Project Manual

For

Parlier High School
Stadium Replacement

603 Third Street, Parlier, CA 93648

Bidding and Contract Requirements
And
Specifications

for the

Parlier Unified School District
900 S Newmark Avenue, Parlier, CA 93648

Date: February 17, 2026

PBK Project No.: 250093
DSA Application No.: 02-124002

Project Manual

for:

Parlier High School

Stadium Replacement

for the

Parlier Unified School District

Date: February 9, 2026

PBK Project No.: 250093

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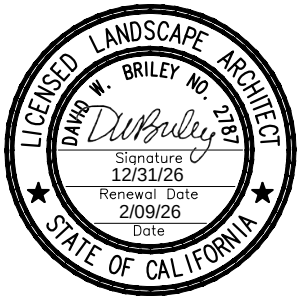

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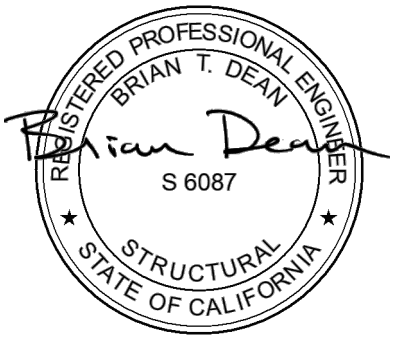

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SECTION 01 10 00 SUMMARY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work by Owner.
5. Work under separate contracts.
6. Future Work.
7. Purchase contracts.
8. Owner furnished products.
9. Owner furnished, Contractor installed products.
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specification and Drawing conventions.
14. Miscellaneous provisions.

1.3 PROJECT INFORMATION

A. Project Identification: Parlier High Stadium Replacement
1. Project Location: **Parlier High School**
603 Third Street
Parlier, CA 93648

B. Owner: **Parlier Unified School District**
1. Owner's Representative: Rene Rodriguez

C. Architect: **PBK Architects**
7790 N Palm Avenue
Fresno, CA 93711

D. Consultants: Additional design professionals have been retained who have prepared designated portions of the Contract Documents. Refer to “stamp” page this project manual.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following: Replacement of Existing Stadium.

B. Type of Contract: Project will be constructed under a Lease-Leaseback.

1.5 WORK SEQUENCE

A. The Work shall be completed according to the Project schedule set forth below.

B. Occupancy: The Project may be occupied by District staff as shown below. If so, the premises will be occupied whether or not the Work is completed, regardless of time extensions (if any).

C. Any Work performed after this date will need to be fully coordinated with District and will be limited to after school hours or on weekends.

D. Project Schedule:

The following schedule summarizes the major activity dates:

Activity	Dates and Time (As Applicable)
1st Advertisement	May 14, 2026
2nd Advertisement	May 21, 2026
Non-Mandatory Pre-Bid Job Walk	June 1, 2026
Last Day to receive Bids RFI's	June 4, 2026
Last Day to issue Addendums	June 9, 2026
Bid Opening Date	June 16, 2026
Board Award of Contract	June 23, 2026
Anticipated NTP date	July 6, 2026
Substantial Completion Based on 13 Months	August 6, 2027

1.6 WORK BY OWNER AND UNDER SEPARATE CONTRACTS

A. The Owner reserves the right to let separate contract for work outside of the scope of this Contract. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. Owner Furnished Products: Refer to specifications section 01 64 00 " Owner Furnished Products"

1.7 ALTERNATES

A. This project contains Alternates. Refer to specifications section 01 23 00 "Alternates"

1.8 REPORTS:

A. A Geotechnical Engineering Investigation Report has been prepared for the project by Certerra RMA GeoScience; Project No. 11-252521-0, dated January, 23, 2026. A copy of the report is available (for reference only) at the cost of reproduction. Contact Certerra RMA GeoScience if a copy of the report is desired

1.9 ACCESS TO SITE

A. Use of Site:
   1. Limit use of Project site to Work in areas and areas within the Contract limits indicated. Do not disturb portions of site beyond areas in which the Work is indicated:
      a. Limits: The Drawings indicate the limits of the construction operations.
      b. Driveways, Walkways, and Entrances:
         1) Keep driveways. parking areas, students drop off and pick up points, loading areas, and entrances serving premises clear and available to Owner,

Owner's employees, the students, 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 onsite.

B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in weathertight condition throughout construction period. Repair damage caused by construction operations.

C. Refer to Appendix G.1 at the end of the Specifications Manual.

1.10 COORDINATION WITH OCCUPANTS

A. Owner Limited Occupancy of Completed Areas of Construction:
   1. Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work:
      a. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
      b. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
      c. Before limited Owner occupancy, ensure mechanical and electrical systems are fully operational, and required tests and inspections and start up procedures are successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
      d. Upon occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.11 WORK RESTRICTIONS

A. Work Restrictions: Comply with restrictions on construction operations. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On Site Work Hours: Limit Work in the existing building to normal working hours, Monday through Friday, unless otherwise indicated. Coordinate with Owner when it is necessary to extend working hours or Work on weekends.

C. Existing Utility Interruptions:
   1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and after providing temporary utility services according to requirements indicated:
      a. Notify Owner not less than two (2) weeks in advance of proposed utility interruptions.
      b. Obtain Owner’s written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors:
   1. Coordinate operations that result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner:
      a. Notify Owner not less than two (2) weeks in advance of proposed disruptive operations.

b. Obtain Owner's written permission before proceeding with disruptive operations.

E. Controlled Substances, Firearms, and Explosive Devices: Use of tobacco products, controlled substances, firearms, and explosive devices on the site is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on site. Require personnel to use identification tags at all times.

G. Employee Screening:
1. Comply with Owner's requirements for drug and background screening of Contractor personnel working on site:
a. Maintain list of approved screened personnel with Owner's representative.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content:
1. 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:
a. 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.
b. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Drawing Coordination:
1. 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:
a. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
b. Abbreviations: Materials and products are identified by abbreviations.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 CONSTRUCTION SCHEDULE

A. The Owner has a critical need for the Work to begin upon Notice to Proceed and shall be Substantially Complete by the date specified on the Project Schedule**. There will be No Extensions of Time due to weather.**

END OF SECTION - 01 10 00

SECTION 01 11 00.01 - PLAYING FIELD SUMMARY OF WORK

PART 1 – GENERAL

1.0 LOCATION OF WORK

A. The Synthetic Turf Manufacturer or Prime Contractor must be fully licensed in the State of California as a Prime Contractor to perform all the necessary work associated with the synthetic turf playing field renovations as identified in the construction design documents, details, permits, and written specifications hereby described as the “Contract Documents”. The location of work is limited to the Parlier Unified School District:

B. PROJECT DATA

i. Project Identification: Parlier High Stadium Replacement
1. Project Location: **Parlier High School**
603 Third Street
Parlier, CA 93648

ii. Owner: **Parlier Unified School District**
1. Owner's Representative: Rene Rodriguez

iii. Architect: **PBK Architects**
7790 N Palm Avenue
Fresno, CA 93711

iv. Consultants: Additional design professionals have been retained who have prepared designated portions of the Contract Documents. Refer to “stamp” page this project manual.

C. It is the Parlier Unified School District preference to have the synthetic turf manufacturer as the Prime Contractor for the playing field, running track, and field events assuming they are fully licensed in the State of California as a Prime Contractor.

D. The Parlier Unified School District intends on awarding the above project under a single contract to the final selected synthetic turf manufacturer that is fully licensed in the State of California as a Prime Contractor.

E. This contract shall be awarded based on a Lump Sum Fee Contract.

F. The Parlier Unified School District reserves the right after award, to alter any portions of the design or specifications to include additional site improvements with the successful synthetic turf manufacturer or Prime Contractor.

1.1 DESCRIPTION OF WORK

A. The synthetic turf manufacturer or the Prime Contractor hereby described as the “Contractor” shall be required to provide all the necessary costs, transportation, qualified construction supervision, site demolition, synthetic turf product materials, infill mix, cooling technology product, skilled labor, professional land surveying, construction stakeouts, all as-built surveys, specialized construction equipment, fuel, 3rd party independent soil laboratory testing, laboratory sampling, collection, shipping, QA/QC ongoing aggregate material testing, subsurface field base construction, subsurface drainage collection system, perimeter concrete curbing header, pressure-treated wooden nailer, stainless steel anchors, drainage gravel aggregate, finished topping stone aggregate, finished topping stone aggregate planarity, shock/drainage pad, color layout and material plan, seaming plan, synthetic turf adhesive

products, inlaid field markings, specialized sports equipment, specialized maintenance equipment, maintenance equipment training, 3rd party independent field surface infiltration testing, as-built surveys of the final compacted subgrade, subsurface drainage collection system, drainage gravel layer, finished topping stone, letter of acceptance from the approved synthetic turf manufacturer for topping stone surface planarity, 3rd party independent H.I.C./G-max field testing based on the highest intended athletic sports field use, and the final surface grading in accordance with the contract documents.

B. All bidders are fully responsible for all cut and fill calculations and provide all the quantities of materials necessary for the delivery of a complete athletic playing field system in accordance with the final contract documents. All bidders must formally submit a written request for approval for any alternative manufacturer's products for review and approval by the Playing Field Designer, Architect, and the Parlier Unified School District 15 days prior to the bid submission deadline date.

C. PLAYING FIELD AND FIELD EVENT PROGRAMMING DESIGN STANDARDS:

1. The playing field, field events, and running track shall conform with the latest version of the National Federation of High Schools (NFHS) guidelines.

D. SYNTHETIC TURF ATHLETIC PLAYING FIELD, FIELD EVENTS, AND RUNNING TRACK:

1. Multi-Use Athletic Playing Field: The multi-use synthetic turf athletic playing field renovation have been designed to accommodate American Tackle Football, Soccer, and field events use. Please refer to the contract documents for actual athletic field programming requirements. The entire multi-use playing field will be synthetic turf with colored inlaid field markings.

2. Running Track Resurfacing: The Parlier Unified School District has requested the construction of a new 9 lane running track with a 1-meter safety lane. The scope of work shall include the removal of unsuitable soils under the running track, compacted subgrade, compacted base layer, installation of virgin asphalt mix, rubberized track surfacing material in accordance with the approved track surfacing manufacturer recommendations. The Contractor shall be fully responsible for all the necessary running track lane markings in accordance with the NFHS.

