meet or exceeds Caltrans Standards, Section 25

1.4 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work in accordance with Caltrans standard, Section 25.
- C. Maintain one copy of each document on site.

PART 2 PRODUCTS

2.1 AGGREGATE MATERIALS

- A. Aggregate Base: Provide ¾" Class II Aggregate Base in accordance with Section 26 of the Caltrans Standard Specification. Material shall be free from organic matter and other deleterious substances, capable of being compacted to form a firm, stable base; conforming to the following grading and quality requirements:

Aggregate Grading Requirements	
Sieve Size	Percentage Passing by Weight
1 inch	100
¾ inch	90 – 100
No. 4	35 – 60
No. 30	10 – 30
No. 200	2 – 9

Quality Requirements	
Tests	Requirement
Resistance (R-value) (CTM 301)	78 min.
Sand Equivalent (CTM 217)	22 min.
Durability Index (CTM 229)	35 min.

- B. Herbicide: Commercial grade guaranteed for at least six months of performance.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify compacted substrate is dry and ready to support paving and imposed loads.
- C. Verify substrate has been inspected, gradients and elevations are correct.

3.2 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

- A. Spread aggregate over prepared substrate.
- B. Place aggregate equal thickness layers to total compacted thickness indicated on Drawings.
 - 1. Maximum Layer Compacted Thickness: 8-inches.
 - 2. Minimum Layer Compacted Thickness: 4-inches.
 - 3. Aggregate Base Surfacing Compacted Thickness: 3-inches
- C. Roller compact aggregate to 95 percent maximum density as determined from test strip, in accordance with ASTM D2940.
- D. Level and contour surfaces to elevations, profiles, and gradients indicated.
- E. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.
- F. Maintain optimum moisture content of fill materials to attain specified compaction density.
- G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

- A. Maximum Variation From Flat Surface: ¼-inch measured with 10-foot straight edge.
- B. Maximum Variation From Thickness: ¼-inch.
- C. Maximum Variation From Elevation: ½-inch.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Owner will engage a qualified independent testing and inspecting agency to field tests and inspections. Compaction testing will be performed in accordance with California Test Method 216 or alternative approved by Owner.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Tests: One test for every 1,000 square yards of each layer compacted aggregate.

3.6 SCHEDULES

- A. Asphalt Paving Base Course: 4-inches thick placed in a single layer.
- B. Aggregate Base Surfacing: 3-inches thick placed in single layer.

END OF SECTION

SECTION 32 12 16**ASPHALT PAVING, STRIPING, AND MARKINGS****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Asphalt paving.
 - 2. Striping and markings.

- B. Related Sections include but are not necessarily limited to:
 - 1. Supplementary Conditions.
 - 2. Section 01 50 00 – Temporary Facilities and Controls
 - 3. Section 32 11 23 – Aggregate Base Courses: Compacted base for paving.
 - 4. Section 33 05 13 – Manholes and Structures: Manholes Drains and including frames.

- C. Measurement and Payment:
 - 1. The contract lump sum price shall include full compensation for all costs and work involved with furnishing and place asphalt paving, striping and markings.

1.2 REFERENCE STANDARDS

- A. Any requirement of these Specifications shall in no way invalidate the minimum requirements of the referenced standards.
 - 1. Caltrans Standard Specifications, State of California Department of Transportation (Caltrans), 2010, Section 39 "Asphalt Concrete," Section 92 "Asphalts: and Section 94 "Asphaltic Emulsions."

- B. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M17 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
 - 2. AASHTO M29 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
 - 3. AASHTO M140 - Standard Specification for Emulsified Asphalt.
 - 4. AASHTO M208 - Standard Specification for Cationic Emulsified Asphalt.
 - 5. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
 - 6. AASHTO M320 - Standard Specification for Performance-Graded Asphalt Binder.
 - 7. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
 - 8. AASHTO MP1a - Standard Specification for Performance-Graded Asphalt Binder.

- C. Asphalt Institute:
 - 1. MS-2 – Mix Design Methods for Asphalt Concrete and Other Hot- Mix Types.
 - 2. MS-19 – Basic Asphalt Emulsion Manual.

3. SP-2 – Superpave Mix Design.

D. ASTM International (ASTM):

1. C1371-2004a – Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
2. C1549-2004 – Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
3. D242 – Standard Specification for Mineral Filler For Bituminous Paving Mixtures.
4. D692 – Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.
5. D946 – Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
6. D977 – Standard Specification for Emulsified Asphalt.
7. D1073 – Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
8. D1188 – Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
9. D2027 – Standard Specification for Cutback Asphalt (Medium-Curing Type).
10. D2397 – Standard Specification for Cationic Emulsified Asphalt.
11. D2726 – Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
12. D2950 – Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.
13. D3381 – Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
14. D3515 – Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
15. D3549 – Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
16. D3910 – Standard Practices for Design, Testing, and Construction of Slurry Seal.
17. D6690 – Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
18. E408-1971(1996)e1 – Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
19. E903-1996 – Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
20. E1918-1997 – Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
21. E1980-2001 – Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

1.3 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures for general submittal requirements and content.
- B. Product Data:
 1. Submit product information for asphalt and aggregate materials.

- a. Fog Seal Coat: Submit a 1/2 gallon sample of Asphaltic emulsion for fog seal coats in a plastic container. Take the sample from the distributor truck spray bar at mid-load.
2. Submit mix design with laboratory test results supporting design.
 - a. See Supplementary Conditions for requirements.
- C. Quality Assurance/Control:
 1. Certificates: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Obtain materials from same source throughout.
- B. Perform Work in accordance with CalTrans Standard Specifications.
- C. Maintain one copy copies of each document on site.
- D. Qualifications:
 1. Installer: Company specializing in performing work of this section with minimum 5-years documented experience approved by manufacturer.

1.5 PROJECT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.
- B. Do not place asphalt mixture when ambient air or base surface temperature is less than 50 °F, or surface is wet or frozen.
- C. Weather Limitations: Operations shall be suspended when in the opinion of the ENGINEER Representative, satisfactory results cannot be achieved. In no such case shall the City be liable for additional costs. Placement of material shall comply with the requirements of Section 39-6 "Spreading and Compacting" from the Standard Specifications.
- D. Dust Control: Use all means necessary to prevent the spread of dust during performance of the work of this Section. Thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of other work on the job site.
- E. Protection: Use all means necessary to protect pavement products before, during, and after installation, and to protect the installed work and products of all other trades. Adjacent concrete walks, curbs, aprons, and similar improvements shall be covered as required.
- F. Replacements: In the event of damage, immediately make all repairs and replacements necessary, to the approval of the ENGINEER, and at no additional cost to the City.

- G. Transport asphalt concrete mixtures from the mixing plant to the project site in trucks having tight, clean compartments. Provide covers over asphalt cement mixture when delivering to protect the mixture from weather and to prevent loss of heat. During period of cool weather or for long-distance deliveries, provide insulation around entire truck bed surfaces.

PART 2 PRODUCTS

2.1 DESIGN CRITERIA

- A. Paving: Design for movement of trucks up to 60,000-lbs.

2.2 MATERIALS

- A. Asphalt Binder: Provide asphalt binder in accordance with Grade PG 64-10 performance grade asphalt, as described in Section 92, Caltrans Standard Specifications.
- B. Asphalt Concrete: Use Type A, per Section 39, Caltrans Specifications.
 - 1. Provide $\frac{3}{4}$ -inch maximum aggregate, coarse grading, as defined in Section 39, Caltrans Specifications.
 - 2. The final thickness for new sections shall be 3-inches of AC using $\frac{3}{4}$ -inch aggregate (except where otherwise specified on the Plans). The completed surfacing shall conform in all respects with the existing lines, grades, and dimensions. The pavement grades at the edge of gutter shall be $\frac{1}{8}$ -inch to $\frac{1}{4}$ -inch above the concrete.
- C. Primer: Use SS-1 or SS1h, per Section 94, Caltrans Specifications, on vertical surfaces of asphalt concrete and Portland cement concrete against which additional asphalt concrete material is to be placed. It shall be spread at the rate of 0.05-gallons of emulsion per square yard.
- D. Tack Coat: Provide a paint binder (tack coat) of asphaltic emulsion to all vertical surfaces of existing pavement, curbs, aprons, and construction joints in the surfacing against which additional material is to be placed, to existing pavement surfaces to be topped, and to other surfaces designated by the ENGINEER, as provided in Sections 39 and 94 of the Caltrans Specifications. Furnish and apply a uniform tack coat between successive layers of asphaltic concrete.
- E. Thermoplastic material and glass beads: Comply with Section 28 of the City of Fresno Standard Specifications.
- F. Pavement Markings: Comply with Section 28 of the City of Fresno Standard Specifications.
- G. Pavement Striping: Comply with Section 28 of the City of Fresno Standard Specifications.

H. Aggregate Base: Aggregate Base shall conform to Section 32 11 23 – Aggregate Base Courses.

I. Sealant: Fog Seal coat include applying slow-setting Asphaltic emulsion.

2.3 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.

B. Submit proposed mix design of each class of mix for review prior to beginning of Work.

C. Test samples in accordance with Caltrans Standards.

PART 3 EXECUTION

3.1 PREPARATION

A. Prepare aggregate base in accordance with Caltrans standards, Section 26.

3.2 INSTALLATION

A. Construct to line, grade, and section as shown on Drawings and in accordance with referenced State Specifications.

B. Primer:

1. Apply primer on aggregate base at uniform rate of 1/2-gal/sq yd.
2. Use clean sand to blot excess primer.

C. Tack Coat:

1. Apply tack coat on asphalt and concrete surfaces over subgrade surface at uniform rate.
 - a. New Surfaces: 1/2-gal/sq yd.
 - b. Existing Surfaces: 1/2-gal/sq yd.
2. Apply tack coat to contact surfaces of curbs, gutters and walkways.
3. Coat surfaces of manhole catch basin frames with oil to prevent bond with asphalt paving.

D. Single Course Asphalt Paving:

1. Install Work in accordance with Caltrans standards.
2. Place asphalt within 24 hours of applying primer or tack coat.
3. Place asphalt wearing course to 2-inch compacted thickness identified in schedule at end of section thickness indicated on Drawings.
4. Compact paving by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
5. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

- E. Double Course Asphalt Paving:
 - 1. Place asphalt binder course within 24 hours of applying primer or tack coat.
 - 2. Place binder course to 2-inch compacted thickness identified in schedule at end of section thickness indicated on Drawings.
 - 3. Place wearing course within 24 hours of placing and compacting binder course. When binder course is placed more than 24 hours before placing wearing course, clean surface and apply tack coat before placing wearing course.
 - 4. Place wearing course to inch compacted thickness identified in schedule at end of section thickness indicated on Drawings.
 - 5. Compact each course by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
 - 6. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

- F. Asphaltic Emulsion for Fog Seal Coat
 - 1. Apply asphaltic emulsion for fog seal coat at a residual asphalt rate from 0.02 to 0.06-gal/sq yd. Apply fog seal coat when the ambient air temperature is above 40 °F. Sprinkle water on fog seal coat that becomes tacky. If fog seal coat and seal coat with screenings are specified on the same project, apply fog seal coat at least 4 days before applying the adjoining seal coat with screenings. The joint between the seal coats must be neat and uniform.

- G. Replace in kind existing striping and markings and those damaged from construction activities.

3.3 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Flatness: Maximum variation of ¼-inch measured with 10-foot straight edge.
- C. Scheduled Compacted Thickness: Within ¼-inch.
- D. Variation from Indicated Elevation: Within ½-inch.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests including mat density tests in accordance with Caltrans standards.
- B. Asphalt Paving Mix Temperature: Measure temperature at time of placement.
- C. Asphalt Paving Thickness: ASTM D3549; test one core sample from every 1,000 square yards compacted paving.

3.5 PROTECTION

- A. Immediately after placement, protect paving from mechanical injury for four hours or until surface temperature is less than 140 °F.

END OF SECTION

SECTION 32 16 13**SIDEWALKS, CURBS, GUTTERS, AND DRIVEWAYS****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Sidewalks, Curbs, Gutters, and Driveways
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 31 23 00 – Earthwork.
 - 2. Section 31 23 16 – Trenching Backfilling and Compaction.
- C. Measurement and Payment:
 - 1. The contract lump sum price shall include full compensation for all costs and work involved to construct or repair sidewalks, curbs, gutters, and driveways.

1.2 REFERENCES

- A. City of Fresno Standards Specifications and Drawings.
- B. California Test Method 301 – Method Test for R-value Stabil-o-meter.
- C. Caltrans' Standard Specifications Section 73 "Concrete Curbs and Sidewalks."

1.3 DESCRIPTION:

- A. Work includes all labor, materials, and equipment to furnish, place, finish and cure concrete sidewalks, curbs gutters, and driveways in accordance with these Standard Specifications, the Engineering Improvement Standards, and Sections 52 and 73 of the State of California Standard Specifications.
- B. Tolerances:
 - 1. Construct concrete surfaces within ¼-inch of the indicated elevation and deviating not more than 1/8-inch from a 10-foot straightedge placed anywhere on the surface.
 - 2. Slab tolerances shall be "straightedge tolerance" as specified in ACI 117.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures for general submittal requirements and content.
- B. Product Data:
 - 1. Submit data for Concrete Mix.
 - 2. Submit drawings that indicate the section profile of curb and gutter, and the locations of joints in concrete, including construction joints, expansion joints, isolation joints, and contraction joints.

3. Submit drawings of extruded curbs and gutters, if proposed, and any modification of the indicated section profile required by the extrusion process.
4. Submit drawings of reinforcing steel, tie bars, and connecting dowels.

1.5 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work in accordance with Caltrans standard, Section 73.
- C. Maintain one copy of each document on site.

PART 2 PRODUCTS

2.1 Portland Cement: Concrete shall be composed of Portland Cement, fine aggregate, coarse aggregate and water, portioned and mixed as specified for "Type II Modified" Portland Cement and mineral admixtures, per Section 90 of the 2010 State of California Standard Specifications.

- A. Class 2: Concrete shall contain five hundred ninety pounds (590-lbs) of Portland Cement per cubic yard with one inch (1") aggregate. Five inch (5") maximum slump. Three thousand pounds per square inch (3,000-psi) at twenty-eight (28) days for design purpose only.
- B. Class 3: Concrete shall contain five hundred and five pounds (505-lbs) of Portland Cement per cubic yard with one inch (1") aggregate. Four inch (4") maximum slump. Twenty-eight hundred pounds per square inch (2,800-psi) at twenty-eight (28) days for design purpose only.
- C. The Class and minimum compressive strength of concrete shall be Class 3 or as required in the Standard Specifications for the items of work requiring Portland Cement Concrete.

2.2 MATERIALS

- A. The materials for manufacturing Portland Cement Concrete shall conform to the following requirements:
- B. Arrange with the manufacturer of ready mixed concrete to provide adequate facilities to assure that cement meeting the requirements specified herein will be kept separate from other cement in order to prevent any but specified cement from entering the work.
- C. All cement not conforming to the Standard Specifications and all cement contaminated shall be removed immediately and not used in the work.

2.3 WATER

- A. In conventionally reinforced concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than

1,000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, nor more than 1,300 parts per million of sulfates as SO₄, when tested in conformance with California Test 417.

- B. In non-reinforced concrete work, the water for curing, for washing aggregates and for mixing shall be free from oil and shall not contain more than 2,000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, or more than 1,500 parts per million of sulfates as SO₄, when tested in conformance with California Test 417.
- C. In addition to the above provisions, water for curing concrete shall not contain impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.
- D. Water reclaimed from mixer wash-out operations may be used in mixing concrete. The water shall not contain coloring agents or more than 300 parts per million of alkalis (Na₂O + 0.658 K₂O) as determined on the filtrate. The specific gravity of the water shall not exceed 1.03 and shall not vary more than ±0.010 during a day's operations.

2.4 COARSE AGGREGATE

- A. Coarse aggregate shall consist of gravel, crushed gravel, crushed rock, or combination thereof. It shall be free from deleterious coatings, roots, barks, sticks, rags and other extraneous materials.
- B. Regardless of source, all coarse aggregate shall be thoroughly and uniformly washed before delivery to the work.
- C. Coarse aggregate, when sampled at the batching bin, shall have a cleanness value of not less than eighty-two (82) when subjected to the cleanness test performed in accordance with Test Method No. California 227.
- D. Coarse aggregates shall be furnished in the sizes determined in accordance with ASTM C136, as shown in Section 90-3.02 of the Standard Specifications.
- E. The maximum size of coarse aggregate shall be as required in these Standard Specifications for the items of work requiring Portland Cement Concrete.
- F. Coarse aggregate, when tested for soundness by the sodium sulphate test, ASTM C88, or CA Test Z14, shall lose not more than ten percent (10%) by weight after five (5) cycles.

2.5 FINE AGGREGATES

- A. Fine aggregate shall be natural sand, well graded manufactured sand produced from larger aggregate, or a combination of natural and manufactured sand. The aggregate shall be of such character that makes possible the production of a workable concrete within the limits of water content provided in Section 10.05 of the Standard

Specifications. It shall be free from deleterious coatings, roots, barks, sticks, rags, and other extraneous material.

- B. When testing in accordance with the test method of ASTM C40, fine aggregate shall not indicate a color darker than the reference standard color solution unless it is determined by the Engineer that a darker color is acceptable.
- C. Fine aggregate shall also comply with the requirements of Section 2-2.02B of the Standard Specifications.
- D. Fine aggregate shall be well graded and shall range in size uniformly within the limits of Section 90-3.03 of the Standard Specifications when tested in accordance with ASTM C136.

2.6 EXISTING CURBS, GUTTERS, AND VALLEY GUTTERS

- A. Where the approved Construction Drawings provide for the reconstruction of a portion of an existing curb, gutter, valley gutter, or sidewalks, the existing section shall be cut to a minimum depth of one and one-half inches (1½") with an abrasive type saw at the line shown in the approved Construction Drawings or as determined by the Engineer, and the entire section to be reconstructed shall be removed. Saw cuts shall also be of sufficient depth to leave an even, straight line. The new curb, gutter, valley gutter, sidewalk or mow strip shall join the original at this line with a two-inch by two-inch (2" x 2") shovel footing under the existing concrete structure or doweled as directed by the Engineer. Full compensation for the removal and disposal of existing concrete improvements shall be included in price bid.

2.7 CONSTRUCTION OF CONCRETE IMPROVEMENTS

- A. Curbs, gutters and cross gutters conform to Section 73 of the State of California Standard Specifications, the City of Fresno Engineering Improvement Standards, and these Specifications.
- B. Extruded curb and gutter shall be constructed with Class 3 concrete.
- C. Sidewalk drain per City of Fresno standard "P-23"

2.8 READY-MIXED CONCRETE

- A. Ready mixed concrete shall be delivered to the job site of the work and discharge shall be completed within one and one-half (1½) hours after the addition of the cement to the aggregates or before the drum has been revolved two hundred fifty (250) revolutions, whichever comes first. In hot weather or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall be less than one and one-half (1½) hours, as directed by the Engineer, except that concrete shall not be discharged once the temperature of the concrete has reached eighty-five degrees Fahrenheit (85 °F).
- B. Should water be added at the job site, the drum shall be revolved a minimum of twenty-five (25) revolutions after the introduction of such water.

- C. The maximum size of coarse aggregate shall be as required in these Standard Specifications for the items of work requiring Portland Cement Concrete.

2.9 ADMIXTURES

- A. No admixture shall be used without written permission from the Engineer or unless elsewhere provided for in these Standard Specifications or in the Special Provisions.
- B. Calcium Chloride: When the use of calcium chloride is permitted or is specified in the Special Provisions, the calcium chloride shall conform to the specifications of ASTM D98.
- C. Air-Entraining Agent: When the use of an air-entraining agent is permitted, or is specified in the Special Provisions, it shall be added at the rate designated by the Engineer to result in an air content of five percent (5%) + or – 1.5% by volume in the freshly mixed concrete.

2.10 WATER REDUCING ADMIXTURE

- A. Type A or F, water-reducing; Type B, retarding; or Type D or G, water-reducing and retarding admixtures as described in ASTM C494 may be used to conserve cementitious material or to facilitate any concrete construction application subject to the following conditions:
 - 1. When a water-reducing admixture or a water-reducing and retarding admixture is used, the cementitious material content specified or ordered may be reduced by a maximum of 5 percent by weight, except that the resultant cementitious material content shall be not less than 505 pounds per cubic yard.
 - 2. When a reduction in cementitious material content is made, the dosage of admixture used shall be the dosage used in determining approval of the admixture.
- B. Unless otherwise specified, a Type C accelerating chemical admixture conforming to the requirements of ASTM C494, may be used in Portland cement concrete. Inclusion in the mix design submitted for approval will not be required provided that the admixture is added to counteract changing conditions that contribute to delayed setting of the Portland cement concrete, and the use or change in dosage of the admixture is approved in writing by the Engineer.

2.11 AMOUNT OF WATER AND SLUMP TEST

- A. The amount of water required for the proper consistency of concrete shall be determined by means of the Slump Test made in accordance with the Standard Method of Slump Test for Consistency of Portland Cement Concrete of the AASHTO Serial Designation: T-1 19-42 with subsequent amendments.
- B. The amount of slump shall be twelve inches (12") minus the height after subsidence. The allowance for slump shall be as follows:
 - 1. Cast-in-place pipe and concrete paving - not more than three inches (3").
 - 2. All concrete structures - not more than three inches (3").
 - 3. Concrete curbs and gutters - not more than five inches (5").

- C. The amount of water used shall not exceed six and one-half gallons (6½ gal.) including moisture in the aggregate, per sack of cement for Class 2 concrete, and seven gallons (7-gal.) per sack of cement for Class 3 concrete.

2.12 PROTECTING CONCRETE

- A. Concrete for structures shall not be placed on frozen ground nor shall it be mixed or placed while the atmospheric temperature is below thirty-five degrees Fahrenheit (35 °F), unless adequate means are employed to heat the aggregates and water, and satisfactory provisions have been made for protecting the work. Provisions satisfactory to the Engineer shall be taken to protect concrete about to be poured when there is danger of temperature dropping below thirty-five degrees Fahrenheit (35 °F) within the next twenty-four (24) hours. Concrete damaged by frost action shall be replaced at no additional cost to the OWNER. Concrete shall not be placed when the atmospheric temperature in the shade in the vicinity of the work exceeds ninety-five degrees Fahrenheit (95 °F), or when the temperature of the concrete exceeds eight-five degrees Fahrenheit (85 °F).
- B. Structure concrete and shotcrete used as structure concrete shall be maintained at a temperature of not less than 45 °F for 72-hours after placing and at not less than 40 °F for an additional 4 days. When required by the Engineer, the CONTRACTOR shall submit a written outline of the proposed methods for protecting the concrete.
- C. All surfaces against which concrete is to be placed shall be free from standing water, mud, debris, and shall be firm enough to prevent contamination of the concrete by earth or other foreign material.
- D. Absorptive surfaces against which concrete is to be placed shall be moistened thoroughly so that moisture will not be drawn from the freshly placed concrete.

2.13 FORMS

- A. Forms shall be smooth, mortar tight, true to the required lines and grades, and of sufficient strength to resist springing out of shape during the placing of the concrete. All dirt, chips, sawdust, nails, and other foreign matter shall be completely removed from the forms before any concrete is deposited therein. Forms previously used shall be thoroughly cleaned of all dirt, mortar, and foreign matter before being reused. Before concrete is placed in forms, all surfaces against which the concrete will be placed shall be thoroughly coated with form oil.
- B. Prior to placing concrete, check all forms for alignment and grade. Forms, reinforcing steel, or earth surfaces to receive concrete shall be wet prior to concrete placement.

2.14 CURING CONCRETE

- A. When maximum daytime temperature exceeds fifty degrees Fahrenheit (50 °F) all newly placed concrete shall be sprayed uniformly with a curing compound. Curing compound shall be applied at a nominal rate of one gallon per one hundred fifty square feet (1 gal/150 ft²), unless otherwise specified. Immediately after finishing, the exposed exterior surfaces of the concrete shall be cured by either the water method,

pigmented curing compound method, or the waterproof membrane method, in accordance with Section 90-7, "Curing Concrete" of the State of California Standard Specifications, except for cast-in-place concrete pipe for which only the waterproof membrane method shall be used as provided in Section 17-05.i of the Standard Specifications.

2.15 VIBRATOR

- A. Whenever a structure requiring reinforcement is to be constructed, provide one (1) or more portable vibrating machines to be used on such structures as directed by the Engineer. Full compensation for providing vibrating machines shall be considered as being included in the price bid.

2.16 CEMENT MORTAR

- A. Cement mortar shall be composed of one (1) part Portland Cement and two (2) parts of clean, well-graded sand of such a size that it will pass a number eight (#8) sieve. An admixture of hydrated lime, fire clay or diatomaceous earth may be used in the mortar to facilitate workability, and the amount of such material used will be limited as ordered by the Engineer. Quick setting cement may be used when necessary to facilitate the early backfilling of trench.
- B. No mortar shall be used in which water has been added to the dry ingredients for a period of over thirty (30) minutes.

2.17 CEMENT REQUIREMENTS

- A. Concrete compressive strength requirements shall be the minimum strength at the age of twenty-eight (28) days as required in these Standard Specifications for the items of work requiring Portland Cement Concrete. The compressive strength of concrete will be determined from test cylinders which have been fabricated from concrete sampled and made in accordance with the Standard Specifications and with ASTM C31. Cylinders shall be tested in accordance with ASTM C39. Should the concrete used in the work fail to meet the minimum strength requirements as specified for the items of work, the Contractor shall, at his expense, make corrective changes in the material mix proportions or in the concrete fabrication procedures, before placing additional concrete.
- B. In addition to the aforementioned requirements, all such concrete represented by test cylinders which indicate strength of less than the specified strength for the item of work will be rejected in accordance with the provisions of Section 6.04, "Defective Materials" of the Standard Specifications. Such rejection shall prevail unless the Contractor, at his expense, obtains and submits evidence of a type acceptable to the Engineer that the strength and quality of the concrete placed in the work are acceptable, or undertakes remedial action to correct the deficiency in a manner acceptable to the Engineer.

PART 3 EXECUTION

3.1 PREPARATION OF SUBGRADE

- A. Excavate for and prepare the sub grade as specified in Section 31 23 00 - Earthwork, true to the indicated grade and cross section.
- B. Test completed sub grade for correct grade and cross section by means of template supported on side forms.
- C. Dampen sub grade and forms just before placing concrete.

3.2 TYPES OF CONSTRUCTION

- A. Provide cast-in-place concrete construction, plain or reinforced as indicated. Curbs and gutters shall be formed accurately to indicate section profile with template screed.
- B. Extruded curbs and gutter, placed by an extrusion machine, may be provided where site conditions are suitable, and the extrusion process is appropriate for the purpose.
- C. Sidewalk drain per City of Fresno standard "P-23"

3.3 JOINTS

- A. Expansion Joints:
 - 1. Construct 3/8-inch to 1/2-inch thick expansion joints in the following locations:
 - a. In curb and combination curb and gutter at the locations of expansion joints in the concrete roadway.
 - b. In curb or combination curb and gutter, at points where curved and tangent sections join.
 - c. Between curb or combination curb and gutter, and any drain inlet or similar structure occurring within the limits of the curb or combination curb and gutter.
 - d. At corners in sidewalks, following the projections of the building lines from the corner of the building to the curb.
 - e. Between sidewalks and any permanent structure.
 - f. Between sidewalk and curb.
 - g. Through sidewalks at intervals not greater than 15-feet.
 - h. Construct expansion joints as specified in the construction plans, except that load transfer devices will not be required unless indicated. Shape preformed filler to cross section of curbs and combination curb and gutter.
- B. Contraction Joints: In sidewalks, provide contraction joints as indicated in uniform intervals not greater than 6 feet, with the edges rounded to a 1/4-inch to 3/8-inch radius.
- C. Tooling: Finish joints with an edging tool having 1/4-inch to 3/8-inch radius, leaving joints free of mortar and concrete. In preformed type joints, leave joint filler material exposed for full length of joint with clean and true edges.

D. Joint Sealing:

1. Seal to within 1/8-inch of pavement surface joints in curbs and gutters, including gutter surfaces of combination curb and gutter sections; all joints between curbs and vehicular pavement; all joints between gutters and vehicular pavement; and all other expansion joints.
2. Do not seal joints until concrete curing is complete. Prior to installation of the joint sealing compound, clean the joints of dirt and other foreign material. Joints may be cleaned with compressed air jets provided that the air in such jets is free of oil or water. Do not fill joints when there is any free water in or adjacent to the joints. Joint walls and all surfaces to which the sealing material is to adhere shall be surface dry for at least three hours prior to sealing.
3. Apply with approved pressurized equipment. Perform sealing of joints to make them impervious to water and to prevent the sealing compound from spreading over the surface of the pavement.