3. Field Venus + Events: The Contractor shall be responsible for the installation of all the necessary materials for the current field events shown on design documents. All construction shall be in accordance with most current NFHS guidelines. The pricing shall include all the stadium field event runways, pole vault, triple/long jump, high jump area, and all concrete runways, and high jump area shall have rubberized track surfacing applied. The current program also includes throwing events for hammer throw, protective throwing cage, discus, and shotput. These events outside the stadium playing field shall be priced as part of this scope of work.

E. TYPICAL SYNTHETIC TURF PROFILE:

1. The typical profile section is as follows:

a) Synthetic Turf Product: 2.0"- 2.50" pile height min. pending on programming use. Synthetic Turf must be produced in the United States. No products from China or Spain will be approved for use as part of this project.

b) Infill Product Mix: Silica Sand, SBR, and cooling technology infill mix. *Two-layer or three-layer mix.*

c) Subsurface Shock/Drainage pad system is mandatory as part of the system profile.

d) 8" X 12" perimeter concrete header curb, 4,000 p.s.i. min. for the attachment of the pressure-treated wooden nailer board and the final synthetic turf product and infill mix. No Bend-A-Board shall be permitted. Unless approved by the Parlier Unified School District and the selected synthetic turf manufacturer.

e) 1" of finished topping stone aggregate. Uniform in infiltration and planarity.

f) 5" of drainage gravel aggregate. Uniform in infiltration and planarity.

g) 1” X 12” slotted flat-panel tile field laterals, spaced 20’ on center in a herringbone pattern layout and installed at a sloped of 0.50%.

h) Perimeter perforated subsurface drainage collector piping system will be constructed approximately 8’ inside the synthetic turf concrete curb header. Installed perimeter piping trenches shall be 2X times the pipe diameter or greater and installed at a slope of 0.50%.

i) Filter fabric shall be installed over the entire compacted sub-grade and along all sides and bottoms of pipe trenching and secured behind the concrete perimeter header curb.

j) An ACO trench drainage system (non-sloped) has been designed between the running track and high jump area.

F. SYNTHETIC TURF COOLING TECHNOLOGY:

1. The Parlier Unified School District desires to utilize “cooling technology” in the infill mix to reduce the overall synthetic turf surface temperature. The cooling technology must be a product that is not required to be water-activated. The use of cork, coconut husk, nutshell, or similar organics materials and floatable products in the infill mix are strictly prohibited for use in conjunction with this project. No water source is being provided as part of this project for activating the cooling technology.

G. RUNNING TRACK SURFACING PRODUCT:

1. The based bid product manufacturer for the rubberized running track and field event surfacing shall be Rekortan BSS or approved equivalent.

H. The above information is solely provided to assist the Prime Contractor (Bidders) in understanding the magnitude of the scope of work being requested. The Prime Contractor (Bidders) should not consider the above information provided as the complete summary of work. The Prime Contractor (Bidders) shall review the contract design documents and written specifications for the complete scope of the work.

1.2 REQUIRED SUBMITTALS BY THE PRIME CONTRACTOR

A. The Synthetic Turf Manufacturer and or Prime Contractor Qualification Requirements: At the time of formal bid submission, the Synthetic Turf Manufacturer or Prime Contractor must provide a copy of proof that the corporation is currently a State of California General Contractor. Failure to provide this proof of license will result in the bidder submission package being non-responsive. The Parlier Unified School District retains the legal right to approve or reject any bidder’s submission that fails to provide or meet the following minimum requirements.

B. All bidders must provide a minimum of ten (10) similar Professional, NCAA, and high schools synthetic turf projects located in the State of California. All similar projects must have also been completed within the last five (5) years that are similar in scope and size.

1. The ten (10) similar projects submitted must include the following minimum information:

a) Name of the project.

b) Location and description of the project.

c) The overall original playing field budget, completion date, and if the project was constructed within the original playing field budget and schedule.

d) Contact name, title, phone number, Team, University, High School, City, or County responsible for overseeing the work performed.

All bidders are encouraged to update the contact names and phone numbers before bid submission.

2. All bidders must provide five (5) successful similar projects in the State of California (Only) that are utilizing the same proposed synthetic turf system profile utilizing a turf between 2.0” – 2.50” in pile height, total

pile weight, and all infill mix products. All successful projects submitted must include the following minimum information:

a) Name of the project.

b) Location and description of the project.

c) The overall original playing field budget, completion date, and if the project was constructed within the original playing field budget and schedule.

d) Contact name, title, phone number, Team, University, High School, City, or County responsible for overseeing the work performed.

All bidders are encouraged to update the contact names and phone numbers before bid submission.

C. All bidders and sub-contractors shall submit a written statement signed by a corporate officer; "stating that the corporation has NO present, past legal action or pending arbitration or litigation against the corporation over the past ten (10) years as a direct result of product manufacturing failure, poor workmanship, unresolved warranty issues, failure to meet owners expectations, non-payment to any sub-contractors and has been terminated based on failure to meet the project schedule". If any of the above conditions have occurred, a written letter of explanation shall be required to be submitted for review by the Parlier Unified School District.

D. All bidders shall prepare an organization chart identifying all key staff member names, years of experience, direct roles and responsibilities, and contact cellphone numbers, and e-mail addresses. The organization chart must also list any subcontractors being utilized during any pre-or post-construction activities.

E. The Playing Field Contractor at the time of formal bid submission shall submit the playing field contractor qualifications that meet the following minimum standards: Currently holds a valid certified playing field builder's certification from the American Sports Builders Association in both classifications as a CFB and CFB-S.

F. The Parlier Unified School District Project Manager, Playing Field Designer, and Architect reserve the right to conduct field visits and contact the previous similar project references listed or not listed as part of this evaluation process.

G. All bidders shall submit a preliminary master bar chart for all tasks associated with the construction of the stadium playing field, running track, and field events that list the types of work to be performed and the length of time for each task and key milestone dates.

H. The Prime Contractor shall not enter into any formal sub-contractor agreements without prior written approval by the Parlier Unified School District Project Manager.

I. The Prime Contractor shall submit the name of the synthetic turf manufacturer product, pile height, type of material, type of rubber, infill mix ratio, total pile weight, the total system installed weight, and a list of projects that this proposed synthetic turf manufacturer product and infill mix has been successfully installed over the last 5 years in the State of California.

J. The following are the recommended synthetic turf manufacturer: The Prime Contractor must submit the synthetic turf manufacturer "Product Fact Sheet" at the time of submission of bid for evaluation by the owner and design team. Listed in alphabetical order.

a. AstroTurf
Mr. Steve Coleman
T: (813) 777-7677
E: Steve.coleman@astroturf.com

PART 2 – PRODUCTS (REQUIRED AT TIME OF BID SUBMISSION)

2.1 GRAVEL MATERIAL TESTING

A. All bidders shall submit the name and location of the source of finished topping stone aggregate and drainage gravel aggregate for the subsurface drainage aggregate profile. **The source of the material must be from a single source quarry for the construction of the stadium playing field**. **Quarry quality control testing is not valid for submission**. All material aggregate testing must be conducted by a certified 3rd party independent testing laboratory. The following laboratory testing shall be conducted and provided at the time of bid submission based on the following specifications:

1. Gravel Drainage Material and Finished Topping Stone aggregates:

The gravel drainage material and finished topping stone aggregates testing shall meet the following requirements using ASTM Method C136:

Gravel Drainage Material 3/4-inch minus		**Finished Topping Stone** (1/4 chip minus)	
Sieve Size	**% Passing by Weight**	**Sieve Size**	**% Passing**
1-1/2”	100		
1”	100		
3/4”	95-100		
1/2”	55-85	1/2”	100
3/8”	40-75	3/8”	100
1/4”	25-65	1/4”	85-100
No. 8	0-40	No. 8	35-75
No. 16	0-20	No. 16	10-55
No. 30	0-10	No. 30	0-30
No. 60	0-8	No. 60	0-15
No. 100	0-4	No. 100	0-5
No. 200	0-2	No. 200	0-4

I. All aggregate stones shall be angular. Rounded or river stone is not acceptable.

1. Any aggregate with shell or shell fragments is not acceptable. The test report shall denote any sample received that contains any shell or shell fragments.

3. Bridging Characteristics:

a) $3 < \frac{\text{D50 base stone}}{\text{D50 top stone}} < 6$ b) $\frac{\text{D85 top stone}}{\text{D15 base stone}} < 2$

4. Drainage Characteristics:

a) Permeability for Gravel drainage material shall be greater than 150”/hr.

b) Permeability for Finished topping stone shall be greater than 50”/hr.

c) Porosity for the Finished topping stone and Gravel drainage material shall be greater than 25% when compacted and saturated.

5. All gravel drainage material and finished topping stone aggregates will be tested in accordance with the Micro Deval Method (ASTM D6928).

Testing Method	Criteria
Micro Deval (ASTM D6928)	Not to exceed a loss of Material greater than 18%

a) All certified 3rd party independent laboratory material testing shall be paid by the bidder at no additional cost to the School District.

b) The approved 3rd party independent testing laboratory shall be responsible for all testing data. No multiple testing agent data shall be submitted.

PART 3 – EXECUTION

3.1 GUARANTEE AND WARRANTY

A. General Synthetic Turf Warranty: Warranty shall cover, in general, the usability of the turf surface, accessories, use characteristics, and suitability of the installation. All items covered by the warranty are to be replaced or repaired with new materials, including installation at the sole expense of the warranting contractor for the period of (10) years to the Parlier Unified School District, for the designated uses enumerated as follows:

1. Football (Full Contact Football)
2. Soccer
3. Marching Band
4. Physical Exercises
5. Physical Education Activities
6. Pneumatic rubber-tired maintenance and service vehicles.
7. Pedestrian traffic.

B. The 10-year warranty for all synthetic turf products, system drainage profile, which includes the infill mix performance. All other work and products shall have a one-year workmanship and product warranty from the date of issuance of final substantial compliance by the project Architect.

END OF SECTION - 01 11 00.01

SECTION 01 23 00 ALTERNATES

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. This Section specifies administrative and procedural requirements governing alternate items.

1.2 RELATED REQUIREMENTS:

A. Section 00 2113: Instructions to Bidders (Not a part of DSA approval).

B. Section 00 4100: Bid and Acceptance Form (Not a part of DSA approval).

C. Section 01 1100: Summary of Work.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.1 SPECIFIC:

A. Bid item is an amount proposed by bidder and stated on the Bid and Acceptance Form for certain Work defined in the Bidding Documents that may be added to or deducted from the base bid amount if OWNER decides to accept a corresponding change in either the amount of Work to be completed, the Contract Documents, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The amount added or deducted from the base bid is the net addition to or deducted from the base bid to incorporate or deduct into the project scope of work. Unless noted otherwise, no other adjustments are made to the Contract Amount, Milestones or the Contract Time.

3.2 PROCEDURES:

A. CONTRACTOR shall modify or adjust affected adjacent Work as necessary to completely and fully integrate any OWNER accepted Alternate.

1. Include as part of each bid item, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

B. Accepted Alternates are subject to the same terms and conditions as other Work of the Contract Documents.

C. OWNER reserves the right to accept Alternates for a period of ninety days after bid opening date.

D. Schedule: A schedule of Alternates is included at the end of this Section. The Contract Documents referenced in the schedule identify necessary requirements to complete the Work described as specified for each Alternate.

3.3 SCHEDULE OF ALTERNATES: (Refer to drawings for Additional Information)

A. DEDUCTIVE ALTERNATE NO. 1: VISITOR BLEACHERS - refer to bleachers manufacturers drawing in the bid documents for additional information. If Deductive Alternate No. 1 is accepted, the footprint area of the Visitor's Bleachers receives Decomposed Granite as specified in the Base bid.

B. DEDUCTIVE ALTERNATE NO. 2: SCOREBOARD - refer to architectural, civil / landscape, structural and electrical drawings and specifications for additional information. If Deductive Alternate No. 2 is accepted, the existing scoreboard remains in its current state.

C. DEDUCTIVE ALTERNATE NO. 3: TEAM ROOM AND STORAGE / LAUNDRY ROOM - refer to architectural, civil / landscape, structural, electrical, mechanical and plumbing drawings and specifications for additional information. If Deductive Alternate No. 3 is accepted, 944 SF (+/-) of building area from building 'N' (Team Room and Storage / laundry Room) is deleted from the project. Refer to new layouts without the Team room and Storage / Laundry Room in the trades referenced above.

D. DEDUCTIVE ALTERNATE NO. 4: THREE NEW FLAGPOLES - refer to architectural, civil / landscape and electrical drawings and specifications for additional information. If Deductive Alternate No. 4 is accepted, the existing flag poles remain as their current state, and the new flagpoles are omitted.

E. DEDUCTIVE ALTERNATE NO. 5: CMU FENCE ENCLOSURE NORTH OF BUILDING 'L' WELDING SHOP, INCLUDING CMU FENCE, GATES AND ALL RELATED ITEMS - refer to architectural and civil / landscape drawings and specifications for additional information. If Deductive Alternate No. 5 is accepted, the existing area directly north of the existing welding shop (CMU footprint), building 'L' remains in its current state.

F. DEDUCTIVE ALTERNATE NO. 6: AC PAVING AND CONCRETE IN AND AROUND CMU ENCLOSURE NORTH OF BUILDING 'L' SHOP AND FIRE ACCESS ROAD WIDENING - refer to architectural and civil / landscape drawings and specifications for additional information. If Deductive Alternate No. 6 is accepted, the existing area directly north of the existing shop, building 'L' remains in its current state and minimal work is required around the existing Fire Lane between the new Accessible parking Stalls and existing shop building 'L'.

G. DEDUCTIVE ALTERNATE NO. 7: DISCUS THROW EVENT FIELD PROTECTIVE NETTING / FENCE - refer to Play Field drawings and specifications for additional information. If Deductive Alternate No. 7 is accepted, the additional protective netting / fencing is omitted.

END OF SECTION

SECTION 01 25 00 | SUBSTITUTION PROCEDURES AND FORM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

A. Products: Items purchased for incorporation in the Work, regardless if specifically purchased for the Project or taken from Contractor's previously purchased stock. The term *product* is inclusive for material, equipment, assembly, system, and other terms of similar intent.

B. Substitutions:
   1. Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor:
      a. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
      b. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

A. Substitution Requests:
   1. Submit three (3) 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:
      a. Substitution Request Form: Use facsimile of form provided in Project manual.
      b. Documentation:
         1) 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, which are 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.

2. Architect's Action:
   a. If necessary, Architect will request additional information or documentation for evaluation within seven (7) 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 (7) days of receipt of additional information or documentation, whichever is later:
      1) Forms of acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
      2) Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 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.

B. Coordination: Revise or adjust affected Work as necessary to integrate Work of the approved substitutions.

PART 2 PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions: Substitutions are considered as changes to the Drawings and shall be submitted to DSA.

B. Substitutions for Cause:
   1. Submit requests for substitution immediately on discovery of need for change, but not later than 30 days prior to time required for preparation and review of related submittals:
      a. Conditions:
         1) Architect will consider Contractor's request for substitution when the following

conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a) Requested substitution is consistent with the Contract Documents and will produce indicated results.
b) Substitution request is fully documented and properly submitted.
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.

C. Substitutions for Convenience:

1. Architect will consider requests for substitution if received prior to the Award of the Contract. Requests received after that time may be considered or rejected at discretion of Architect:
   a. Conditions:
      1) Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
         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) Substitution request is fully documented and properly submitted.
         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 USED)

REQUEST FOR SUBSTITUTION

Contract Award Date:
_____

To:
_____

Substitution Requested By:
_____

Project Name and Number:
_____

We submit for consideration the following product in lieu of the specified item for the above Project:

Drawing No.	Specification Section	Paragraph	Specified Item
_____	_____	_____	_____

Proposed Substitution:
_____

Request is made during ____ bidding _____ construction period.

Submit in accordance with Section 01 33 00: Submittal Procedures.

1. Technical data, cost, and time information relating to changes to Construction Documents required by proposed substitution.
2. Detailed comparison of proposed substitution and specified product including but not limited to warranty, significant variations, qualifications of manufacturers, and maintenance.
3. Complete technical data, detailed shop drawings, samples, installation procedures, warranty, and substantiating data marked to indicate equivalent quality and performance to that specified. Manufacturer sell sheets are not acceptable submittals.

Cause for Request:
_____

Cost saving realized by Owner:
_____

Does substitution affect adjacent Work, Construction Documents, cost, schedule, quality, and related submittals?

Yes _____ No ____ On separate sheet, explain affects to the Work, documents, schedule, and submittals.

Contractor is responsible for associated costs and additional time of the proposed substitution including costs incurred by the Architect for evaluation of substitution and changes to the documents. Describe costs for changes to design, including engineering and detailing costs caused by the requested substitution.
_____

_____

Warranty: Is the warranty for the requested substitution the same or different? Yes ____No ____

Explain Differences:
_____

Contractor Certification:

In making a request for substitution, Contractor certifies that:

1. The proposed substitution has been thoroughly researched and evaluated and determined as equivalent or superior to specified product or material, will fit into space provided, and is compatible with adjacent materials.
2. It will provide the same or better warranty for the proposed substitution at no additional cost to the Owner.
3. Cost data is complete and includes related costs under the Contract. Claims for additional costs related to the proposed substitution that may subsequently become apparent are waived.
4. It will assume the responsibility for delays and costs caused by the proposed substitution, if approved, are accepted by Contractor unless delays are and costs are specifically mentioned and approved in writing by the Owner and the Architect.
5. It will assume the liability for the performance of the substitution and its performance.
6. The installation of the proposed substitution is coordinated with the Work and with changes required for the Work.
7. It will reimburse the Owner and Architect for evaluation and redesign services associated with the substitution request and, when required, by approval by governing authorities.

Submitted by:

_____
Signature of Contractor Title

_____
Firm Telephone Date

Signature shall be by the individual authorized to legally bind Contractor to the above terms. Failure to provide legally binding signature will result in retraction of approval.

FOR USE BY ARCHITECT:

____ Accepted ____ Accepted as Noted
____ Not Accepted ____ Received Too Late

By: _____

Date: _____

Remarks: _____

FOR USE BY OWNER:

____ Accepted ____ Not Accepted

By: _____

By: _____

Remarks: _____

END OF SECTION - 01 25 00

SECTION 01 25 13 | PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Specified product compliance, and product quality assurance.
   2. Specific administrative and procedural requirements for handling requests for substitutions made prior to award of Contract.
   3. Requirements for product delivery, storage, and handling.

B. Related Requirements:
   1. Instructions to Offerors:
      a. Product options and procedures for submittal of requests for substitutions during the Proposal period.

1.3 DEFINITIONS

A. Definitions used in this Section are not intended to negate the meaning of other terms used in the Contract Documents, including such terms as “specialties,” “systems,” “structure,” “finishes,” “accessories,” “furnishings,” “special construction,” and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry:
   1. Equipment: Product with operational parts, regardless of whether motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.
   2. Materials: Products that must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form units of work.
   3. Products:
      a. Items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the Project or taken from Contractor’s previously purchased stock. The term “product” as used herein includes the terms “material”, “equipment”, “system”, and other terms of similar intent:
         1) Named products: Identified by the use of the manufacturer’s name for a product, including such items as a make or model designation as recorded in published product literature of the latest issue as of the date of the Contract Documents.
         2) Specified products: Same as Named Products.

1.4 QUALITY ASSURANCE

A. Source Limitations:
   1. To the fullest extent possible, provide products of the same generic kind from a single source for each unit of work:
      a. When it is discovered that specific products are available only from sources that do not or cannot produce an adequate quantity to complete Project requirements in a timely manner, consult with the Architect/Engineer for a determination of what product quantities are most important before proceeding. The Architect/Engineer will designate those qualities, such as visual, structural, durability, or compatibility

that are most important. When the Architect/Engineer's determination has been made, select products from those sources that produce products that possess the most important qualities to the fullest extent possible.

B. Compatibility of Options:
   1. Compatibility of products is a basic requirement of product selection. When Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected must be compatible with other products previously selected, even if the products previously selected were also Contractor options. The complete compatibility between the various choices available to Contractor is not assured by the various requirements of the Contract Documents but must be provided by Contractor.

C. Or Equal:
   1. Where the phrase "or equal," "or equivalent," "or Architects approved equal," or similar phrasing occurs in the Proposal Documents, do not assume that materials, equipment, or methods of construction will be approved by the Architect unless the item has been specifically approved for this Work by the Architect.
   2. The decision of the Architect shall be final.