E. Form Removal:

1. Remove front curb forms not less than two or more than six hours after placing concrete, but in no case while the concrete is still plastic enough to slump.
2. Remove other forms not less than twelve hours after finishing is completed.

3.4 FINISHING**A. General:**

1. Keep the curb face wet during above finishing operations.
2. Allow no coarse aggregate to show on the finished curb surface.

B. Curb and Combination Curb and Gutter:

1. Trowel the face of curb smooth to a depth of not less than 2-inches below the flow line, or to the flow line of integral curb and gutter, and finish with a steel trowel, all immediately after removal of front curb forms.
2. Finish all curb edges with a radius of 1/2-inch.
3. Provide a final fine brush finish to both top and face of curb with brush strokes parallel to the line of the curb, so that both top and front face present the same uniform appearance.

C. Ramps and Driveways:

- a. For pedestrian and wheelchair ramps, and all other surfaces where the Contract Drawings require a non-slip finish, provide a "nonslip finish" in combination with a "floated finish" or "broom finish" in accordance with the requirements of ACI 301.
- b. Broom finish shall be applied perpendicular to the direction of traffic flow.
- c. Finish all edges with a radius of 1/4-inch to 3/8-inch.

3.5 CURING AND PROTECTION

- A. Comply with the applicable requirements of the Caltrans' Standards, for curing concrete with liquid membrane-forming curing compound. Do not permit traffic on new concrete pavement until the concrete has cured a minimum period of ten days.

- B. Provide damp curing only, in accordance with Caltrans' Standards, for concrete slab surfaces indicated to be treated with concrete hardener and dust proofer.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform inspections and tests as specified in Caltrans' Standards for Portland Cement Concrete.

END OF SECTION

SECTION 32 31 13**CHAINLINK FENCES AND GATES****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Chain link fence, gates, and accessories.
 2. See City of Fresno Standard Detail P-98 for additional information.
- B. Measurement and Payment:
1. The contract lump sum price shall include full compensation for all costs and work involved with furnishing and installing chain link fences and gates.

1.2 REFERENCES

- A. ASTM International (ASTM):
1. A121 – Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
 2. A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 3. A153/A153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 4. A392 – Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 5. A491 – Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric.
 6. A817 – Standard Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcellled Tension Wire.
 7. A1011/A1011M-07 – 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
 8. B429/B429M – Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
 9. C94/C94M – Standard Specification for Ready-Mixed Concrete.
 10. F552 – Standard Terminology relating to Chain Link Fencing.
 11. F567 – Practice for Installation of Chain-Link Fence.
 12. F626 – Standard Specification for Fence Fittings.
 13. F668 – Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric.
 14. F900 – Standard Specification for Industrial and Commercial Swing Gates.
 15. F934 – Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.
 16. F1043 – Standard Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
 17. F1083 – Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
 18. F1183 – Standard Specification for Aluminum Alloy Chain Link Fence Fabric.
 19. F1184 – Standard Specification for Industrial and Commercial Horizontal Slide Gates.

20. F1345 – Standard Specification for Zinc - 5% Aluminum -Mischmetal Alloy-Coated Steel Chain-Link Fence Fabric.

- B. Chain Link Fence Manufacturers Institute:
1. CLFMI – Product Manual.

1.3 SYSTEM DESCRIPTION

- A. Fence Height: as indicated on Drawings.
B. Line Post Spacing: At intervals not exceeding 10-feet.
C. Fence Post and Rail Strength: Conform to ASTM F1043 Heavy Industrial quality.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures for general submittal requirements and content.
B. Product Data:
1. Acknowledgement that products submitted meet requirements of standards referenced.
2. Submit data on fabric, posts, accessories, fittings and hardware.
C. Shop Drawings:
1. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
D. Samples:
1. Submit two-inch samples of wrought iron fence, fence fabric, slat infill, inch in size illustrating construction and colored finish.
E. Quality Assurance/ Control:
1. Manufacturer's Installation Instructions: Submit installation requirements, post foundation anchor bolt templates, and.
F. Closeout Submittals:
1. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
2. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.
3. Operation and Maintenance Data: Procedures for submittals.

1.5 QUALITY ASSURANCE

- A. Supply material in accordance with CLFMI - Product Manual.
B. Perform installation in accordance with ASTM F567.
C. Perform Work in accordance with City of Fresno standard.

- D. Maintain one copy copies of each document on site.
- E. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
 - 2. Installer: Company specializing in performing work of this section with minimum 3-years documented experience approved by manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

- A. See Section 01 65 00 – Delivery, Storage, and Handling for general requirements.
- B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.
- C. Identify each package with manufacturer's name.
- D. Store wrought iron, fence fabric and accessories in secure and dry place.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Chain Link Fence and Accessories:
 - a. Master Halco.
 - b. TFC, Torres Fence Co, Fresno, CA
 - c. Or approved equal.

2.2 MATERIALS AND COMPONENTS

- A. Materials and Components: Conform to CLFMI Product Manual.
- B. Fabric Size: CLFMI Heavy Industrial.
- C. Intermediate Posts: Type I round.
- D. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round. I square II round.

2.3 MATERIALS

- A. Framing (Steel): ASTM F1083 Schedule-80 galvanized steel pipe, welded construction, minimum yield strength of 25-ksi; coating conforming to ASTM F1043 Type A on pipe exterior and interior.
- B. Fabric Wire (Steel): ASTM A392 Class 1 zinc coated.
- C. Barbed Wire: ASTM A121 Coating Type Z, galvanized steel; 12-gage thick wire, 2-strands, 4 points at 3-inches oc.

- D. Concrete: ASTM C94/C94M, Option A; Normal Sulfate Resisting Portland Cement, 2,500 psi strength at 28-days.

2.4 COMPONENTS

- A. Line Posts: 2 3/8-inch diameter, 3.65 lbs/ft.
- B. Corner and Terminal Posts: 2 7/8 –inch, 5.8 lb/ft.
- C. Gate Posts:
 - 1. 2 7/8-inch for gates up to 5-feet wide.
 - 2. 4-inch for gates 6 to 12-feet wide.
- D. Top and Brace Rail: 1 5/8-inch diameter, plain end, sleeve coupled.
- E. Gate Frame: 1 5/8-inch diameter for welded fittings and truss rod fabrication.
- F. Fabric: 1.75-inch diamond mesh interwoven wire, 9 gage thick, top salvage knuckle end closed, twisted tight, bottom selvage twisted tight. Knuckle end closed.
- G. Tension Wire: 7-gage thick steel, single strand, marcelled, spiraled or crimped, aluminum-coated tension wire conforming to ASTM A824.
- H. Tension Band: 11-gage steel @ 15-inch o.c.
- I. Stretcher: ¼ x ¾-inch thick steel.
- J. Tie Wire: 6-gage aluminum alloy steel wire for fastening fabric to line posts and rails.

2.5 ACCESSORIES

- A. Caps: Cast steel galvanized pressed steel Malleable iron galvanized Aluminum alloy Molded rigid vinyl; sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; galvanized steel.
- C. Extension Arms: Cast steel galvanized or pressed steel, to accommodate 3 strands of barbed wire, single arm, vertical sloped to 45 degrees.
- D. Gate Hardware: Fork latch with gravity drop Center gate stop and drop rod Mechanical keepers; two 180-degree gate hinges for each leaf and hardware for padlock keyed to match hardware specified in Section 08 71 00 – Finish Hardware.

2.6 GATES

- A. General:
 - 1. Gate Types, Opening Widths and Directions of Operation: As indicated on Drawings.
 - 2. Factory assemble gates.

3. Conform to requirements specified for PVC coated steel chain link fence except that PVC coated aluminum alloy framing conforming to ASTM B429/B429M may be used.
4. Design gates for operation by one person.

B. Swing Gates:

1. Fabricate gates to permit 180-degree swing.
2. Gates Construction: ASTM F900 with welded corners. Use of corner fittings is not permitted.

2.7 PRIVACY SLATS

A. Privacy Slats: Extruded polyethylene, with color pigments and ultraviolet inhibitors, color as selected by the City.

1. Slat Profile: Flat tubular shape nominal ¼-inch deep, 0.020-inch wall thickness; width to suit fence fabric.
2. Slat Locking: Self-locking horizontal bottom channel system.

2.8 FINISHES

A. Components and Fabric: Vinyl coating, dark green color in accordance with ASTM F934 as selected over galvanized coating.

B. Vinyl Components: color to match fabric as selected.

C. Hardware: Galvanized to ASTM A153/A153M, 2.0-oz/sq ft coating.

D. Accessories: Same finish as framing fabric.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567.
- B. Set intermediate, terminal, gate, and posts plumb, in concrete footings with top of footing 2-inches above finish grade. Slope top of concrete for water runoff.
- C. Line Post Footing Depth Below Finish Grade ³ -feet.
- D. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ⁴ -feet.
- E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
- F. Install top rail through line post tops and splice with 6-inch long rail sleeves.
- G. Install center and bottom brace rail on corner gate leaves.
- H. Place fabric on outside inside of posts and rails.

- I. Do not stretch fabric until concrete foundation has cured 28-days.
- J. Stretch fabric between terminal posts or at intervals of 100-feet maximum, whichever is less.
- K. Position bottom of fabric 2-inches above finished grade.
- L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15-inches on centers.
- M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- N. Install bottom tension wire strap stretched taut between terminal posts.
- O. Install support arms sloped inward outward and attach barbed wire; tension and secure.
- P. Support gates from gate posts. Do not attach hinged side of gate from building wall.
- Q. Install gate with fabric and barbed wire overhang to match fence. Install three hinges on each gate leaf, latch, catches, drop bolt foot bolts and sockets torsion spring retainer and locking clamp.
- R. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.
- S. Connect to existing fence at existing terminal post new terminal post existing line post converted to terminal post by installation of brace rails and brace rods.
- T. Install posts with 6 inches maximum clear opening from end posts to buildings, fences and other structures.
- U. Excavate holes for posts to diameter and spacing indicated on Drawings without disturbing underlying improvements.
- V. Center and align posts. Place concrete around posts, and vibrate or tamp for consolidation. Verify vertical and top alignment of posts and make necessary corrections.
- W. Extend concrete footings 1-inch above grade, and trowel, forming crown to shed water.
- X. Allow footings to cure minimum 7-days before installing fabric and other materials attached to posts.

3.2 PRIVACY SLATS

- A. Install slat inserts in diagonal pattern woven through fence fabric.
- B. Fasten slats according to manufacturer's instructions.

3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb: 1/4 inch.
- C. Maximum Offset From Indicated Position: 1 inch.
- D. Minimum distance from property line: 6 inches.

3.4 SCHEDULES

- A. Property Perimeter: Dark green fabric, privacy slats.

END OF SECTION

SECTION 32 31 19**WROUGHT IRON FENCES AND GATES****PART 1 GENERAL****1.1 SUMMARY**

- A. The contractor shall provide all labor, materials and appurtenances necessary for installation of the ornamental fence system defined herein.

1.2 RELATED WORK

- A. Division 31 – Earthwork.
- B. Division 03 – Concrete

1.3 SYSTEM DESCRIPTION

- A. The manufacturer shall supply a total Riveted Steel Ornamental Fence system of the Master Halco Monumental Iron Works, Estate Spear, or equal design. The system shall include all components (i.e., pickets, rails, posts, brackets, gates, and hardware) required.

1.4 QUALITY ASSURANCE

- A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.5 REFERENCES**A. ASTM International (ASTM):**

1. A653/A653M – Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM B117 – Practice for Operating Salt-Spray (Fog) Apparatus.
3. ASTM D523 – Test Method for Specular Gloss.
4. ASTM D714 – Test Method for Evaluating Degree of Blistering in Paint.
5. ASTM D822 – Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
6. ASTM D1654 – Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
7. ASTM D2244 – Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
8. ASTM D2794 – Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
9. ASTM D3359 – Test Method for Measuring Adhesion by Tape Test.
10. ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.6 SUBMITTALS

- A. The manufacturer’s submittal package shall be provided prior to installation.

1.7 PRODUCT HANDLING AND STORAGE

- A. Upon receipts at the job site, all materials shall be checked to ensure that no damages occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. The fence system shall conform to Monumental Iron Works, Estate type with pressed point picket design, and 3-Rail, style sold by Master Halco, Inc., Irving Texas or equal. The manufacturer shall supply this total Riveted Ornamental Steel Fence system in compliance with the requirements of ASTM F2408.

2.2 MATERIALS AND COMPONENTS

- A. Steel material for fence framework (i.e. ¾” tubular pickets, rails and posts), shall be galvanized prior to forming in accordance with the requirements of ASTM A653/A653M, with minimum yield strength of 45,000 psi. The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with minimum zinc coating weight of 0.90 oz/ft², Coating Designation G-90 for rails; 0.60 oz/ft², Coating Designation G-60 for pickets and posts.
- B. Material for pickets shall be a minimum of ¾” x 16ga tubing. The cross-sectional shape of the rails shall conform to the manufacturer’s U-channel design with outside cross-section dimensions of 1.375” x 1.5” and a minimum thickness of 11 Ga. Picket holes in the U-channel rail shall be spaced 4.687” on center. Picket channel connection shall be ¼” diameter aluminum drive rivet. Fence posts and gate posts shall meet the minimum size requirements of **Table 1**.