D. Where a proposed substitution involves the work of more than one (1) contractor, each contractor involved shall cooperate and coordinate the work with all other contractors involved, so as to provide uniformity and consistency and to assure the compatibility of products.

E. Foreign Product Limitations:
   1. "Foreign products" as distinguished from "domestic products" are defined as products that are either manufactured substantially (50 percent or more of value) outside of the United States and its possessions, or produced or supplied by entities known to be substantially owned (more than 50 percent) by persons who are not citizens of, nor living within the United States and its possessions.
   2. Except under one (1) of the following conditions, select and provide domestic, not foreign, products for inclusion in the Work:
      a. There is no domestic product available that complies with the requirements of the Contract Documents.
      b. Available domestic products that comply with the requirements of the Contract Documents are available only at prices or other procurement terms that are substantially higher (25 percent or more) than for available foreign products that comply with the requirements of the Contract Documents.
      c. At the discretion of Architect or Owner.
   3. Final determination and acceptance will be the responsibility of Architect.

1.5 SUBSTITUTIONS OF PRODUCTS

A. The products described in the Proposal Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. The materials and equipment named in, and the procedures covered by these Specifications have been selected as a standard because of quality, particular suitability, or record of satisfactory performance. It is not intended to preclude the use of equal or better materials or equipment, provided that same meets the requirements of the particular Project and is approved in an Addendum as a substitution prior to the submission of proposals.

B. No substitution will be considered prior to receipt of proposals unless written request for approval has been received by the Architect at least seven (7) days prior to the date for receipt of proposals. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute

including Drawings, cuts, performance and test data, and any other information necessary for an evaluation. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

C. If the Architect approves any proposed substitution prior to receipt of proposals, such approval will be set forth in an Addendum. Offerors shall not rely upon approvals made in any other manner.

D. The Architect and Owner reserve the right to disapprove the use of any manufacturer who in their judgment is unsuitable for use on the Project and that decision will be final.

E. The following are not considered as substitutions:
1. Revisions to the Contract Documents, when requested by Owner, Architect, or any of their consultants are considered as changes, not substitutions.
2. Specified Contractor options on products and construction methods included in Contract Documents are choices made available to Contractor and are not subject to the requirements specified in this Section for substitutions.
3. Except as otherwise provided in the Contract Documents, Contractor’s determination of and compliance with governing authorities does not constitute substitutions, nor does it constitute a basis for change orders.

F. The following may be considered as a reason for a request for substitution:
1. The request is directly related to an “or approved equal” clause or similar language in the Contract Documents.
2. The specified product or method of construction cannot be provided within the Contract Time in accordance with the paragraph below concerning availability of specified items.
3. The specified product or method of construction cannot receive necessary approval by a governing authority, but the requested substitution can be approved.
4. A substantial advantage is offered to Owner, in terms of cost, time, energy conservation, or other consideration of merit, after deducting offsetting responsibilities Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to Architect/Engineer for redesign and evaluation services, the increased cost of other work by Owner or separate contractors, and similar considerations.
5. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, but Contractor certifies that the substitution will overcome the incompatibility.
6. The specified product or method of construction cannot be coordinated with other materials, but Contractor certifies that the proposed substitution can be coordinated with them.
7. The specified product or method of construction cannot provide a warranty required by the Contract Documents, but Contractor certifies that the proposed substitution provides the required warranty.

G. Availability of Specified Items:
1. Verify prior to submittal of Proposal that all specified items will be available in time for installation during orderly and timely progress of the Work:
   a. In the event specified items will not be so available, notify the Architect prior to receipt of Proposals. Submit Request for Substitutions in accordance with this Section.
   b. The request will not be considered if the product or method cannot be provided as a result of Contractor’s failure to pursue the Work promptly or coordinate activities properly.
2. Costs of delays because of non-availability of specified items, when such delays could have been avoided by Contractor, will be back-charged as necessary and shall not be borne by Owner.

H. A request constitutes a representation that Offeror:
   1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
   2. Will provide same warranty for substitution as for specified product, except when inability to provide specified warranty is reason for request for substitution as described above.
   3. Will coordinate installation and make changes to other work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Will reimburse Owner and pay for all costs, including Architect/Engineer's redesign and evaluation costs resulting from the use of the proposed substitution, or for review or redesign of services associated with re-approval by authorities having jurisdiction.

I. No substitutions will be considered after the Award of Contract.

1.6 SUBSTITUTION REQUEST SUBMITTAL

A. Requests for Substitutions:
   1. Submit three (3) copies of each request for substitution. In each request, identify the product or fabrication or installation method to be replaced by the substitution. Include related Specifications Section and Drawing numbers, and complete documentation showing compliance with the requirements for substitutions. Include, as appropriate, with each request, the following information:
      a. Product data, drawings, and descriptions of products, fabrication, and installation procedures.
      b. Samples, where applicable or requested.
      c. A detailed comparison of the significant qualities of the proposed substitution with those of the Work originally specified. Significant qualities may include elements such as size, weight, durability, performance, and visual effect, where applicable.
      d. Coordination information, including a list of changes or modifications needed by other parts of the Work and to construction performed by Owner and separate contractors that will become necessary to accommodate the proposed substitution.
      e. A statement indicating the effect the substitution will have on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
      f. Cost information, including a proposal of the net change, if any, in the Contract Sum.
      g. Certification by Contractor to the effect that, in Contractor's opinion, after thorough evaluation, the proposed substitution will result in work that in every significant respect is equal to, or better than, the Work required by the Contract Documents, and that it will perform adequately in the application indicated. Include Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
      h. A statement indicating that Contractor will reimburse Owner and pay for all costs, including Architect/Engineer's re-design and evaluation costs resulting from the use of the proposed substitution.

B. Work-Related Submittals: Contractor's submittal of, and Architect/Engineer's acceptance of, shop drawings, product data, or samples related to work not complying with the Contract Documents, does not constitute an acceptance or valid request for a substitution, nor approval thereof.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General:
1. Deliver, store, and handle products in accordance with manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft. Control to prevent overcrowding of construction spaces or overloading of structure. In particular, coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss:
   a. Deliver products to the site in the manufacturer's sealed containers or other packaging system, complete with labels intact, and instructions for handling, storage, unpacking, installing, cleaning, and protecting.
   b. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of product.
   c. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
   d. Store products at the site or in a bonded and insured off-site storage facility or warehouse in a manner that will facilitate inspection and measurement of quantity or counting of units. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
   e. Store heavy materials away from the Project structure or in a manner that will not endanger the supporting construction.

PART 2 PRODUCTS

2.1 GENERAL PRODUCT COMPLIANCE

A. General:
1. Requirements for individual products are indicated in the Contract Documents; compliance with these requirements is in itself a Contract requirement. These requirements may be specified in any one (1) of several different specifying methods, or in any combination of these methods. These methods include the following:
   a. Proprietary.
   b. Descriptive.
   c. Performance.
   d. Compliance with Reference Standards.
2. Compliance with codes, compliance with graphic details, allowances, and similar provisions of the Contract Documents also have a bearing on the selection process.

B. Procedures for Selecting Products:
1. Contractor's options in selecting products are limited by requirements of the Contract Documents and governing regulations. They are not controlled by industry traditions or procedures experienced by Contractor on previous construction projects. Required procedures include, but are not limited to, the following for the various indicated methods of specifying:
   a. Proprietary and semi-proprietary Specification requirements:
      1) Single product name: Where only a single product or manufacturer is named, provide the product indicated, unless the Specification indicates the possible consideration of other products. Advise Architect/Engineer before proceeding, when it is discovered that the named product is not a reasonable or feasible solution.
      2) Two (2) or more product names: Where two (2) or more products or manufacturers are named, provide one (1) of the products named, at Contractor's option. Exclude products that do not comply with Specification requirements. Do not provide or offer to provide an unnamed product, unless the Specification indicates the possible consideration of other products.

Advise Architect/Engineer before proceeding where none of the named products comply with Specification requirements or are not feasible for use. Where products or manufacturers are specified by name, accompanied by the term “or approved equal” or similar language, comply with this Section regarding substitutions to obtain approval from Architect/Engineer for the use of an unnamed product.

b. Nonproprietary Specification requirements: Where the Specifications name products or manufacturers that are available and may be incorporated in the Work, but do not restrict Contractor to the use of these products only, Contractor may, at his option, use any available product that complies with the Contract requirements.
c. Descriptive Specification requirements: Where the Specifications describe a product or assembly generically, in detail, listing the exact characteristics required, but without use of a brand name, provide products or assemblies that provide the characteristics indicated and otherwise comply with Contract requirements.
d. Performance Specification requirements: Where the Specifications require compliance with indicated performance requirements, provide products that comply with the specific performance requirements indicated, and that are recommended by the manufacturer for the application indicated. The manufacturer’s recommendations may be contained in published product literature, or by the manufacturer’s individual certification of performance. General overall performance of a product is implied where the product is specified for specific performances.
e. Compliance with standards, codes, and regulations: Where the Specifications require only compliance with an imposed standard, code, or regulation, Contractor has the option of selecting a product that complies with Specification requirements, including standards, codes, and regulations.
f. Visual matching: Where matching an established sample is required, the final judgement of whether a product proposed by Contractor matches the sample satisfactorily will be determined by Architect. Where there is no product available within the specified product category that matches the sample satisfactorily and also complies with other specified requirements, comply with the provisions of this Section regarding substitutions and other Contract Documents for change orders for the selection of a matching product in another product category, or for noncompliance with specified requirements.
g. Visual selection: Except as otherwise indicated, where specified product requirements include the phrase “…as selected from the manufacturer’s standard colors, patterns, textures…” or similar phrases, Contractor has the option of selecting the product and manufacturer, provided the selection complies with other specified requirements. Architect is subsequently responsible for selecting the color, pattern, and texture from the product line selected by Contractor.
h. Allowances: Refer to individual Sections of the Specifications for an indication of product selections that are controlled by established allowances, and for the procedures required for processing such selections.

C. Producer’s Statement of Applicability: Where individual Specification Sections indicate products that require a “Statement of Applicability” from the manufacturer or other producer, submit a written certified statement from the producer stating that the producer has reviewed the proposed application of the product on the Project. This statement shall affirm that the producer agrees with, or does not object to, Architect/Engineer’s Specification, and that Contractor’s selection of the product on the Project is suitable and proper.