Table 1- Minimum Sizes for Posts

Fence post recommendation chart		
FENCE Posts	Panel Height	
2-1/2" x 16 Ga.	Up to & Including 6' Height	
2-1/2" x 14 Ga	Over 6' Up to & Including 8' Height	
GATE POST RECOMMENDATION CHART		
GATE LEAF	GATE HEIGHT	
	UP TO INCLUDING 6'	OVER 6' UP TO AN INCLUDING 8'
UP TO 4'	2-1/2" X 12 GA	3" X 12 GA
4' 1" TO 6	3" X 12GA	3" X 12 GA
6'1" TO 12'	4" X 11 GA	6" X 3/16"
12'1" TO 16'	6" X 3/16"	6" X 3/16"
16'1" TO 18"	8" X 1/4"	8" X 1/4"

18"1" TO 24'	8" X 1/4"	8" X 1/4"
--------------	-----------	-----------

2.3 FABRICATION

- A. Pickets, rails and posts shall be pre-cut to specified lengths. U-channel rails shall be pre-punched to accept pickets. Pickets shall be pre-drilled to accept rivets.
- B. Industrial drive rivets of sufficient length shall attach pickets to rails in a secure fashion to minimize picket movement. Rivet shall have a minimum of 1100 lbs. holding power and a shear of 1500 lbs.
- C. Pro-Arc Rail End Brackets: Brackets shall be die cast zinc (ZAMAK #3 alloy) per ASTM B86-83Z 33521. Ball and socket design capable of 30 swivel (up/down-left/right). Bracket to fully encapsulate rail end with snap fit top cap for complete security. Bracket shall be secured to the rail by a #4 Drive Rivet.
- D. The manufacturer galvanized framework shall be subjected to thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pretreatment/wash (with zinc phosphate), an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508 mm). The topcoat shall be "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508 mm). The color shall be as determined by the owner from manufacturer's standard colors. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2.

Table 2 - Coating Requirements

Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance over 1,000 hours (Scribed per D1654; failure mode is accumulation of 1/5" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D822, D2244, D523 (60 Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of

		more than 3 delta-E color units).
--	--	-----------------------------------

- E. Gates shall be fabricated using channel rail, gate ends, gussets and pickets. Gates that exceed 6' in width will have intermediate upright(s) and cable trussing with turnbuckle. Gate leaves from 6' – 1" through 12' will have 1-1/2" sq. rail stiffeners. Gate leaves from 12' – 1" through 16' will have 2"sq. top and bottom rails. Gate leaves from 16' – 1" through 24' will have 2" sq. top and bottom rails and 2" sq. rail stiffeners. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding.

PART 3 EXECUTION

3.1 PREPARATION

- A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.2 FENCE INSTALLATION

- A. Fence post shall be spaced according to Table 3, plus or minus 5/16". For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to post with brackets supplied by the manufacturer. Posts shall be set in concrete 8" in diameter having a minimum depth of 36". The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only by engineering analysis to be sufficient in strength for the intended application.

Table 3 - Post Spacing by Bracket Type

Post size	2-1/2"	3"	2-1/2"	3"
w	Flat Mount		Enclosed Swivel	Enclosed Swivel
Post Settings ± 5/16" O.C. 6' Nominal Span (67.305" Rail)	71-1/2"	72"	71-1/2"	72"
Post Settings± 5/16" O.C. 8' Nominal Span (90.740" Rail)	95"	95-1/2"	95"	95-1/2"

3.3 SEALING EXPOSED SURFACES

- A. To seal the exposed steel surfaces when cutting/drilling rails or posts, the following steps shall be performed:
 1. Remove all metal shavings from cut area.

2. Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry.
 3. Apply 2 coats of custom finish paint matching fence color.
- B. Failure to seal exposed surfaces per steps 1-3 above will be cause for rejection of materials. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Parts and components shall be furnished by the manufacturer.

3.4 GATE INSTALLATION

- A. Gate posts shall be spaced according to the gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacturer of the gate and shall be installed per manufacturer's recommendations.

3.5 CLEANING

- A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION

SECTION 33 01 32**SEWER AND MANHOLE TESTING****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Testing Manholes:
 - a. Vacuum Test.
 - b. Exfiltration Test.
 - 2. Testing Gravity Sewer Piping:
 - a. Low-pressure Air Test.
 - b. Infiltration Test.
 - 3. Deflection Testing Plastic Piping.

- A. Related Sections include but are not necessarily limited to:
 - 1. Section 33 05 13 – Manholes and Structures.
 - 2. Section 33 31 13 – Sanitary Sewer Piping.

- B. Measurement and Payment:
 - 1. The contract lump sum price shall include full compensation for all costs and work involved with sewer and manhole testing.

1.2 REFERENCES

- A. City of Fresno Construction Standards.
 - 1. Section 17-2.2.4, Sanitary Sewer Pipe and Appurtenances, Test Requirements

- B. ASTM International (ASTM):
 - 1. C1244 – Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.
 - 2. D2122 – Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

1.3 DEFINITIONS

- A. Exposed Piping:
 - 1. Piping installed above ground outside or above finished floor in buildings, structures, vaults, galleries, or concrete trenches.

- B. Buried Piping:
 - 1. Piping directly backfilled or concrete encased below finished grade or beneath structures.

- C. Submerged Piping:
 - 1. Piping placed below the high-water level of a tank or basin. See the requirements for buried piping for piping placed below groundwater level.

1.4 DESCRIPTION

- A. Provide all labor, equipment, and temporary fittings, valves, and piping necessary to conduct testing of gravity piping and manholes.

1.5 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures for general submittal requirements and content.
- B. Submit the following prior to start of testing:
 - 1. Testing procedures.
 - 2. List of test equipment.
 - 3. Testing sequence schedule.
 - 4. Provisions for disposal of flushing and test water.
 - 5. Certification of test gauge calibration.
 - 6. Deflection mandrel drawings and calculations.
- C. Test Reports: Indicate results of manhole and piping tests.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify manholes and piping are ready for testing.
- C. Verify pressure piping concrete reaction support blocking or mechanical restraint system is installed.

3.2 PIPING PREPARATION

- A. Lamping:
 - 1. Lamp gravity piping after flushing and cleaning.
 - 2. Perform lamping operation by shining light at one end of each pipe section between manholes. Observe light at other end.
 - 3. Reject pipe not installed with uniform line and grade. Remove and reinstall rejected pipe sections and re-clean and lamp until pipe section achieves uniform line and grade.
- B. Plug outlets, wye-branches and laterals; brace plugs to resist test pressures.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Testing Gravity Sewer Piping:
1. Low-Pressure Air Test:
 - a. Test each section of gravity sewer piping between manholes.
 - b. Introduce air pressure slowly to approximately 4 psig.
 - 1) Determine ground water elevation above spring line of pipe for every foot of ground water above spring line of pipe, increase starting air test pressure by 0.43-psig; do not increase pressure above 10-psig.
 - c. Allow pressure to stabilize for at least five minutes. Adjust pressure to 3.5-psig or increased test pressure as determined above when ground water is present. Start test.
 - d. Test:
 - 1) Determine test duration for sewer section with single pipe size from the following table. Do not make allowance for laterals.

Nominal Pipe Size, inches	Minimum Test Time, min/100-feet
3	0.2
4	0.3
6	0.7
8	1.2
10	1.5
12	1.8
15	2.1
18	2.4
21	3.0
24	3.6
27	4.2
30	4.8
33	5.4
36	6.0

- 2) Record drop in pressure during test period; when air pressure has dropped more than 1.0-psig during test period, piping has failed; when 1.0-psig air pressure drop has not occurred during test period, discontinue test and piping is accepted.
- 3) When piping fails, determine source of air leakage, make corrections and retest; test section in incremental stages until leaks are isolated; after leaks are repaired, retest entire section between manholes.

2. Test pipe larger than 36-inches diameter with exfiltration test not exceeding 100-gallons for each inch of pipe diameter for each mile per day for each section under test. Perform test with minimum positive head of 2-feet.
 3. Infiltration Test:
 - a. Use only when gravity piping is submerged in ground water minimum of 4-feet above crown of pipe for entire length being tested.
 - b. Maximum Allowable Infiltration: 100-gallons per inch of pipe diameter for each mile per day for section under test, include allowances for leakage from manholes. Perform test with minimum positive head of 2-feet.
- C. Deflection Testing of Plastic Sewer Pipe:
1. Perform vertical ring deflection testing on PVC sewer piping, after backfilling has been in place for at least 30 days but not longer than 12 months.
 2. Allowable maximum deflection for installed plastic sewer pipe limited to 5 percent of original vertical internal diameter.
 3. Perform deflection testing using properly sized rigid ball or 'Go, No-Go' mandrel.
 4. Furnish rigid ball or mandrel with diameter not less than 95 percent of base or average inside diameter of pipe as determined by ASTM standard to which pipe is manufactured. Measure pipe in compliance with ASTM D2122.
 5. Perform test without mechanical pulling devices.
 6. Locate, excavate, replace and retest pipe exceeding allowable deflection.
- D. Testing Manholes:
1. General: Test using air whenever possible prior to backfilling to assist in locating leaks. Make joint repairs on both outside and inside of joint to ensure permanent seal. Test manholes with manhole frame set in place.
 2. Vacuum test in accordance with ASTM C1244 and as follows:
 - a. Plug pipe openings; securely brace plugs and pipe.
 - b. Inflate compression band to effect seal between vacuum base and structure; connect vacuum pump to outlet port with valve open; draw vacuum to 10-inches of Hg; close valve; start test.
 - c. Test:
 - 1) Determine test duration for manhole from the following table:

Manhole Diameter	Test Period
4 feet	60 seconds
5 feet	75 seconds
6 feet	90 seconds

- 2) Record vacuum drop during test period; when vacuum drop is greater than 1-inch of Hg during test period, repair and retest manhole; when vacuum drop of 1-inch of Hg does not occur during test period, discontinue test and accept manhole.
- 3) When vacuum test fails to meet 1-inch Hg drop in specified time after repair, repair and retest manhole.

3. Exfiltration Test:

- a. Plug pipes in manhole; remove water in manhole; observe plugs over period of not less than 2 hours to ensure there is no leakage into manhole.
- b. Determine ground water level outside manhole.
- c. Fill manhole with water to within 4-inches of top of cover frame. Prior to test, allow manhole to soak from minimum of 4 hours to maximum of 72 hours; after soak period, adjust water level inside manhole to within 4-inches of top of cover frame.
- d. Measure water level from top of manhole frame; at end of 4-hour test period, again measure water level from top of manhole frame; compute drop in water level during test period.
- e. Manhole exfiltration test is considered satisfactory when drop in water level is less than values listed in table below:

Manhole Depth (feet)	Allowable Leakage inches for Manhole Diameter		
	4-feet	5-feet	6-feet
4	0.11	0.14	0.17
6	0.17	0.21	0.26
8	0.23	0.29	0.35
10	0.28	0.35	0.42
12	0.34	0.43	0.51
14	0.40	0.50	0.60
16	0.45	0.56	0.68
18	0.51	0.64	0.77
20	0.57	0.71	0.86
22	0.62	0.78	0.93
24	0.68	0.85	1.02
26	0.74	0.93	1.11
28	0.79	0.99	1.19
30	0.85	1.06	1.28

4. When unsatisfactory test results are achieved, repair manhole and retest until result meets criteria; repair visible leaks regardless of quantity of leakage.

END OF SECTION

SECTION 33 05 13**MANHOLES AND STRUCTURES****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Modular precast concrete manholes and structures with tongue-and-groove joints with masonry transition to cover frame, covers, anchorage, and accessories.
 2. Doghouse manhole connections to existing sanitary storm sewer lines.
 3. Bedding and cover materials.
- B. Related Sections include but are not necessarily limited to:
1. Section 03 21 00 – Concrete Reinforcement.
 2. Section 03 30 00 – Cast-In-Place Concrete.
 3. Section 31 23 00 – Earthwork.
 4. Section 31 23 16 – Trenching Backfilling and Compaction.
 5. Section 33 05 16 – Utility Structures.
 6. Section 33 31 13 – Sanitary Sewer Pipe
 7. Section 33 41 13 – Storm Drain Piping.
- C. Measurement and Payment:
1. The contract lump sum price shall include full compensation for all costs and work involved with furnishing and installing manholes and structures.

1.2 REFERENCES

- A. City of Fresno Standard Drawings
1. S-3 48-inch Sewer Manhole
 2. S-4 60-inch Sewer manhole
 3. S-5 Cast-iron Manhole, Frame and Cover
- B. American Association of State Highway Transportation Officials (AASHTO):
1. M288 – Geotextiles.
 2. M306 – Drainage Structure Castings.
- C. American Concrete Institute (ACI):
1. 530/530.1 – Building Code Requirements for Masonry Structures and Specifications for Masonry Structures.
- D. ASTM International (ASTM):
1. A48/A48M – Standard Specification for Gray Iron Castings.
 2. A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 3. C150 – Standard Specification for Portland Cement.
 4. C361 – Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.

5. C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections.
6. C497 – Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
7. C913 – Standard Specification for Precast Concrete Water and Wastewater Structures.
8. C923 – Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

1.3 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures for general submittal requirements and content.
- B. Shop Drawings:
 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 2. Fabrication and/or layout drawings:
 - a. Include detailed diagrams of manholes showing typical components and dimensions, reinforcements and other details.
 - b. Itemize, on separate schedule, sectional breakdown of each manhole structure with all components and refer to drawing identification number or notation.
 - c. Indicate knockout elevations for all piping entering each manhole.
- C. Product Data:
 1. Submit manhole covers, component construction, features, configuration, and dimensions.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.5 DELIVERY, STORAGE AND HANDLING

- A. See Section 01 65 00 – Delivery, Storage, and Handling for general requirements.
- B. Comply with precast concrete manufacturer's instructions and ASTM C913 for unloading, storing, and moving precast manholes and drainage structures.
- C. Store precast concrete manholes and drainage structures to prevent damage to OWNER's property or other public or private property. Repair property damaged from materials storage.

- D. Mark each precast structure by indentation or water-proof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Manhole rings, covers and frames:
 - a. Neenah Foundry Co.
 - b. Deeter Foundry.
 - c. Or approved equal.
 2. Black mastic joint compound:
 - a. Kalktite 340.
 - b. Tufflex.
 - c. Plastico.
 3. Premolded joint compound:
 - a. Ram Nec.
 - b. Kent Seal.
 - c. Or approved equal.
 4. Flexible Seals:
 - a. Kor-n-Seal
 - b. Z-Lok-XP
 - c. Or approved equal
 5. Emulsified fibrated asphalt compound:
 - a. Sonneborn Hydrocide 700B Semi-Mastic

2.2 MANHOLES AND STRUCTURES

- A. Manhole and Structure Sections: See City of Fresno Standard Drawings S-3 and S-4.
1. Precast sections: Class II reinforced concrete pipe in accordance with ASTM C478 with gaskets in accordance with ASTM C923.
- B. Provide all sanitary manholes constructed with Portland ASTM C150, Type I or II cement with a tricalcium aluminate content not to exceed 8 percent.
- C. Mortar and Grout: Type S, 3000-psi non-shrink grout as specified in Section 04 05 13 – Masonry Mortar and Grout.

2.3 FRAMES AND COVERS

- A. Material: Cast iron per ASTM A48/A48M, Class 30B AASHTO M306.
- B. Machined flat bearing surface, removable lockable bolttable lid, open checkerboard grille for storm drain cover with sluice gate, cover design to read SEWER or STORM DRAIN; Heavy traffic rated; sealing gasket; Grate: Diagonal grate for storm drain Bicycle Safe grate.

- C. Nominal Lid Grate Size: 24 inches.

2.4 COMPONENTS

- A. Manhole and Structure Steps: Formed polypropylene covered galvanized steel rungs; 3/4 inch diameter for storm drain only. Formed integral with manhole sections.
- B. Foundation Slab: Cast-in-place concrete of type specified in Section 03 30 00 – Cast-in-Place Concrete, leveled top surface for storm drain and formed channel for sanitary sewer.

2.5 CONFIGURATION

- A. Shaft Construction and Concentric Cone Top Section: Reinforced precast Concrete pipe sections, lipped male/female joints, rubber gasket or manufactured rope seal for all joints sleeved to receive pipe conduit and sections.
- B. Shape: Cylindrical
- C. Clear Inside Dimensions: 48-inch diameter as indicated on Drawings.
- D. Design Depth: ft. as indicated on Drawings.
- E. Clear Cover Opening: as indicated on Drawings.
- F. Pipe Entry: Furnish openings as indicated on Drawings required.
- G. Structure Joint Gaskets: ASTM C361; rubber.
- H. Steps: Provide steps for storm drains only, 12-inches wide, 16-inches on center vertically, set into structure wall.

2.6 FINISHING - STEEL

- A. Galvanizing: ASTM A123/A123M; hot dip galvanized after fabrication.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify items provided by other sections of Work are properly sized and located.
- C. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify manholes and structures are internally clean and free from damage. Remove and replace damaged units.

3.2 PREPARATION

- A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

3.3 INSTALLATION - GENERAL

- A. Excavation and Backfill:
 - 1. Excavate for manholes and structures in location and to depth shown. Provide clearance around sidewalls of manhole or structure for construction operations, granular backfill and placement of geotextile filter fabric.
 - 2. When groundwater is encountered, prevent accumulation of water in excavations. Place manholes or structures in dry trench.
 - 3. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation.
- B. Place manhole sections plumb and level, trim to correct elevations. Place foundation slab integral with bottom barrel section.
- C. Make inverts with a semi-circular bottom conforming to the inside contour of the adjacent sewer sections. Where branches change direction in the manhole, make a circular curve in the manhole invert using as large a radius as manhole inside diameter will permit.
- D. Set frames and covers level without tipping, to elevations shown on the drawings.

3.4 PRECAST CONCRETE MANHOLE CONSTRUCTION

- A. For all horizontal mating surfaces between concrete to concrete and concrete to metal, install resilient O-ring type gaskets.
- B. For horizontal joints that fall below established high groundwater elevation shown, install a resilient O-ring type gasket or pre-molded joint compound.
- C. For PVC pipe, install resilient O-ring gaskets centered in wall of manhole.
- D. Seal all pipe penetrations in manhole.
 - 1. Form pipe openings smooth and well shaped.
 - 2. After installation, seal cracks with, non-shrink grout.
- E. Set and adjust frame and cover final 6-inch (minimum) to 18-inch (maximum) to match finished pavement or finished grade elevation using precast adjuster rings.

3.5 CAST-IN-PLACE CONCRETE MANHOLE AND STRUCTURE INSTALLATION

- A. crushedErect and brace forms against movement.
- C. Install reinforcing steel as indicated on Drawings.
- D. Place and cure concrete.

3.6 SANITARY MANHOLE DROP CONNECTIONS

- A. Construct drop connections into sanitary manholes in accordance with Drawings.
- B. Concrete encase pipe drop connection to minimum of 2-feet outside of manhole.
- C. Form channel from pipe drop to sweep into main channel at maximum angle of 30 degrees.

3.7 CASTINGS INSTALLATION

- A. Set frames using mortar and masonry as indicated on Drawings. Set frame and cover 2-inches above finished grade where located within unpaved areas and grade away from cover beginning 1 inch below rim.
- B. Vertical Adjustment of Existing Frames:
 - 1. Where required, adjust top elevation of existing manholes and structures to finished grades shown on Drawings.
 - 2. Carefully remove existing frames and remove mortar prior to reinstalling.
 - 3. Reset existing frames, grates, and covers to required elevation as indicated on Drawings in accordance with requirements specified for installation of castings.

3.8 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements; 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Test concrete manhole and structure sections in accordance with ASTM C497.

END OF SECTION

SECTION 33 05 16

UTILITY STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes precast concrete utility structures:
1. Drainage system catch basins.
 2. Drainage system inlets.
 3. Drainage system junction boxes.
 4. Valve pits.
 5. Frames and covers.
- B. Related Sections include but are not necessarily limited to:
1. Section 03 10 00 – Concrete Formwork.
 2. Section 03 21 00 – Concrete Reinforcing.
 3. Section 03 30 00 – Cast-In-Place Concrete
 4. Section 04 05 13 – Masonry Mortaring and Grouting.
 5. Section 31 23 00 – Earthwork.
 6. Section 31 23 16 – Trenching Backfilling and Compaction.
 7. Section 33 31 13 – Sanitary Sewer Pipe.
 8. Section 33 41 13 – Storm Drain Piping.
 9. Section 40 23 51 – Steel Pipe
 10. Section 40 23 53 – Ductile Iron Pipe
- C. See FMFCD Standard drawings for additional information.
- D. Measurement and Payment:
1. The contract lump sum price shall include full compensation for all costs and work involved with furnishing and installing utility structures.

1.2 REFERENCES

- A. American Association of State Highway Transportation Officials:
1. AASHTO M306 – Drainage Structure Castings.
- B. American Concrete Institute:
1. ACI 318 – Building Code Requirements for Structural Concrete.
 2. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
- C. ASTM International (ASTM):
1. A36/A36M – Standard Specification for Carbon Structural Steel.
 2. A48/A48M – Standard Specification for Gray Iron Castings.
 3. A82/A82M – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 4. A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

5. A185/A185M – Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
6. A496 – Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
7. A497/A497M – Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
8. A615/A615M – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
9. A706/A706M – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
10. A996/A996M – Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
11. C31/C31M – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
12. C33 – Standard Specification for Concrete Aggregates.
13. C39/C39M – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
14. C138/C138M – Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
15. C143/C143M – Standard Test Method for Slump of Hydraulic Cement Concrete.
16. C150 – Standard Specification for Portland Cement.
17. C173/C173M – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
18. C192/C192M – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
19. C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
20. C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
21. C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
22. C330 – Standard Specification for Lightweight Aggregates for Structural Concrete.
23. C443 – Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
24. C494/C494M – Standard Specification for Chemical Admixtures for Concrete.
25. C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
26. C857 – Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
27. C890 – Standard Practice for Minimum Structural Design Loading for Monolithic or Section Precast Concrete Water and Wastewater Structures.
28. C891 – Standard Practice for Installation of Underground Precast Concrete Utility Structures.
29. C913 – Standard Specification for Precast Concrete Water and Wastewater Structures.
30. C923 – Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

31. C989 – Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
32. C990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
33. C1107/C1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
34. C1244 – Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test prior to Backfill.
35. C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
36. C1433 – Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers.
37. C1504 – Standard Specification for Manufacture of Precast Reinforced Concrete Three-Sided Structures for Culverts, Storm Drains, and Sewers.

D. American Welding Society (AWS):

1. D1.1 – Structural Welding Code – Steel.
2. D1.4 – Structural Welding Code - Reinforcing Steel.

E. National Precast Concrete Association (NPCA):

1. NPCA Quality Control Manual for Precast Plants.
2. NPCA Plant Certification Program.

F. SSPC: The Society for Protective Coatings:

1. SSPC Paint 20 – Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

1.3 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures for general submittal requirements and content.

B. Shop Drawings:

1. Indicate structure locations, elevations, sections, equipment supports, piping, conduit, and sizes and elevations of penetrations.
2. Indicate design, construction and installation details, typical reinforcement and additional reinforcement at openings and for each custom type, size and configuration.

C. Product Data:

1. Submit data for frames and covers, steps, component construction, features, configuration, dimensions and.

D. Design Data:

1. Submit concrete mix design for each different mix.

E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Obtain precast concrete utility structures from single source.
- B. Perform structural design in accordance with ACI 318.
- C. Perform Work in accordance with NPCA Quality Control Manual for Precast Plants.
- D. Conform to the following for material and fabrication requirements:
 - 1. ASTM C913.
- E. Perform welding in accordance with the following:
 - 1. Structural Steel: AWS D1.1.
 - 2. Reinforcing Steel: AWS D1.4.
- F. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.
 - 2. Design custom utility structures under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of California.
 - 3. Welders: AWS qualified within previous 12 months.

1.5 DELIVERY, STORAGE AND HANDLING

- A. See Section 01 65 00 – Delivery, Storage, and Handling for general requirements.
- B. Comply with precast concrete manufacturer's instructions for unloading, storing and moving precast structures. Lift structures from designated lifting points.
- C. Do not deliver products until concrete has cured 5 days or attained minimum 75 percent of specified 28-day compressive strength.
- D. Store precast concrete structures to prevent damage to Owner's property or other public or private property. Repair property damaged from materials storage.
- E. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Precast Concrete Utility Structures:
 - a. Old Castle.
 - b. Teichert Precast
 - c. Brooks.

- d. Jensen Precast
- e. Or approved equal

2.2 MATERIALS

- A. Cement: ASTM C150, Type II.
- B. Fine and Coarse Aggregates: ASTM C33, except gradation requirements do not apply.
- C. Lightweight Aggregate: ASTM C330, except gradation requirements do not apply.
- D. Water: Clean and not detrimental to concrete.

2.3 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical Admixtures: ASTM C494/C494M.
 - 1. Type A - Water Reducing.
 - 2. Type B - Retarding.
 - 3. Type C - Accelerating.
 - 4. Type D - Water Reducing and Retarding.
 - 5. Type E - Water Reducing and Accelerating.
 - 6. Type F - Water Reducing, High Range.
 - 7. Type G - Water Reducing, High Range and Retarding.
- C. Fly Ash Calcined Pozzolan: ASTM C618 Class.

2.4 CONCRETE REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, 60-ksi yield grade, deformed billet bars uncoated finish.
 - 1. Plain Wire: ASTM A82/A82M; unfinished epoxy coated.
 - 2. Deformed Wire: ASTM A496 unfinished epoxy coated.
- B. Welded Steel Wire Fabric: ASTM A185
 - 1. Plain Wire: ASTM A185/A185M; unfinished epoxy coated.
 - 2. Deformed Wire: ASTM A497/A497M; unfinished epoxy coated.
 - 3. Galvanized Finish: ASTM A767/A767M, Class I II.
 - 4. Epoxy Coating Finish: ASTM A775/A775M.

2.5 FRAMES AND COVERS

- A. Manufacturers:
 - 1. Neenah Foundry Co. Model.
 - 2. Deeter Foundry.
 - 3. Or approved equal.
- B. Product Description: ASTM A48/A48M, Class 25 Cast iron construction in accordance with FMFCD Standards.

1. Lid: Machined flat bearing surface, removable lockable boltable lid, closed open checkerboard grille cover design; live load rating of psf; sealing gasket; cover molded with identifying name and logo.
2. Grate: Diagonal grate Bicycle Safe grate.
3. Nominal Lid Grate Size: inches.
4. Cover: Diamond plate reinforced with structural stiffeners to support required loads.
5. Frame: Angle type; Channel type; Gutter type; with integral seat to support cover stiffeners; anchor flange straps around frame perimeter.
6. Hinges: Steel Stainless steel.
7. Lift Handle: Flush drop handle, non-removable type mounted in cover.
8. Lifting Mechanism: Steel Stainless steel compression springs with automatic hold open and dead stop to retain cover in open position. Cover springs to prevent contact by personnel entering utility structure.
9. Latch Mechanism: Stainless steel lock with removable external handle and permanent internal release mechanism.
10. Hardware: Steel Stainless steel.
11. Finish: Factory prime paint with rust inhibitive primer. galvanized after fabrication. unfinished.

2.6 ACCESSORIES

- A. Membrane Curing Compound: ASTM C309 Type 1 1-D 2 Class A B.
- B. Steps: Formed steel reinforced polypropylene covered rungs.
 1. Diameter: 3/4 inch.
 2. Width: 12 inches.
 3. Spacing: 16 inches on center vertically. As indicated on Drawings.
- C. Inserted and Embedded Items:
 1. Structural Joint Sealants and Joint Gaskets:
 1. Gasket Joints for Circular Concrete Pipe: ASTM C443; standard oil-resistant rubber gaskets.
 2. External Sealing Bands: ASTM C877; Type I rubber and mastic bands Type II plastic film and mesh reinforced bands Type III chemically bonded adhesive butyl bands.
 3. Preformed Joint Sealants for Concrete Pipe and Box Sections: ASTM C990.
 4. Elastomeric Joint Sealants: ASTM C920; silicone polyurethane polysulfide; Grade NS, Class 25.
- E. Pipe Entry Connectors: ASTM C923.
- F. Grout:
 1. Cement Grout: Portland cement, sand and water mixture with stiff consistency to suit intended purpose.
 2. Non-Shrink Grout: ASTM C1107/C1107M; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400-psi in 48-hours and 7,000-psi in 28-days.

- G. Touch-Up Primer for Galvanized Surfaces: SSPC 20 Type I Inorganic Type II Organic.

2.7 CONCRETE MIX

- A. Select proportions for normal weight concrete in accordance with ACI 318 and ACI 211.1.
- B. Provide concrete to the following criteria:
1. Compressive Strength: 4,000-psi at 28-days.
 2. Water Cement Ratio: Maximum 0.45 percent by mass.
 3. Air Content: Use Moderate exposure as indicated below.

Maximum Aggregate Size, inches	Air Content, Percent	
	Severe Exposure	Moderate Exposure
3/8-inches	6.0 to 9.0	4.5 to 7.5
1/2-inches	5.5 to 8.5	4.7 to 7.0
3/4-inches	4.5 to 7.5	3.5 to 6.5
1-inch	4.5 to 7.5	3.0 to 6.0
1 1/2-inches	4.5 to 7.0	3.0 to 6.0

- C. Admixtures: Include admixture types and quantities indicated in concrete mix designs approved through submittal process.
1. Do not use calcium chloride.