2.2 SUBSTITUTIONS

A. Condition: Contractor’s request for substitution will be received and considered when extensive revisions to Contract Documents are not required, when the proposed changes are in keeping with the general intent of the Contract Documents, when the request is timely, fully documented and properly submitted, and when one (1) or more of the above

conditions are satisfied, all as judged and determined by Architect/Engineer; otherwise, the requests will be returned without action except to record noncompliance with these requirements.

PART 3 EXECUTION

3.1 INSTALLATION OF PRODUCTS

A. General: Except as otherwise indicated in individual Sections of these Specifications, comply with the manufacturer's instructions and recommendations for installation of the products in the applications indicated.

B. Anchor each product securely in place, accurately located, and aligned with other work.

C. Clean exposed surfaces and protect surfaces as necessary to ensure freedom from damage and deterioration at time of acceptance.

D. Products and assemblies shall be installed complete, in-place, watertight, and structurally sound.

3.2 INSTALLATION OF APPROVED SUBSTITUTIONS

A. Coordinate all approved substitutions with adjacent work.

B. Comply with the manufacturer's and/or supplier's instructions and recommendations for installation of the products in the applications indicated.

C. Provide all items required by manufacturer and/or supplier regarding installation, i.e. supplemental supports, anchors, fasteners, painting, etc., whether or not indicated or specified.

END OF SECTION - 01 25 13

SECTION 01 26 00 | CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Section:
   1. Section 01 25 00: Substitution Procedures and Form.

C. Minor Changes in the Work:
   1. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 *Architect's Supplemental Instructions*.

1.3 PROPOSAL REQUESTS

A. Owner Initiated Proposal Requests:
   1. Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications:
      a. Work Change Proposal Requests issued by Architect are not instructions either to stop Work in progress or to execute the proposed change.
      b. Within time specified in Proposal Request after receipt of Proposal Request, submit quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change:
         1) Include list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
         2) Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
         3) Include costs of labor and supervision directly attributable to the change.
         4) Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor Initiated Proposals:
   1. If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect:
      a. Include statement outlining reasons for the change and the effect of the change on the Work. Provide complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
      b. Include list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade

discounts.

d. Include costs of labor and supervision directly attributable to the change.
e. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
f. Comply with requirements in Section 01 25 00: Substitution Procedures and Form if the proposed change requires substitution of one product or system for product or system specified.
g. Proposal Request Form: Use AIA Document G709.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive:
   1. Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order:
      a. Construction Change Directive contains a complete description of change in the Work and designates the method to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of Work required by the Construction Change Directive. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION - 01 26 00

SECTION 01 29 00 | PAYMENT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

A. Pencil Copy: A copy submitted prior to a final/official.

B. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination:
   1. Coordinate preparation of the schedule of values with preparation of Contractor's Construction Schedule:
      a. Coordinate line items in the schedule of values with administrative forms and schedules, including the following:
         1) Application for Payment forms with continuation sheets.
         2) Updated submittal schedule.
         3) Items required to be indicated as separate activities in updated Contractor's Construction Schedule.
      b. Submit the schedule of values to Architect at earliest possible date, but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment. Contractor's standard form or electronic media printout will be considered but must be approved by Owner.

B. Format and Content:
   1. Use Project manual table of contents as a guide to establish line items for the schedule of values. Provide at least one (1) line item for each Specification Section:
      a. Identification:
         1) Include the following Project identification on the schedule of values:
            a) Project name and location.
            b) Name of Architect.
            c) Architect's Project number.
            d) Contractor's name and address.
            e) Date of submittal.
   2. Arrange schedule of values consistent with format of AIA Documents G702/G703.
   3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
      a. Related Specification Section or Division.
      b. Description of the Work.
      c. Name of Subcontractor.

d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent (.01%), adjusted to total 100 percent:
    1) Labor.
    2) Materials.
    3) Equipment rentals.
    4) General Conditions:
        a) Supervisor.
        b) Submittals.
        c) Closeout.
        d) Field Engineering.
        e) Daily Clean-up.
        f) Final Clean-up.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed:
    a. Differentiate between items stored on site and items stored off site. Include evidence of insurance.
6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line item value of unit cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item:
    a. Temporary facilities and other major cost items that are not direct cost of actual Work in place may be shown either as separate line items in the schedule of values or distributed as general overhead expense.
8. Schedule updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATION FOR PAYMENT

A. Submit preliminary (pencil) copy of proposed values to PBK Construction Field Representative and Owner for review by the 20th of the month. Allow four (4) days for comments. Schedule review of the pencil copy during bi-monthly site visits.

B. Once preliminary (pencil) approved, submit four (4) notarized originals of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702 or other similar form approved by Owner.

C. Content and Format: Utilize schedule of values for listing items in Application for Payment.

D. Submit updated construction or recovery schedule with each Application for Payment.

E. Payment Period: Submit at intervals stipulated in Owner/Contractor Agreement. Include Supplementary Conditions of the Contract.

F. Only materials stored on the Project site shall be paid for unless the materials are stored in a bonded warehouse agreed upon by Owner. Periodic review of stored item will be required by the inspector of record.

G. Substantiating Data:

1. When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Items that may be requested by Architect or Owner to substantiate costs include, but are not limited to the following:
   a. Current Record Documents as specified in Section 01 77 00: Closeout Procedures.
   b. Labor time sheets, purchase orders, or similar documentation.
   c. Affidavits attesting to products stored off-site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION - 01 29 00

SECTION 01 29 73 | SCHEDULE OF VALUES - SAMPLE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Schedule of values listing to be edited by Contractor of description of Work, not scheduled value, Work completed, stored materials, total complete, percentage, balance to finish, and retainage. These parts must remain intact.

B. Related Sections:
   1. Section 01 29 00: Payment Procedures.

1.3 DEFINITIONS

A. Pencil Copy: A copy submitted prior to a final/official submission on a monthly basis.

B. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

MATRIX TO START ON NEXT PAGE:

This is a sample illustration:

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Div. 1 - General Reqs.								
	Site Work General Conditions								
	Supervision								
	Mobilization								
	Bonds & Insurance								
	Permits								
	Contractor's Fee								
	Closeout Documents								
	Div. 1 - Total								
	Div. 2 - Existing Conditions								
	Demolition (As applicable)								
	Erosion Control								
	Div. 2 - Total								
	Div. 3 - Concrete								
	Drill Piers								
	Caps & Beams								
	Slab on Grade								
	Cooling Tower Basin								
	Misc Bldg Conc								
	Floor Sealer								
	Rebar Matl								
	Rebar Labor								
	Lt.Wt.Insul Fill - Materials								
	Lt.Wt.Insul Fill - Labor								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 3 - Total								
	Div 4 - Masonry								
	Brickwork - Labor								
	Brickwork - Matls								
	Concrete Masonry - Labor								
	Concrete Masonry - Materials								
	Str. Glazed Tile-Labor								
	Str. Glazed Tile-Materials								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 4 - Total								
	Div 5 - Metals								
	Structural Steel - Labor								
	Structural Steel - Materials								
	Alternating Stairs								
	Misc. Steel - Materials								
	Steel Joists - Materials								
	Lt. Gauge Steel Framing-Labor								
	Lt. Gauge Steel Framing-Matls								
	Metal Decking - Labor								
	Expansion Joint Covers								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Detailing								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 5 - Total								
	Div. 6 - Wood & Plastics								
	Rough Carpentry - Labor								
	Rough Carpentry - Materials								
	Millwork - Labor								
	Millwork - Materials								
	Submittals/Closeout Documents								
	Div. 6 - Total								
	Div. 7 - Thermal and Moisture Protection								
	Waterpfng / Dampprfng-Matls								
	Waterpfng / Dampprfng-Labor								
	Building Insulation - Labor								
	Building Insulation - Materials								
	Fireproofing - Labor								
	Fireproofing - Materials								
	Metal Roof - Labor								
	Metal Roof - Materials								
	Metal Roof Guarantee								
	Built-up Roofing-Labor								
	Built-up Roofing-Materials								
	Built-up Roofing Guarantee								
	Roof Accessories								
	Building Sheet Metal - Labor								
	Building Sheet Metal - Matls								
	Bldg. Sheet Metal Guarantee								
	Roof Curbs								
	Roof Hatches								
	Sealants								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 7 - Total								
	Div. 8 - Doors and Frames								
	Finish Carpentry/Door - Labor								
	Finish Hardware - Matls								
	Thresholds & Seals - Matls+B66								
	Hollow Metal Doors & Frames - Matls								
	Plastic Faced Doors-Matls								
	Overhead Doors & Grilles-Labor								
	Overhead Doors & Grilles - Matls								
	Alum. Entrances & Store-fronts - Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	fronts - Matls								
	Alum. Windows - Labor								
	Alum Windows - Matls								
	Glass & Glazing-Labor								
	Glass & Glazing-Matls								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 8 - Total								
	Div. 9 - Finishes								
	Lath & Plaster-Labor								
	Lath & Plaster-Matls								
	Gypsum Wallboard								
	Systems - Labor								
	Gypsum Wallboard								
	Systems - Matls								
	Ceramic Tile - Labor								
	Ceramic Tile - Matls								
	Quarry Tile - Labor								
	Quarry Tile - Matls								
	Terrazzo-Labor								
	Terrazzo-Matls								
	Acoustic Clg. - Labor								
	Acoustic Clg. - Matls								
	Acoustic Wall Panels								
	Resilient Flooring - Labor								
	Resilient Flooring - Matls								
	Carpet - Labor								
	Carpet - Matls								
	Athletic Flooring - Materials								
	Athletic Flooring - Labor								
	Floor Sealer								
	Painting - Labor								
	Painting - Mtls								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 9 - Total								
	Div. 10 - Specialties								
	Visual Display Boards &								
	Tackboards - Materials								
	Visual Display Boards &								
	Tackboards - Labor								
	Toilet Partitions - Labor								
	Toilet Partitions - Matls								
	Louvers								
	Aluminum Flag Pole								
	Graphics								
	Lockers								
	Cubicle Curtains & Track								
	Fire Extinguisher Cabinets								
	Demountable Partitions-Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App	This App					
	Demountable Partitions-Matls Shelving Toilet Room Accessories-Matls Toilet Room Accessories-Lbr Submittals/Closeout Documents Supervision Clean-up								
	Div. 10 - Total								
	Div. 11 - Equipment Stage Curtains Misc. Appliances Food Service Eqpt-Labor Food Service Eqpt-Matls Submittals/Closeout Documents Supervision Clean-up								
	Div. 11 - Total								
	Div. 12 - Furnishings Horizontal Blinds Projection Screens Casework - Labor Casework - Matls Science Casework - Labor Science Casework - Matls Submittals/Closeout Documents Supervision Clean-up								
	Div. 12 - Total								
	Div. 13 - Specialties Stage Curtains and Draperies Music Instrument Storage Bleachers Press Box Pre-eng. Metal Bldg. Stadium Seating Submittals/Closeout Documents Supervision Clean-up								
	Div. 13 - Total								
	Div. 14 - Conveying Systems Platform Lifts Elevators Submittals/Closeout Documents Supervision Clean-up								
	Div. 14 - Total								
	Div. 21, 22 - Plumbing Shop Drawings As-Builts/Closeout/ O&M Manuals Sanitary Underground – Labor								