2.8 FABRICATION

- A. Fabricate precast concrete utility structures in accordance with ACI 318 and NPCA Quality Control Manual for Precast Plants.
- B. Fabricate precast concrete utility structures to size, configuration, knock out panels, and openings as indicated on Drawings as scheduled in this section.
- C. Construct forms to provide uniform precast concrete units with consistent dimensions.
- D. Clean forms after each use.
- E. Install reinforcing by tying or welding to form rigid assemblies. Position reinforcing to maintain minimum 1-inch cover. Secure reinforcement to prevent displacement when placing concrete.
- F. Position and secure embedded items to prevent displacement when placing concrete.
- G. Deposit concrete in forms. Consolidate concrete without segregating aggregate.
- H. Provide initial curing by retaining moisture using one of the following methods:

1. Cover with polyethylene sheets.
2. Cover with burlap or other absorptive material and keep continually moist.
3. Apply curing compound in accordance with manufacturer's instructions.

I. Provide final curing in accordance with manufacturer's standard.

J. Remove forms without damaging concrete.

2.9 CONCRETE FINISHES

A. Formed Surfaces Not Exposed to View: As formed.

B. Unformed Surfaces: Finish with vibrating screed or hand float.

1. Permitted: Color variations, minor indentations, chips, and spalls.
2. Not Permitted: Major imperfections, honeycomb, or other defects.

C. Exposed to View Finishes: Troweled to smooth for following surfaces:

1. Top of roof and top of floor slab.

2.10 SOURCE QUALITY CONTROL

A. Perform the following tests for each 150-cy of concrete placed, with minimum one set of tests each week.

1. Slump: ASTM C143/C143M.
2. Compressive Strength: ASTM C31/C31M ASTM C192/C192M and ASTM C39/C39M.
3. Air Content: ASTM C231 or ASTM C173/C173M.
4. Unit Weight: ASTM C138/C138M.

B. Visually inspect completed precast structures for defects.

1. Repair defects affecting exposed to view surfaces to achieve uniform appearance.
2. Repair honeycomb by removing loose material and applying grout to produce smooth surface flush with adjacent surface.
3. Repair major defects only when permitted by ENGINEER.

C. Make test results available to ENGINEER upon request.

D. Allow witnessing of factory inspections and test at manufacturer's test facility. Notify ENGINEER at least seven days before inspections and tests are scheduled.

2.11 FINISHING - STEEL

A. Galvanizing: ASTM A123/A123M; hot dip galvanized after fabrication.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

- B. Verify correct size and elevation of excavation.
- C. Verify subgrade and bedding is properly prepared, compacted and ready to receive Work of this section.

3.2 PREPARATION

- A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.
- B. Do not install structures where site conditions induce loads exceeding structural capacity of structures.
- C. Inspect precast concrete structures immediately prior to placement in excavation to verify are internally clean and free from damage. Remove and replace damaged units.

3.3 INSTALLATION

- A. Install underground precast utility structures in accordance with ASTM C891.
- B. Lift precast concrete structures at lifting points designated by manufacturer.
- C. When lowering structures into excavations and joining pipe to units, take precautions to ensure interior of pipeline and structure remains clean.
- D. Install precast concrete base to elevation and alignment indicated on Drawings.
- E. Install precast concrete utility structures to elevation and alignment indicated on Drawings.
- F. Assemble multi-section structures by lowering each section into excavation.
 - 1. Clean joint surfaces.
 - 2. Install watertight joint seals in accordance with manufacturer's instructions using gasket joints, external sealing bands, preformed joint sealants, elastomeric joint sealants, or grout.
- G. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe. Fill annular space with grout.
- H. Connect pipe to structure and seal watertight. Cut pipe flush with interior of structure.
- I. Grout base foundation slab to achieve slope to exit piping. Trowel smooth. Contour to form continuous drainage channel as indicated on Drawings.
- J. Paint interior with 2 coats of bituminous interior coating at rate of 120 square feet per gallon for each coat.
- K. Set frame and cover and access hatch level without tipping, to elevations indicated on Drawings.

1. Set cover and access hatch 2 inches above finished grade for structures located within unpaved areas to allow area to be graded away from cover beginning 1 inch below top surface of frame.
 2. Connect drain from access hatch frame to storm drainage system.
- L. Touch up damaged galvanized coatings.
- M. Backfill excavations for structures in accordance with Section 31 23 16 – Trenching, Backfill, and Compaction.
- 3.4 FIELD QUALITY CONTROL
- A. Perform vacuum test and exfiltration test in accordance with Section 33 01 32 – Sewer and Manhole Testing.

END OF SECTION

SECTION 33 05 17**PRECAST CONCRETE VAULTS****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Precast concrete vaults.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 40 05 30 – Pipe Supports
 - 1. Section 40 23 51 – Steel Pipe
 - 2. Section 40 23 53 – Ductile Iron Pipe
- C. Measurement and Payment:
 - 1. The contract lump sum price shall include full compensation for all costs and work involved with furnishing and installing precast concrete vaults.

1.2 REFERENCES

- A. American Association of State Highway Transportation Officials:
 - 1. AASHTO M306 – Drainage Structure Castings.
- B. American Concrete Institute:
 - 1. ACI 318 – Building Code Requirements for Structural Concrete.
 - 2. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
- C. ASTM International (ASTM):
 - 1. A36 – Structural Steel
 - 2. A48/A48M – Standard Specification for Gray Iron Castings.
 - 3. A153 Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - 4. A185/A185M – Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - 5. A536 – Standard Specification for Ductile Iron Castings.
 - 6. A615/A615M – Standard Specification for Deformed and Plain Billet–Steel Bars for Concrete Reinforcement.
 - 7. C33 – Standard Specification for Concrete Aggregates.
 - 8. C150 – Standard Specification for Portland Cement.
 - 9. C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
 - 10. B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 11. C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections.
 - 12. C497 – Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
 - 13. C857 Recommended Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
 - 14. C858 Standard Specification for Underground Precast Concrete Utility Structures

15. C890 – Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
 16. C913 – Standard Specification for Precast Concrete Water and Wastewater Structures.
 17. C990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
 18. D71 – Standard Test Method for Relative Density of Solid Pitch and Asphalt (Displacement Method).
 19. D92 – Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester.
 20. D113 – Standard Test Method for Ductility of Bituminous Materials.
 21. D217 – Standard Test Methods for Cone Penetration of Lubricating Grease
 22. D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 23. D2922 – Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 24. D3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- D. American Welding Society (AWS):
1. D1.1 – Structural Welding Code – Steel.
 2. D1.4 – Structural Welding Code – Reinforcing Steel.
- E. National Precast Concrete Association:
1. NPCA Quality Control Manual for Precast Plants.
 2. NPCA Plant Certification Program.
- F. Precast/Prestressed Concrete Institute (PCI):
1. MNL 116, Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.
 2. PCI Design Handbook - Precast and Prestressed Concrete.

1.3 DESCRIPTION

- A. Design Criteria:
1. Manufacture, quality, dimensional and erection tolerances of all units to be in accordance with both PCI MNL 116 and PCI Design Handbook - Precast and Prestressed Concrete.
 2. Provide watertight precast reinforced concrete structures designed to ASTM C890 A16 live loading and installation conditions, and manufactured to conform to ASTM C913.
 3. Minimum 28-day Compressive Strength: 5,000 psi.
 4. Honeycombed or retempered concrete is not permitted.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures for general submittal requirements and content.

- B. Shop Drawings:
 - 1. Indicate structure locations, elevations, sections, equipment supports, piping, conduit, and sizes and elevations of penetrations.
 - 2. Indicate design, construction and installation details, typical reinforcement and additional reinforcement at openings and for each custom type, size and configuration.
- C. Product Data:
 - 1. Acknowledgement that products submitted meet requirements of standards referenced.
 - 2. Submit data for frames and covers, steps, component construction, features, configuration, dimensions.
 - 3. Sizes, types, and manufacturer of neoprene bearing pads.
 - 4. Hardware to be utilized to support suspended appurtenances.
 - 5. Manufacturer's installation instructions.
- D. Design Data:
 - 1. Submit concrete mix design for each different mix.
- E. Quality Assurance:
 - 1. Manufacturer's Certificates:
 - a. Submit Statement of Compliance, supporting data, from materials suppliers attesting that precast concrete valve vaults and meter boxes provided meet or exceed ASTM Standards and specification requirements.
 - 2. Test Reports:
 - a. Copies of source quality control tests.
 - 3. Instructions:
 - a. Submit special procedures for precast concrete valve vaults and meter boxes installation.
- F. Closeout Submittals:
 - 1. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
 - 2. Project Record Documents: Accurately record actual locations and inverts of buried pipe, components and connections.

1.5 QUALITY ASSURANCE

- A. Obtain precast concrete utility structures from single source.
- B. Perform structural design in accordance with ACI 318.
- C. Perform Work in accordance with NPCA Quality Control Manual for Precast Plants.
- D. Conform to the following for material and fabrication requirements:
 - 1. ASTM C913.
- E. Perform welding in accordance with the following:
 - 1. Structural Steel: AWS D1.1.
 - 2. Reinforcing Steel: AWS D1.4.

F. Qualifications:

1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.
2. Design custom utility structures under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of California.
3. Welders: AWS qualified within previous 12 months.

1.6 DELIVERY, STORAGE AND HANDLING

- A. See Section 01 65 00 – Delivery, Storage, and Handling for general requirements.
- B. Do not ship units until they have reached their 28-day required compressive strengths.
- C. Transport and handle precast concrete units with equipment designed to protect units from damage.
- D. Do not place concrete units in position to cause overstress, warp, or twist.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. Precast Vaults
 - a. Christy.
 - b. Brooks.
 - c. Jensen Precast
 - d. Or approved equal
 2. Headed studs and deformed bar anchors:
 - a. Nelson Stud Welding Div., TRW, Inc.
 - b. KSM Division, Omark Industries.
 - c. Or approved equal
 3. Joint Sealant;
 - a. Conseal
 - b. Ram-nek
 - c. A-lok
 - d. Or approved equal.

2.2 MATERIALS:

- A. Cement
 1. Comply with ASTM C150, Type I or III.
- B. Aggregate for Normal Weight Concrete:
 1. Comply with ASTM C33; Coarse Aggregates Graded 1 inch to No. 4 Sieve meeting gradation for size 67.

- C. Aggregates for Lightweight Concrete:
 - 1. ASTM C330 fine natural aggregate with 3/4 IN maximum size coarse aggregate.
- D. Sand:
 - 1. Comply with ASTM C33; 2.35 fineness modulus.
- E. Water:
 - 1. Potable; clean and free of injurious amounts of acids, alkalis, salts, organic materials, and substances incompatible with concrete or steel.
- F. Air-Entraining Admixtures:
 - 1. Comply with ASTM C260.
- G. Reinforcing Steel:
 - 1. Deformed Bars: ASTM A615/A615M, Grade 60.
 - 2. Welded Wire Fabric: ASTM A185/A185M.
- H. Joint Sealant:
 - 1. Comply with ASTM C990, bitumen or butyl rubber.
- I. Valve Vault and Meter Box Frames and Covers:
 - 1. Cast Iron Castings: ASTM A48/A48M, Class 30 or better; free of bubbles, sand and air holes, and other imperfections.
 - 2. Ductile Iron Castings: ASTM A536.
 - 3. Contact surfaces machined and matched.
 - 4. Cast cover inscription WATER
- J. Access Steps:
 - 1. Steel reinforced copolymer polypropylene meeting the following specifications:
 - a. ASTM C478.
 - b. ASTM C497, Method of test.
 - c. ASTM D4104, PP0344B33534Z02 copolymer polypropylene.
 - d. ASTM A615/A615M, Grade 60, 1/2" reinforced rod.
- K. Headed Studs:
 - 1. ASTM A108.
 - 2. Minimum yield strength: 50,000 psi.
 - 3. Minimum tensile strength: 60,000 psi.
- L. Deformed Bar Anchors:
 - 1. ASTM A496.
 - 2. Minimum tensile strength: 80,000 psi.
 - 3. Minimum yield strength: 70,000 psi.
- M. Electrodes:
 - 1. E70 series conforming to AWS A5.1 or AWS A5.5 for welding steel shapes and plates.
 - 2. E90 series conforming to AWS A5.5 for welding rebar.

2.3 MIXES

- A. Design concrete mix to produce required concrete strength, air-entrainment, watertight properties, and loading requirements.
- B. Maximum water cement ratio for lightweight concrete to be determined in accordance with recommendations of ACI 211.2 to provide required 28 day compressive strength and maximum slump of 3 IN.
- C. Do not begin fabrication of units until concrete mix design(s) have been approved by Engineer.

2.4 FABRICATION AND MANUFACTURE

- A. Do not fabricate units until Shop Drawings have been approved by ENGINEER and support locations have been field verified by CONTRACTOR.
- B. Concrete vaults shall have a smooth trowel finish for floors and horizontal surfaces.
 - 1. Precast concrete vaults shall conform to ASTM C478, except that the spacing of steps or ladder rungs shall not exceed 16 inches.
 - 2. Vaults shall be the type and size noted on the drawings and shall be constructed in accordance with the applicable details and appurtenances as indicated or specified herein.
 - 3. Top, walls, and bottom shall consist of reinforced concrete.
 - 4. Walls, bottom and top of vaults shall be of monolithic concrete construction; sectionalized construction is not acceptable, unless otherwise shown on the Drawings.
 - 5. Covers shall fit the frames without undue play.
 - 6. Steel and iron shall be formed to shape and size with sharp lines and angles.
 - 7. Castings shall be free from warp and blow holes that may impair their strength or appearance.
 - 8. Exposed metal shall have a smooth finish and sharp lines and arises.
 - 9. Provide all necessary lugs, rabbets, and brackets.
- C. Metal Frames and Gratings: Provide steel or malleable iron frames and gratings conforming to Federal Specification RR-G-661, Type I.
- D. Vault Covers:
 - 1. Vault covers shall be H20 traffic rated, hot-dipped galvanized steel after fabrication with spring operated hinged doors and safety latch. Transverse I-beam supports, if required, shall be removable.
- E. Cast all members in smooth rigid forms that will provide straight, true members of uniform thickness and uniform color and finish.
- F. Use sand cement grout mixture to fill all air pockets and voids, and to repair chipped edges. Finish all repairs smooth and to match adjacent surface texture and color.

- G. Where units are to receive concrete topping, provide units having heavy broom finish on top surface for bond.
 - 1. Provide roughness of top surface to provide bond with topping and design for horizontal shear at topping and unit interface in accordance with requirements of Paragraph 17.5 of ACI 318.
 - 2. Make all other surfaces smooth.
- H. Incorporate embedded plates, angles, and flange welding strips into members at time of manufacture.
 - 1. Provide embedded items as shown on the Drawings unless prior approval is received from Engineer to do otherwise.
 - 2. Provide flange welding strips where indicated on Drawings.
 - 3. Cast lifting handles into units at or near support points.
 - a. Remove lifting handles after units are erected.
- I. Cast openings larger than 6 IN SQ or 6 IN DIA in units at time of manufacture.
 - 1. Make smaller openings by neat cutting or neat drilling by trades requiring them.
 - 2. Coordinate sizes and locations of all openings before fabrication of units.
- J. Automatically weld headed studs and deformed bar anchors to members to provide full penetration weld between studs, bar anchors, and members they are attached to.
- K. Weld steel shapes and plates per AWS D1.1 and reinforcing steel per AWS D1.4.

2.5 SOURCE QUALITY CONTROL

- A. Manufacture, quality, dimensional and erection tolerances of all units to be in accordance with both PCI MNL 116 and PCI Design Handbook - Precast and Prestressed Concrete.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify piping connections, sizes, locations and inverts are as indicated on Drawings.
- B. Check bearing surfaces to determine that they are level and uniform.

3.2 FIELD QUALITY CONTROL

- A. Request inspection by Inspector prior to placing aggregate cover over piping.
- B. Compaction Testing: In accordance with ASTM D1557. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- C. Frequency of Tests: One on each box.

END OF SECTION

SECTION 33 12 13**WATER SERVICE CONNECTIONS****PART 1 GENERAL****1.1 SUMMARY****A. Section Includes:**

1. Pipe and fittings for domestic water service connections to buildings.
2. Corporation stop assembly.
3. Backflow Preventers.
4. Double Check Valve Assemblies

B. Related Sections include but are not necessarily limited to:

1. Section 31 23 00 – Earthwork.
2. Section 31 23 16 – Trenching Backfilling and Compaction.
3. Section 33 05 13 – Manholes and Structures.
4. Section 33 13 00 – Disinfecting of Water Distribution System.

C. Measurement and Payment:

1. The contract lump sum price shall include full compensation for all costs and work involved with furnishing and installing water service connections.

1.2 REFERENCE STANDARDS**A. American Society of Sanitary Engineering (ASSE)**

1. 1012 – Backflow Preventer with Intermediate Atmospheric Vent.
2. 1013 – Reduced Pressure Principle Backflow Preventers.

B. ASTM International (ASTM):

1. A48/A48M – Standard Specification for Gray Iron Castings.
2. B62 – Standard Specification for Composition Bronze or Ounce Metal Castings.
3. B88 – Standard Specification for Seamless Copper Water Tube.
4. C858 – Standard Specification for Underground Precast Concrete Utility Structures.
5. D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
6. D1785 – Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
7. D2241 – Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
8. D2466 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
9. D2922 – Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

10. D3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

C. American Welding Society (AWS):

1. A5.8 – Specification for Filler Metals for Brazing and Braze Welding.

D. American Water Works Association (AWWA):

1. C510 – Double Check Valve – Backflow Prevention Assembly
2. C511 – Reduced Pressure Principal – Backflow Prevention Assembly
3. C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances.
4. C700 – Cold-Water Meters – Displacement Type, Bronze Main Case.
5. C701 – Cold-Water Meters – Turbine Type, for Customer Service.
6. C800 – Underground Service Line Valves and Fittings.
7. C901 – Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. through 3 in., for Water Service.
8. M6 – Water Meters – Selection, Installation, Testing, and Maintenance.

1.3 SUBMITTALS

- A. See Section 01 33 00 – Submittal Procedures for general submittal requirements and content.
- B. Product Data: Submit data on pipe materials, pipe fittings, corporation stop assemblies, curb stop assemblies, meters, meter setting equipment, service saddles, backflow preventer, and accessories.
- C. Shop Drawings: Provide shop drawings for precast concrete vaults to include detail drawings showing the vault and accessories.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements of the City of Fresno.
- E. Closeout Submittals:
 1. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
 2. Project Record Documents: Record actual locations of piping mains, curb stops, connections, thrust restraints, and invert elevations.
 3. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the City of Fresno standards.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 65 00 – Delivery, Storage, and Handling for general requirements.
- B. Exercise care in handling precast concrete products to avoid chipping, cracking, and breakage.

PART 2 PRODUCTS

2.1 WATER PIPING AND FITTINGS

- A. Copper Tubing: ASTM B88, Type K, annealed:
 - 1. Fittings: ASME B16.26, cast copper, alloy fittings for flared copper tube.
 - 2. Joints: Flared joints.

- B. Polyethylene Pipe: AWWA C901 ASTM D2737, SDR-9, PE3408 for 200psi pressure rating:
 - 1. Fittings: AWWA C901, molded.
 - 2. Joints: Compression with stainless steel inserts.

2.2 CORPORATION STOP ASSEMBLY

Furnish materials in accordance with City of Fresno standard drawings W-1 and W-2.

- A. Manufacturer List:
 - 1. Ford Model FB 1000-6 for 1 ½" service connection.
 - 2. Ford Model FB 1000-7 for 2" service connection
 - 3. Mueller.
 - 4. James Jones
 - 5. Or approved Corporation Stops:
 - 1. Brass or red brass alloy body conforming to ASTM B62.
 - 2. Inlet end threaded for tapping according to AWWA C800.
 - 3. Outlet Service Saddles:
 - 1. Double strap-type, designed to hold pressures in excess pipe working pressure.

2.3 ANGLE METER STOP

Furnish materials in accordance with City of Fresno standard drawings W-1 and W-2.

- A. Manufacturer and Product List:
 - 1. 4205 for 1 ½" service connection.
 - 2. Ford Model FV43-666W for 1 ½" service connection.
 - 3. Ford Model FV43-777W for 2" service connection.
 - 4. No substitutions permitted Stops Meter and Covers:
 - 1. Christy-style METER SETTING EQUIPMENT

- A. by City of Fresno.

2.5 WATER METERS

- A. Provided City of Fresno.

2.6 BACKFLOW PREVENTERS

- A. 1 to 2½-inches:
 - 1. Acceptable Manufacturers:

- a. Subject to compliance with the Contract Documents the following manufacturers are acceptable:
 - 1) Febco Model LF825Y, Watts LF909, Wilkens 975 XL2, Apollo RPLF4A, or approved equal.
 - 2. Materials:
 - a. Lead free bronze body, with lead free bronze internal parts and stainless steel springs.
 - 3. Design Requirements:
 - a. Two independently operating, spring-loaded check valves with replaceable seats; diaphragm-type differential pressure relief valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; two full-port bronze ball valves with stainless steel handles, bronze strainer, and test cocks.
 - b. ANSI B1.20.1 threaded ends.
 - c. Pressure loss not to exceed 14-psi at design flow.
 - d. Comply with ANSI/AWWA C511 standards.
 - e. NSF-61 compliant.
- B. 2½-inch and larger:
- 1. Acceptable Manufacturers:
 - a. Subject to compliance with the Contract Documents the following manufacturers are acceptable:
 - b. In-line style:
 - 1) Febco LF860, Watts LF909, Zurn 375, Apollo RP40, or approved equal.
 - c. Angled N-Pattern style:
 - 1) Febco LF880V, Watts LF909, Zurn 475V, or approved equal.
 - 2. Materials:
 - a. Ductile or cast iron body, with lead free bronze internal parts and stainless steel springs, seats, and disc holder.
 - b. Coating: Fusion bonded epoxy internal and external.
 - 3. Design Requirements:
 - a. Two independently operating, spring loaded check valves with replaceable seats; diaphragm-type differential pressure relief opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two AWWA C509 NRS resilient seated gate valves, and four resilient-seated test cocks.
 - b. Comply with ANSI/AWWA C511 standards.
 - c. UL Classified.
 - d. NSF-61 compliant.
- C. Accessories:
- 1. Provide a backflow preventer enclosure at each installation conforming to City of Fresno standard drawing W-15.
 - 2. Place an insulating blanket conforming to City of Fresno standards over each backflow device.
 - 3. Provide union joints on valves 2½-inches and smaller.

2.7 DOUBLE CHECK VALVE ASSEMBLIES

A. Design Requirements:

1. Furnish double-check assembly and components in accordance with City of Fresno standard drawing W-12.

B. Materials:

1. Comply with ASSE 1012 and AWWA C 510
2. Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

C. Accessories:

1. Provide a backflow preventer enclosure at each installation conforming to City of Fresno standard drawing W-15.
2. Place an insulating blanket conforming to City of Fresno standards over each backflow device.

PART 3 EXECUTION

3.1 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare pipe connections to equipment with flanges or unions.

3.2 INSTALLATION - CORPORATION STOP ASSEMBLY

- A. Make connection for each different kind of water main using suitable materials, equipment, and methods approved by the Engineer.
- B. Screw corporation stops directly into tapped and threaded iron main at 45 degrees to the horizontal on main's circumference; locate corporation stops at least 12-inches apart longitudinally and staggered.
- C. For plastic pipe water mains, provide full support for service clamp for full circumference of pipe, with minimum 2-inches width of bearing area; exercise care against crushing or causing other damage to water mains at time of tapping or installing service clamp or corporation stop.
- D. Use proper seals or other devices so no leaks are left in water mains at points of tapping; do not backfill and cover service connection until approved by the Engineer.

3.3 EXCAVATION

- A. Excavate pipe trench in accordance with Sections 31 23 16 – Trenching, Backfill, and Compaction.

3.4 INSTALLATION - PIPE AND FITTINGS

- A. Install Work in accordance with City of Fresno standards.
- B. Maintain separation of water main from sewer piping in accordance with City of Fresno and State of California standards.
- C. Install pipe to indicated elevation to within tolerance of 5/8-inches.
- D. Route pipe in straight line.
- E. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- F. Install access fittings to permit disinfection of water system performed under Section 33 13 00 – Disinfecting of Water Distribution System.
- G. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.
- H. Establish elevations of buried piping with not less than 42-inches of cover.
- I. Install warning tape continuous over top of pipe 6-inches above pipe line; coordinate with Sections 31 23 16– Trenching, Backfill, and Compaction.
- J. Backfill trench in accordance with Section 31 23 16– Trenching, Backfill, and Compaction.

3.5 INSTALLATION - BACKFLOW PREVENTERS

- A. Backflow preventer installation to conform to City of Fresno standard drawing W-11.
- B. Comply with City of Fresno requirements and State of California requirements in regards to testing and installation requirements.
- C. Install backflow preventer where indicated on the Contract Drawings and in accordance with manufacturer's instructions.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Flush and disinfect system in accordance with Section 33 13 00 – Disinfecting of Water Distribution System.

3.7 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing.

- B. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- C. Perform pressure test on domestic site water distribution system in accordance with AWWA C600.
- D. Pressure test in accordance with Section 40 05 15 – Pipe Testing.

END OF SECTION

SECTION 33 13 00**DISINFECTING OF WATER DISTRIBUTION SYSTEM****PART 1 GENERAL****1.1 SUMMARY****A. Section includes:**

1. Disinfection of potable water distribution and transmission system;
2. Testing and reporting results.

B. Related Sections include but are not necessarily limited to:

1. Section 40 23 61 – Plastic Pipe

C. Measurement and Payment:

1. The contract lump sum price shall include full compensation for all costs and work involved with disinfecting water distribution system piping and hydropneumatic tank.

1.2 REFERENCES**A. American Water Works Association (AWWA):**

1. B300 – Hypochlorites.
2. B301 – Liquid Chlorine.
3. C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances.
4. C651 – Disinfecting Water Mains.

1.3 SUBMITTALS**A. See Section 01 33 00 – Submittal Procedures for general submittal requirements and content.****B. Disinfection Procedure:**

1. Submit procedure description including type of disinfectant and calculations indicating quantities of disinfectants required to produce specified chlorine concentration in accordance with AWWA C651.

C. Furnish copy of discharge permit to Construction Manager.**D. Quality Assurance/Control:**

1. Test Reports: Indicate results comparative to specified requirements.
 - a. Disinfection Report:
 - 1) Type and form of disinfectant used.
 - 2) Date and time of disinfectant injection start and time of completion.
 - 3) Test locations.
 - 4) Name of person collecting samples and State of California Certification.
 - 5) Initial and 24 hour disinfectant residuals in treated water in ppm for each outlet tested.
 - 6) Date and time of flushing start and completion.

- 7) Disinfectant residual after flushing in ppm for each outlet tested.
- b. Bacteriological Report:
 - 1) Date issued, project name, and testing laboratory name, address, and telephone number.
 - 2) Time and date of water sample collection.
 - 3) Name of person collecting samples and Certification.
 - 4) Test locations.
 - 5) Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
 - 6) Coliform bacteria test results for each outlet tested.
 - 7) Certify water conforms, or fails to conform, to bacterial standards.
- c. Water Quality Certificate:
 - 1) Certify water conforms to quality standards of the State of California, suitable for human consumption.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the State of California standards and AWWA C651.
- B. Qualifications:
 1. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section with minimum three years documented experience.
 2. Testing Firm: Company and individual specializing in testing potable water systems, certified by State of California.
 3. Submit bacteriologist's signature and authority associated with testing.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 65 00 – Delivery, Storage, and Handling for general requirements.
- B. Store disinfectants in cool, dry place away from combustibles such as wood, rags, oils and grease.
- C. Handle disinfectants with caution; protect skin and eyes from contact; avoid breathing vapors; wear gloves, aprons, goggles, and vapor masks.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Neutralize disinfectant solution before legally dispose of disinfection solution off site.
- B. Repair damage caused by disinfectant solution and disinfection procedures.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Liquid Chlorine.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify piping system has been cleaned, inspected, and pressure tested.
- B. Obtain a discharge permit from local jurisdiction.