Item No.	Description of Work	Scheduled Value	Work Completed Previous App.	Work Completed This App.	Stored Materials	Total Completed	%	Balance To Finish	Retainage
	Sanitary Underground - Matls								
	Storm Underground - Labor								
	Storm Underground - Matls								
	Domestic Water - Labor								
	Domestic Water - Matls								
	Plumbing Insulation - Matls								
	Plumbing Insulation - Labor								
	Gas Piping - Matls								
	Gas Piping - Labor								
	Grease Trap								
	Plumbing Fixtures - Matls								
	Plumbing Fixtures - Labor								
	Coordination Drawings								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 21, 22 Plumbing - Total								
	Div. 23 - Mechanical								
	Shop Drawings								
	As-Builts/Closeout/ O&M Manuals								
	Chillers - Matls								
	Chillers - Labor								
	Cooling Towers - Matls								
	Cooling Towers - Labor								
	Boilers - Matls								
	Boilers - Labor								
	AHU's - Matls								
	AHU's - Labor								
	Fans - Matls								
	Fans - Labor								
	Grilles - Matls								
	Grilles - Labor								
	Ductwork - Matls								
	Ductwork - Labor								
	Pumps - Mtls								
	Pumps - Labor								
	Water Treatment - Labor								
	Water Treatment - Matls								
	Isolation - Labor								
	Isolation - Matls								
	Pipe Flex - Matls								
	Pipe Flex - Labor								
	Connections								
	Sheet Metal - Matls								
	Sheet Metal - Labor								
	Duct Insulation - Matls								
	Duct Insulation - Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Pipe Insulation - Matls								
	Pipe Insulation - Labor								
	VAV Boxes - Materials								
	VAV Boxes - Labor								
	Refrigerant Monitor - Matls								
	Refrigerant Monitor - Labor								
	Unit Heaters - Materials								
	Unit Heaters - Labor								
	Startup								
	Controls - Matls								
	Control - Labor								
	Engineer / Submittals								
	Modules / End Devices								
	Low Voltage Wiring								
	Startup								
	Closeout Documents								
	Fire Sprinkler								
	Engineer / Submittals								
	Piping - Materials								
	Piping - Labor								
	Equipment - Materials								
	Equipment - Labor								
	Trimout - Materials								
	Trimout - Labor								
	Pipe, Valves, Fittings - Labor								
	Pipe, Valves, Fittings - Matls								
	Misc. - Matls								
	Insulation - Matls								
	Insulation - Labor								
	Sanitary Above Slab-Labor								
	Sanitary Above Slab-Matls								
	Storm Above Slab - Labor								
	Storm Above Slab - Matls								
	Gas - Labor								
	Gas - Matls								
	Fixtures - Labor								
	Fixtures - Matls								
	Permits								
	Coordination Drawings								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 23 Mechanical - Total								
	Div. 26 - Electrical								
	Mobilization+B220								
	Shop Drawings								
	As-Builts/Closeout/ O&M Manuals								
	Underground								
	Conduit - Labor								
	Conduit - Matl								
	Wire - Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Wire - Matls								
	Feeder Wire - Labor								
	Feeder Wire - Matls								
	Switches/Recpt.								
	Switchgear - Labor								
	Switchgear - Matls								
	Temporary - Materials								
	Temporary - Labor								
	Gas Generator - Materials								
	Gas Generator - Labor								
	Fixtures - Labor								
	Fixtures - Matls								
	Communications - Labor								
	Communications - Matls								
	Fire Alarm - Labor								
	Fire Alarm - Matls								
	Security - Labor								
	Security - Matls								
	Low Voltage Ltng Sys-Matls								
	Low Voltage Ltng Sys-Labor								
	Voice System - Materials								
	Voice System - Labor								
	Video System - Materials								
	Video System - Labor								
	Data System - Materials								
	Data System - Labor								
	Master Clock - Materials								
	Master Clock - Labor+B277								
	Coordination Drawings								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 26 - Total								
	Divs. 31, 32 and 33 - Earthwork, Exterior Improvements and Utilities								
	Site Clearing & Grubbing								
	Building Pad - Materials								
	Building Pad - Labor								
	Paving Subgrade								
	Signage / Striping								
	Bike Racks								
	Landscaping - Materials								
	Landscaping - Labor								
	Hydro Mulch - Materials								
	Hydro Mulch - Labor								
	Irrigation - Materials								
	Irrigation - Labor								
	Earthwork								
	Finish Grading								
	Stabilization - Materials								
	Stabilization - Labor								
	Site Drainage - Materials								
	Site Drainage - Labor								

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Chain Link Fence-Materials								
	Chain Link Fence-Labor								
	Paving - Labor								
	Paving - Materials								
	Sidewalks								
	Submittals/Closeout Documents								
	Supervision Clean-up								
	Div. 31, 32 and 33 - Total								
	General Conditions								
	Mobilization								
	Temp. Facilities								
	Final Cleaning								
	Record Documents/Closeout/ O&M Manuals								
	Supervision								
	Permits								
	Bonds								
	Insurance								
	Allowances								
	Alternates (list)								
	Change Orders								
	A. PR#								
	B. PR#								
	C. PR#								

END OF SECTION - 01 29 73

SECTION 01 31 00 | PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
      a. General coordination procedures.
      b. Coordination drawings.
      c. Pre-installation meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Contractor shall make a reasonable attempt to interpret the Contract Documents before asking the Architect for assistance in interpretation. Requests for Information (RFI) will not be allowed from Sub-Contractors. The Contractor is to evaluate the Sub-Contractor's request and respond if the Contractor deems necessary the RFI will be forwarded to the Architect for a evaluation and response. The Contractor shall arrange the necessary meeting in the field with appropriate Architect's field representative(s) to obtain clarification as needed on items that may need interpretation, clarification and respond appropriately.

1.3 SUBMITTALS

A. Subcontract List:
   1. Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
      a. Name, address, and telephone number of entity performing subcontract or supplying products.
      b. Number and title of related Specification Section(s) covered by subcontract.
      c. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names:
   1. Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and the duties and responsibilities; list address, telephone numbers (home, office, and cellular), and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project:
      a. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.4 COORDINATION PROCEDURES

A. Coordinate construction operations to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations that depend on each other for proper

installation, connection, and operation:

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

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

C. Administrative Procedures:
   1. Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Administrative activities include, but are not limited to, the following:
      a. Preparation of Contractor's Construction Schedule.
      b. Preparation of the schedule of values.
      c. Installation and removal of temporary facilities and controls.
      d. Delivery and processing of submittals.
      e. Progress meetings.
      f. Pre-installation conferences.
      g. Project closeout activities.
      h. Startup and adjustment of systems.
      i. Coordinating inspections and other jurisdictional requirements.
      j. Coordinate OFCI equipment.
      k. Action items and issue logs.

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

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General:
   1. Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on shop drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity:
      a. Content:
         1) Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
            a) Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
            b) Coordinate the addition of trade specific information to the coordination drawings by multiple contractors in sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.

c) Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
d) Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e) Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f) Indicate required installation sequences.
g) Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization:
1. Floor plans and reflected ceiling plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan Drawings with section drawings where required to adequately represent the Work.
2. Plenum space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures, ductwork, piping, and other components.
3. Mechanical rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire-alarm, and electrical equipment.
4. Structural penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab edge and embedded items: Indicate slab edge locations and sizes, and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and plumbing work - Show the following:
   a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
   b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts, and electrical distribution equipment.
   c. Fire-rated enclosures around ductwork.
7. Electrical work - Show the following:
   a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.
   e. Floor boxes.
8. Fire protection system - Show the following:
   a. Locations of standpipes, mains piping, branch lines, pipe drops, sprinkler heads, and inspector test locations.
9. IDF/MDF rooms: Communications and low voltage (security, data, phone, etc.) audio.
10. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
11. Coordination drawing prints: Prepare coordination drawing prints according to

requirements in Section 01 33 00: Submittal Procedures.

C. Coordination Digital Data Files:
   1. Prepare coordination digital data files according to the following requirements:
      a. File preparation format: Same digital data software program, version, and operating system as original Drawings.
      b. File submittal format: Submit or post coordination drawing files using same format as file preparation.
      c. BIM file incorporation:
         1) Develop and incorporate coordination drawing files into Building Information Model established for Project:
            a) Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
      d. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files:
         1) Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
         2) Digital data software program: Drawings are available in Revit.
         3) Contractor shall execute a data licensing agreement in the form of AIA Document C106.

1.6 PROJECT MEETINGS

A. Schedule and conduct meetings and conferences at Project site unless otherwise indicated:
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
   2. Agenda: Architect to prepare the meeting agenda and distribute the agenda to all invited attendees.
   3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
   4. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
   5. Issue logs: Documentation element of software project management and contains a list of ongoing and closed issues of the Project.