3.2 INSTALLATION

- A. Provide and attach required equipment to perform the Work of this section.
- B. Maintain disinfectant in system for 24-hours.
- C. Flush, circulate, and clean until required cleanliness is achieved; Use municipal domestic water.
- D. Neutralize and discharge water used for disinfection in accordance with discharge permit.
- E. Replace permanent system devices removed for disinfection.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout
Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Disinfection, Flushing, and Sampling:
 - 1. Disinfect pipeline installation in accordance with AWWA C651.
 - 2. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system.
 - 3. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
 - 4. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory and certified operator to sample, test and certify water quality suitable for human consumption.

END OF SECTION

SECTION 33 31 13**SANITARY SEWER PIPE****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Sanitary sewer pipe and fittings starting 5-feet beyond the operations building.
 2. Wye branches and tees.
 3. Sanitary laterals.
 4. Connection to existing manholes.
- B. See Section 22 00 00 – Plumbing for sewer piping within the building to 5-feet beyond.
- C. Related Sections include but are not necessarily limited to:
1. Section 03 30 00 – Cast-In-Place Concrete.
 2. Section 31 23 00 – Earthwork.
 3. Section 31 23 16 – Trenching Backfilling and Compaction.
 4. Section 33 01 32 – Sewer and Manhole Testing.
 5. Section 33 05 13 – Manholes and Structures
- D. Measurement and Payment:
1. The contract lump sum price shall include full compensation for all costs and work involved with furnishing and installing sanitary sewer pipe.

1.2 REFERENCES

- A. ASTM International (ASTM):
1. A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 2. C443 – Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
 3. C923 – Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
 4. D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 5. D2729 – Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 6. D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 7. D3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
 8. F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 9. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

10. F679 – Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
 11. F794 – Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
 12. F949 – Standard Specification for Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings.
- B. AmericanAmericanAmerican National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
3. C150 – ANSI Standard for the Thickness Design of Ductile Iron Pipe.
 4. C151 – American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
 5. C153 – AmericaSUBMITTALS
- A. See Section 01 33 00 - Submittal Procedures for general submittal requirements and content.
- B. Shop Drawings:
1. Indicate layout of sewer system and appurtenances. Show size, materials, components of system and burial depth.
- C. Product Data:
1. Submit catalog cuts and other pertinent data indicating proposed materials, accessories, details, and construction information.
- D. Quality Assurance:
1. Reports: Submit reports indicating field tests made and results obtained.
 2. Instructions: Furnish Manufacturer's installation instructions and indicate special procedures required to install Products specified.
 3. Manufacturer's Certificate: Certify products meet or exceed specified requirements of the City of Fresno.
- E. Closeout Submittals:
1. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
 2. Project Record Documents: Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with City of Fresno standards.
- B. All materials shall be new and all similar materials shall be from the same manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 65 00 – Delivery, Storage, and Handling for general requirements.

- B. Block individual and stockpiled pipe lengths to prevent moving.

1.6 FIELD MEASUREMENTS

- A. Verify field measurements and elevations are as indicated.

1.7 COORDINATION

- A. Coordinate the Work with City of Fresno.
- B. Notify affected utility companies minimum of 72 hours prior to construction.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Pipe and Fittings:
 - 1. 4 through 15-inch: ASTM D3034, SDR 35 PVC.
 - 2. 18 through 27-inch: ASTM F679, SDR 35 PVC.
- B. Joints:
 - 1. ASTM D3213 Push-on joints
- C. Gaskets:
 - 1. ASTM F477 elastomeric.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

3.2 PREPARATION

- A. Remove large stones or other hard matter capable of damaging pipe or impeding consistent backfilling or compaction.
- B. Protect and support existing sewer lines, utilities, and appurtenances.
- C. Maintain profiles of utilities. Coordinate with other utilities to eliminate interference. Notify ENGINEER where crossing conflicts occur.

3.3 PIPE INSTALLATION

- A. Excavate pipe trench in accordance with Section 31 23 16 – Trenching, Backfill, and Compaction.
- B. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.
- C. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches, and compact to 90 percent.
- D. Install pipe, fittings, and accessories in accordance with ASTM D2321. Lay pipe to slope gradients noted on drawings; with maximum variation from indicated slope of 1/8-inch in 10-feet. Begin at downstream end and progress upstream laying bell and spigot pipe with bells upstream.
- E. Place pipe in a shaped bed of material. Excavate suitable bell holes so entire barrel of pipe rests on the bedding material.
- F. Keep pipe and fittings clean until work is completed and accepted by /Engineer. Cap open ends during periods of work stoppage.

3.4 INSTALLATION OF WYE BRANCHES AND TEES

- A. See City of Fresno Standard Drawings S-8 and S-9.
- B. Install wye branches or pipe tees at locations indicated on Drawings concurrent with pipe laying operations. Use standard fittings of same material and joint type as sewer main.
- C. Maintain minimum 5-foot separation distance between wye connection and manhole.
- D. Use saddle wye or tee with stainless steel clamps for taps into existing piping. Mount saddles with solvent cement or gasket and secure with metal bands. Layout holes with template and cut holes with mechanical cutter.

3.5 INSTALLATION - SANITARY LATERALS

- A. Construct laterals from wye branch to terminal point at 5-feet from building.
- B. Maintain 3-foot minimum depth of cover over pipe.
- C. Install watertight plug, braced to withstand pipeline test pressure thrust, at termination of lateral. Install temporary marker stake extending from end of lateral to 12 inches above finished grade. Paint top 6 inches of stake with fluorescent orange paint.

3.6 CONNECTION TO MANHOLES

- A. Connect to manholes in accordance with Section 33 05 13 – Manholes and Structures.

3.7 BACKFILLING

- A. Backfill around sides and to top of pipe with cover fill in maximum lifts of 8 inches, tamp in place and compact to 90 percent. Maintain optimum moisture content of bedding material to attain required compaction density.
- B. Backfill around sides and to top of pipe in accordance with Section 31 23 16 – Trenching, Backfill, and Compaction.
- C. Install tracer wire and warning tape per Section 40 05 13 –General Pipe Requirements, Couplings, and Accessories.

3.8 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Pressure Test: Test in accordance with Section 33 01 32 – Sewer and Manhole Testing.
- C. Infiltration Test: Test in accordance with Section 33 01 32 – Sewer and Manhole Testing.
- D. Deflection Test: Test in accordance with Section 33 01 32 – Sewer and Manhole Testing.
- E. Request inspection prior to placing bedding.
- F. When tests indicate Work does not meet specified requirements, remove work, replace, and retest.
- G. Frequency of Compaction Tests on site work. One test for each lift for each 500-LF of pipe or fraction thereof.
- H. Provide Sewer video record in accordance with City of Fresno Standards.

3.9 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 41 13**STORM DRAIN PIPING****PART 1 GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Storm drain piping and accessories.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 03 30 00 – Cast-In-Place Concrete: Concrete type for catch basin manhole foundation slab construction.
 - 2. Section 03 60 00 – Grout.
 - 3. Section 31 23 00 – Earthwork.
 - 4. Section 31 23 16 – Trenching Backfilling and Compaction.
 - 5. Section 33 05 13 – Manholes and Structures.
 - 6. Section 40 05 50 – Process Valves
- C. Measurement and Payment:
 - 1. The contract lump sum price shall include full compensation for all costs and work involved with furnishing and installing storm drain piping and appurtenances.

1.2 REFERENCES

- A. City of Fresno Standard Drawings
- B. Fresno Metropolitan Flood Control District
- C. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. M86 – Concrete, Sewer, Storm Drain, and Culvert Pipe.
 - 2. M170 – Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 3. M198 – Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets.
 - 4. M252 – Corrugated Polyethylene Drainage Tubing.
 - 5. M278 – Class PS 50 Polyvinyl Chloride (PVC) Pipe.
 - 6. M288 – Geotextiles.
- D. ASTM International (ASTM):
 - 1. A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. A746 – Standard Specification for Ductile Iron Gravity Sewer Pipe.
 - 3. C76 – Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 4. C361, Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
 - 5. C443 – Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

6. C655, Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe.
 7. C969 – Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
 8. C924 – Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method.
 9. D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 10. D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 11. D2729 – Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 12. D2922 – Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 13. D3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 14. D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 15. F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- E. American Water Works Association (AWWA):
1. M9, Installation of Concrete Pipe.

1.3 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures for general submittal requirements and content.
- B. Product Data:
1. Submit manufacturer's technical product data and installation instructions for storm drainage system materials and products.
- C. Maintenance Data:
1. Submit maintenance data and parts lists for storm drainage system materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual; in accordance with requirements of Division 1 – General Requirements.
- D. Shop Drawings:
1. Pipe: Before fabrication, submit for approval plans showing pipe dimensions, joints, reinforcement and other details.
 2. Shop Drawings: Concrete Box Culverts: Submit for approval shop drawings for fabrication, bending, and placement of concrete reinforcement showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of bars. Include special bars required about openings. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures". Also submit for approval working plans and design calculations for false work; the design shall comply with Caltrans Standard Specifications, Subsection 51-1.06 False work.

- E. Quality Assurance:
1. Design Data:
 - a. Submit design calculations that provide evidence as to the adequacy of the design of pipe proposed for use in the Work. The evidence must be approved in writing by the Engineer before the pipe for the project is manufactured.
 2. Certificates:
 - a. Mill Certificates: Reinforcing: Submit 2 copies of steel producer's certificates of mill tests for reinforcing steel which indicates that the reinforcing steel meets specified requirements.
 - b. Mill Certificates: Cement: Submit 2 copies of manufacturer's certification for each shipment of cement used in the manufacturing of pipe indicating that the chemical composition of the cement meets the requirements of ASTM C 150.
 - c. Laboratory's Certificate: Pipe: Before delivering pipe to the job site, submit an independent testing laboratory report certifying that the pipe and fittings are in accordance with ASTM Standards herein referenced. Forward copies of these reports to the Engineer; no pipe will be accepted without these reports.
 - d. Aggregates: Submit 2 copies of manufacturer's certificates for fine and course aggregates indicating that grading, soundness and abrasion meet the requirements of ASTM C33.
 3. Test Reports:
 - a. Absorption Test Reports: Submit test reports, which demonstrate and certify that the absorption test requirements for pipe to be used on this project are in accordance with ASTM C76.
 - b. 3-Edge and Crush Test Results: Submit test reports, which demonstrate and certify that the test requirements for pipe to be used on this project are in accordance with ASTM C76.
- F. Closeout Submittals:
1. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
 2. Project Record Documents:
 - a. Accurately record actual locations of pipe runs, connections, manholes, inlets, catch basins, and invert elevations.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the State of California and Fresno Metropolitan Flood Control District Standards.
- B. Qualifications:
1. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five years documented experience.
 2. Installer: Company specializing in performing work of this section with minimum three years experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 65 00 – Delivery, Storage, and Handling for general requirements.
- B. Block individual and stockpiled pipe lengths to prevent moving.
- C. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- D. Do not place pipe flat on ground. Cradle to prevent point stress.
- E. Store UV sensitive materials out of direct sunlight.

PART 2 PRODUCTS

2.1 STORM DRAINAGE PIPING

- A. Reinforced Concrete Pipe: ASTM C76, Class III with Wall Type B; bar reinforcement; inside nominal diameter of inches per plan, bell and spigot ends.
 - 1. Fittings: Reinforced concrete.
 - 2. Joints: ASTM C443 rubber compression gasket.
- B. Substitution (Only if approved by Engineer):
 - 1. Pipe: ASTM D3034, SDR 35, PVC inside nominal diameter of inches per plans, bell and spigot style rubber ring sealed gasket joint.
 - 2. Fittings: PVC.
 - 3. Joints: ASTM F477, elastomeric gaskets.

2.2 DRAINAGE STRUCTURES

- A. Drainage Structures: Precast and cast-in-place concrete, as specified in Section 33 05 13 – Manholes and Structures.
 - 1. Manholes: 48-inches diameter, depth per plan feet deep, cast iron covers inscribed with “STORM SEWER” per City of Fresno and Fresno Metropolitan Flood Control District.
 - 2. Provide inlets, grates, and slide gates as indicated on plans.

2.3 SOURCE QUALITY CONTROL

- A. Conduct testing methods to evaluate physical properties of pipe in full compliance with ASTM C497. Report full results test showing compliance with referenced standard.
- B. Determine acceptability of RCP in all diameters and classes by the following tests:
 - 1. Conduct three-edged bearing test as specified to determine the loading to produce a 0.01-inch crack extending 12-inches or more.
 - a. Complete bearing test prior to shipment date of lot tested.
 - 2. Conduct crushing test, as specified on cured concrete cylinders.
 - a. Achieve specified 28-day design compressive strength prior to shipment date of lot tested.

PART 3 EXECUTION

3.1 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- B. Remove large stones and other hard or organic matter capable of damaging piping or impeding consistent backfilling or compacting.

3.2 EXCAVATION AND BEDDING

- A. Excavate pipe trench in accordance with Section 31 23 16 –Trenching Backfill, and Compaction. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Dewater excavations to maintain dry conditions to preserve final grades at bottom of excavation.
- C. Provide sheeting and shoring in accordance with Section 31 23 16 –Trenching Backfill, and Compaction.
- D. Place bedding material at trench bottom, level materials in continuous layers not exceeding 8 inches compacted depth.
- E. Install pipe on compacted subgrade meeting bedding requirements. Cradle bottom 20 percent of diameter to avoid point load.

3.3 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.
- B. Place pipe on minimum 4-inch-deep bed of bedding, or compacted subgrade meeting bedding requirements.
- C. Lay pipe to slope gradients noted on drawings with maximum variation from indicated slope of 1/8-inch in 10-feet. Connect pipe to drainage structures.
- D. Refer to Section 31 23 16 –Trenching Backfill, and Compaction for backfilling and compacting requirements. Do not displace or damage pipe when compacting.

3.4 FIELD QUALITY CONTROL

- A. Request inspection prior to placing aggregate cover over pipe.
- B. Compaction Testing: In accordance with ASTM D1557.
- C. When tests indicate work does not meet specified requirements, remove work, replace and retest.

- D. Frequency of Compaction Tests: Every 100-feet.
- E. Infiltration Test: Test in accordance with ASTM 969.
- F. Pressure Test: Test in accordance with ASTM C924 and ASTM 1103, depending on size of pipe.
- G. Provide video record in accordance with City of Fresno standards.

3.5 PROTECTION OF FINISHED WORK

- A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is complete.
 - 1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
 - 2. Repair or replace pipe that is damaged or displaced from construction operations.

END OF SECTION