B. Kick-off and Preconstruction Conference:
   1. Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect:
      a. Conduct the conference to review responsibilities and personnel assignments.
      b. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
      c. Agenda: Discuss items of significance that affect progress.
      d. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
      e. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

C. Pre-Installation Conferences:
   1. Conduct a pre-installation trade conference at site before each construction activity that requires coordination with other construction trades:
      a. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Engineer of Record of scheduled meeting dates.
      b. Agenda: Contractor to review progress of other construction activities and preparations for the particular activity under consideration.
      c. Contractor to record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
      d. Reporting: Contractor to distribute minutes of the meeting to each party present and to other parties requiring information.
      e. 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.
      f. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

D. Project Closeout Conference:
   1. Schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion:
      a. Conduct the conference to review requirements and responsibilities related to Substantial Completion.
      b. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.
      c. Agenda: Discuss items of significance that could affect or delay Project closeout.
      d. Minutes: Entity conducting meeting will record and distribute meeting minutes.
      e. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

E. Progress Meetings:
   1. Conduct progress meetings at weekly intervals:
      a. Coordinate dates of meetings with preparation of payment requests.
      b. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.
      c. Agenda:
         1) 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 the Project:
            a) Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      d. Minutes:

1) Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information:
   a) Schedule updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
   b) Six (6) week look-ahead schedules. This may be altered to three (3) week look-ahead as part of an action item when Architect/District request:
      i. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

F. Coordination Meetings:
   1. Conduct coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences:
      a. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with the Project and authorized to conclude matters relating to the Work.
      b. Agenda:
         1) 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 the Project:
            a) Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
            b) Schedule updating: Revise combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
            c) Review present and future needs of each contractor present.
      c. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
      d. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION - 01 31 00

SECTION 01 32 00 | CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Startup construction schedule.
   2. Contractor's Construction Schedule.
   3. Construction schedule updating reports.
   4. Daily construction reports.
   5. Material location reports.
   6. Site condition reports.
   7. Special reports.

1.3 DEFINITIONS

A. Activity:
   1. A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources:
      a. Critical activity: An activity on the critical path that must start and finish on the planned early start and finish times.
      b. Predecessor activity: An activity that precedes another activity in the network.
      c. Successor activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. 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 the project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

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

F. Look-ahead Schedule: Schedule indicating activities scheduled to occur or commence prior

to submittal of next schedule update.

G. Milestones: Measurable, observable, and serve as progress markers (flags) but, by definition, are independent of time (have zero durations); therefore, no Work or consumption of resources is associated with them.

H. Recovery Schedule: Submittal of a revised CPM schedule and a written plan.

I. Resource Loading: The allocation of manpower and equipment necessary for completion of an activity as scheduled.

1.4 SUBMITTALS

A. Submittal Format:
   1. Submit required submittals in the following format:
      a. Working electronic copy of schedule file, where indicated.
      b. PDF electronic file.

B. Startup Diagram: Of size necessary to display entire network for entire construction period. Show logic relationship ties for all activities.

C. Contractor's Construction Schedule:
   1. Initial schedule, of size required to display entire schedule for entire construction period:
      a. Submit a working electronic copy of schedule labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

D. CPM Reports:
   1. Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days:
      a. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
      b. 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.
      c. Total Float Report: List of all activities sorted in ascending order of total float.
      d. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Daily Construction Reports: Submit at monthly intervals.

G. Material Location Reports: Submit at monthly intervals.

H. Site Condition Reports: Submit at time of discovery of differing conditions.

I. Special Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

A. Pre-Scheduling Conference:
   1. Conduct conference at site. Review methods and procedures related to the preliminary

construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
a. Review software limitations and content and format for reports.
b. Verify availability of qualified personnel needed to develop and update schedule.
c. Discuss constraints, including phasing, Work stages, area separations, interim milestones, and partial Owner occupancy.
d. Review delivery dates for Owner furnished products.
e. Review schedule for work of Owner's separate contracts, if any.
f. Review submittal requirements and procedures.
g. Review time required for review of submittals and resubmittals.
h. Review requirements for tests and inspections by independent testing and inspecting agencies.
i. Review time required for Project closeout and Owner startup procedures.
j. Review and finalize list of construction activities to be included in schedule.
k. Review procedures for updating schedule.

B. Coordination:
1. 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:
a. Secure time commitments for performing critical elements of the Work from entities involved.
b. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Time is of the essence to Owner. Commence Work immediately upon issuance of the Notice to Proceed. There is a critical need for the Work to be substantially complete within the time frame identified in the Agreement.

B. Time Frame:
1. Extend schedule from date established for commencement of the Work to date of Substantial Completion and date of final completion:
a. Contract completion date shall not be changed by submission of schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities:
1. Treat each separate area or story as a separate numbered activity for each main element of the Work. Comply with the following:
a. Activity duration: Define activities in terms of number of days anticipated.
b. Procurement activities: Include procurement process activities for 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.
c. 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.
d. Startup and testing time: Include number of days anticipated for startup and testing.
e. Substantial Completion: Indicate completion of all conditions as in advance of date

established for Substantial Completion and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

f. Punch list and final completion: Include a maximum of 30 days for completion of punch list items and final completion.
g. Inspections required by Authorities Having Jurisdiction (AHJ).

D. Constraints:
1. Include constraints and Work restrictions indicated in the Contract Documents and show how the sequence of the Work is affected:
a. Work restrictions:
1) Show the effect of the following items on the schedule:
a) Coordination with existing construction.
b) Limitations of continued occupancies.
c) Uninterruptible services.
d) Partial occupancy before Substantial Completion.
e) Use of premises restrictions.
f) Provisions for future construction.
g) Seasonal variations.
h) Environmental control.
i) Rain days as indicated in Section 01 10 00: Summary.
b. Work stages:
1) Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
a) Submittals.
b) Mockups.
c) Fabrication.
d) Installation.
e) Tests and inspections.
f) Adjusting.
g) Curing.

E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

F. Six (6) Week Look-Ahead Schedule:
1. Prepare schedule indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
a. Unresolved issues.
b. Unanswered Requests for Information.
c. Rejected or unreturned submittals.
d. Notations on returned submittals.
e. Pending modifications affecting the Work and Contract Time.
f. Inspections by AHJ.
g. Trade pre-installation conference.

G. 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. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

I. Contract Modifications: For each proposed Contract modification and concurrent with its

submission, prepare a time impact analysis to demonstrate the effect of the proposed change on the overall Project schedule.

J. Schedule Updating:
1. Concurrent with making revisions to the schedule, prepare tabulated reports showing the following:
a. Identification of activities that have changed.
b. Changes in early and late start dates.
c. Changes in early and late finish dates.
d. Changes in activity durations in workdays.
e. Changes in the critical path.
f. Changes in total float or slack time.
g. Changes in Contract Time.

3.2 REPORTS

A. Daily Construction Reports:
1. Prepare a daily construction report recording information concerning events at the site and submit each month to Architect:
a. List of subcontractors at the Project site.
b. List of separate contractors at the Project site.
c. Approximate count of personnel at the Project site.
d. Rental equipment at the Project site.
e. Material deliveries.
f. High and low temperatures and general weather conditions, including presence of rain or snow.
g. Accidents.
h. Meetings and significant decisions.
i. Unusual events (see special reports).
j. Stoppages, delays, shortages, and losses.
k. Meter readings and similar recordings.
l. Emergency procedures.
m. Orders and requests of AHJ.
n. Change Orders received and implemented.
o. Construction Change Directives received and implemented.
p. Services connected and disconnected.
q. Equipment or system tests and startups.
r. Partial completions and occupancies.
s. Substantial Completions authorized.

B. Material Location Reports:
1. At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from the Project site. Indicate the following categories for stored materials:
a. Material stored prior to previous report and remaining in storage.
b. Material stored prior to previous report and since removed from storage and installed.
c. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report and contact Architect’s field representative. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents to Architect’s field representative.

D. Special Reports:
   1. Submit special reports directly to Owner within 24 hours of an occurrence. Distribute copies of report to parties affected by the occurrence:
      a. Reporting unusual events: When an event of an unusual and significant nature occurs at site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, and response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner and Architect in advance when these events are known or predictable.

3.3 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating:
   1. At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule with a pencil copy of pay application:
      a. 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.
      b. 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.
      c. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution:
   1. Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and interested parties identified by Contractor with a need-to-know schedule responsibility:
      a. Post copies in Project meeting rooms and temporary field offices.
      b. 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 - 01 32 00

SECTION 01 32 33 | PHOTOGRAPHIC DOCUMENTATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Pre-construction photographs.
   2. Periodic construction photographs.
   3. Final completion construction photographs.

1.3 SUBMITTALS

A. Key Plan: Submit key plan of the Project site and building with notation of vantage points marked for location and direction of each photograph or video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Submit image files of digital photographs within three (3) days of taking photographs:
   1. Digital camera: Minimum sensor resolution of eight (8) megapixels.
   2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
   3. Identification:
      a. Provide the following information with each image description in file metadata tag:
         1) Name of the Project.
         2) Name and contact information for the photographer.
         3) Name of Architect.
         4) Name of Contractor.
         5) Date photograph was taken.
         6) Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
         7) Unique sequential identifier keyed to accompanying key plan.

1.4 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three (3) years.

B. Usage Rights:
   1. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of eight (8) megapixels, and at an image resolution of not less than 3200 by

2400 pixels.

PART 3 EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted:
   1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Digital Images:
   1. Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image editing software:
      a. Date and time: Include date and time in file name for each image.
      b. Field office images: Maintain one set of images accessible in the field office at the Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

C. Pre-Construction Photographs:
   1. Before commencement of the Work, take photographs of site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect:
      a. Flag construction limits before taking construction photographs.
      b. Take a minimum of 20 photographs to show existing conditions adjacent to property before starting the Work.
      c. Take a minimum of 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
      d. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

D. Periodic Construction Photographs:
   1. Take a minimum of 20 photographs monthly, coinciding with cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Architect Directed Construction Photographs:
   1. From time to time, Architect will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

F. Time Lapse Sequence Construction Photographs:
   1. Take a minimum of 20 photographs as indicated, to show status of construction and progress since last photographs were taken:
      a. Frequency: Take photographs monthly, coinciding with the cutoff date associated with each Application for Payment.
      b. Vantage Points:
         1) Following suggestions by Architect and Contractor, photographer to select vantage points. During each of the following construction phases, take not less than two (2) of the required shots from same vantage point each time to create a time lapse sequence:
            a) Commencement of the Work, through completion of subgrade construction.
            b) Above grade structural framing.

c) Exterior building enclosure.
d) Interior work, through date of Substantial Completion.

G. Final Completion Construction Photographs:
1. Take a minimum of 20 color photographs after date of Substantial Completion for submission as Project record documents. Architect will inform photographer of desired vantage points:
   a. Do not include date stamp.

H. Additional Photographs:
1. Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum:
   a. Three (3) days' notice will be given, where feasible.
   b. In emergency situations, take additional photographs within 24 hours of request.
   c. Circumstances that could require additional photographs include, but are not limited to, the following:
      1) Special events planned at the Project site.
      2) Immediate follow up when onsite events result in construction damage or losses.
      3) Take photographs at fabrication locations away from site.
      4) Substantial Completion of a major phase or component of the Work.
      5) Extra record photographs at time of final acceptance.
      6) Owner's request for special publicity photographs.

END OF SECTION - 01 32 33

SECTION 01 33 00 | SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Requirements for the submittal schedule and administrative and procedural requirements for submitting shop drawings, product data, samples, and other submittals.

B. Related Section:
   1. Section 01 25 00: Substitution Procedures and Form.

1.3 DEFINITIONS

A. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

B. Portable Document Format (PDF): An open standard file format used for representing documents in a device and display resolution independent fixed layout document format.

C. Submittals: Written and graphic information and physical samples that require Architect's responsive action, or are for information and do not require Architect’s action.

1.4 SUBMITTALS

A. 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. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's Construction Schedule.
   2. Initial submittal: Submit concurrently with construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
   3. Final submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files:
   1. Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals:

a. Upon request, 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:
   1) Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
   2) Digital drawing software program: The Contract Drawings are available in Revit.
   3) Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.
   4) The following digital data files will by furnished for each appropriate discipline:
      a) Floor plans.
      b) Reflected ceiling plans.

B. Coordination:
   1. Coordinate preparation and processing of submittals with performance of construction activities:
      a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
      b. Submit submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
      c. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
      d. 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:
         1) Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time:
   1. Allow time for submittal review, including time for resubmittals. 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:
      a. 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.
      b. Intermediate review: If intermediate submittal is necessary, process in same manner as initial submittal.
      c. Resubmittal review: Allow 15 days for review of each resubmittal.
      d. Sequential review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
      e. Concurrent consultant review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

D. Electronic Submittals:
   1. Identify and incorporate information in each electronic submittal file:
      a. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
      b. Name file with submittal number or other unique identifier, including revision identifier:

1) File name shall use Project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., SLOHSM-06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., SLOHSM-06 10 00.01.A).

c. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

d. Transmittal form for electronic submittals:

1) Use software generated form from electronic project management software acceptable to Owner**,** containing the following information:

a) Project name.
b) Date.
c) Name and address of Architect.
d) Name of Construction Manager.
e) Name of Contractor.
f) Name of firm or entity that prepared submittal.
g) Names of Subcontractor, manufacturer, and supplier.
h) Category and type of submittal.
i) Submittal purpose and description.
j) Specification Section number and title.
k) Specification paragraph number or Drawing designation and generic name for each of multiple items.
l) Drawing number and detail references, as appropriate.
m) Location(s) where product is to be installed, as appropriate.
n) Related physical samples submitted directly.
o) Indication of full or partial submittal.
p) Transmittal number, numbered consecutively.
q) Submittal and transmittal distribution record.
r) Other necessary identification.
s) Remarks.

e. Metadata:

1) Include the following information as keywords in the electronic submittal file metadata:

a) Project name.
b) Number and title of appropriate Specification Section.
c) Manufacturer name.
d) Product name.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

G. Resubmittals:

1. Make resubmittals in same form and number of copies as initial submittal:
   a. Note date and content of previous submittal.
   b. Note date and content of revision in label or title block and clearly indicate extent of revision.
   c. 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 the Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. Submittal Procedure Requirements:
   1. Prepare and submit submittals required by individual Specification Sections:
      a. Submit electronic submittals via email as PDF electronic files:
         1) Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
      b. Submittals: Submit three (3) paper copies of each submittal unless otherwise indicated. Architect will return two (2) copies.
      c. Certificates and certifications submittals:
         1) Provide 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 digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
            b) Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data:
   1. Collect information into a single submittal for each element of construction and type of product or equipment:
      a. 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.
      b. Mark each copy of each submittal to show which products and options are applicable.
      c. Include the following information, as applicable:
         1) Manufacturer's catalog cuts.
         2) Manufacturer's product specifications.
         3) Standard color charts.
         4) Statement of compliance with specified referenced standards.
         5) Testing by recognized testing agency.
         6) Application of testing agency labels and seals.
         7) Notation of coordination requirements.
         8) Availability and delivery time information.
      d. For equipment, include the following in addition to the above, as applicable:
         1) Wiring diagrams showing factory installed wiring.
         2) Printed performance curves.
         3) Operational range diagrams.
         4) Clearances required to other construction, if not indicated on accompanying shop drawings.
      e. Submit product data before or concurrent with samples.
      f. Submit product data in PDF electronic file.

C. Shop Drawings:
   1. Prepare Project specific information, drawn accurately to scale. Do not base shop drawings on reproductions of the Contract Documents or standard printed data:
      a. Preparation:
         1) 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.

b. Sheet size: Except for templates, patterns, and similar full-size drawings, submit shop drawings on sheets size indicated in Specification Section.
c. Submit shop drawings in PDF electronic file.

D. Samples:
1. Submit samples for review of kind, color, pattern, and texture for a check of characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed:
a. Transmit samples that contain multiple related components, such as accessories, together in one submittal package.
b. Identification:
1) 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.
e) Specification paragraph number and generic name of each item.
c. 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:
1) Disposition: Maintain sets of approved samples at the 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.
2) 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.
3) Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
d. 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:
1) Partial sections of manufactured or fabricated components.
2) Small cuts or containers of materials.
3) Complete units of repetitively used materials.
4) Swatches showing color, texture, and pattern.
5) Color range sets.
6) Components used for independent testing and inspection:
a) Number of samples - Submit three (3) sets of samples. Architect will retain two (2) sample sets; remainder will be returned:
i. Submit a single sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
ii. If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a sample, submit at least three (3) sets of paired units that show approximate limits of variations.

E. Product Schedule:
   1. As required in individual Specification Section, prepare a written summary indicating types of products required for the Work and their intended locations. Include the following information in tabular form:
      a. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
      b. Manufacturer, product name, and model number if applicable.
      c. Number and name of room or space.
      d. Location within room or space.
      e. Submit product schedule in PDF electronic file.

F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00: Project Management and Coordination.

G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00: Payment Procedures.

H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 45 23: Testing and Inspecting Services.

I. Closeout Submittals required for Substantial Completion: Comply with requirements specified in Section 01 77 00: Closeout Procedures.

J. Maintenance Data: Comply with requirements specified in Section 01 78 23: Operation and Maintenance Data.

K. 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.

L. 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.

M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that the installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

N. 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.

O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

Q. 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.

R. 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.

S. Research Reports:
1. Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with the building code in effect for the Project. Include the following information:
   a. Name of evaluation organization.
   b. Date of evaluation.
   c. Time period when report is in effect.
   d. Product and manufacturers' names.
   e. Description of product.
   f. Test procedures and results.
   g. Limitations of use.

T. Pre-Construction 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.

U. 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.

V. 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.

W. 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.

2.2 DELEGATED DESIGN SERVICES

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

B. Delegated Design Services Certification:
1. In addition to shop drawings, product data, and required submittals, submit digitally signed PDF electronic file and three (3) paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional:
   a. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 EXECUTION

3.1 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. 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.

3.2 ARCHITECT'S ACTION

A. 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.
   1. Reviewed: Indicates the Architect has reviewed the submittal and takes no exceptions as submitted.
   2. Furnish as Corrected: Submittal is approved, provided modifications noted are properly incorporated. Resubmission is not usually necessary.
   3. Revised and Resubmit: Modifications are required prior to approval. Work cannot proceed until the submittal is revised and resubmitted for further review.
   4. Rejected: Work covered by the submittal is not complete or does not conform the contract documents and cannot proceed. A new submittal needs to be made according to the notations and resubmitted for approval prior to fabrication or construction.

B. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

C. Incomplete submittals are not permitted, will be considered nonresponsive, and will be returned for resubmittal without review.

D. Submittals not required by the Contract Documents will be returned by Architect without action.

END OF SECTION - 01 33 00

SECTION 01 35 16 | ALTERATION PROJECT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Special procedures for alteration Work.

1.3 DEFINITIONS

A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.

B. Consolidate: To strengthen loose or deteriorated materials in place.

C. Design Reference Sample: A sample that represents the Architect's pre-bid selection of Work to be matched; it may be existing work or work specially produced for the Project.

D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish, as approved by Architect.

F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.

K. Retain: To keep existing items that are not to be removed or dismantled.

L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 QUALITY ASSURANCE

A. Coordination:
   1. Alteration Work sub-schedule:
      a. A construction schedule coordinating the sequencing and scheduling of alteration

Work for the entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration Work:

1) Schedule construction operations in sequence required to obtain best Work results.
2) Coordinate sequence of alteration Work activities to accommodate the following:
    a) Owner's continuing occupancy of portions of existing building.
    b) Owner's partial occupancy of completed Work.
    c) Other known work in progress.
    d) Tests and inspections.
3) Detail sequence of alteration Work, with start and end dates.
4) Utility services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
5) Use of elevator and stairs.
6) Equipment data: List gross loaded weight, axle-load distribution, and wheelbase dimension data for mobile and heavy equipment proposed for use in existing structure. Do not use such equipment without certification from Contractor's professional Engineer that the structure can support the imposed loadings without damage.

2. Pedestrian and vehicular circulation: Coordinate alteration Work with circulation patterns within Project building(s) and site. Some Work is near circulation patterns and adjacent to restricted areas. Circulation patterns cannot be closed off entirely and in places can be only temporarily redirected around small areas of Work. Access to restricted areas may not be obstructed. Plan and execute the Work accordingly.

B. Project Meetings for Alteration Work:
1. Preliminary conference for alteration Work: Before commencing alteration Work, conduct conference at site.
2. Coordination meetings:
    a. Conduct coordination meetings specifically for alteration Work at regular intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences:
        1) Review items of significance that affect progress of alteration Work:
            a) Interface requirements of alteration Work with other Project Work.
            b) Status of submittals for alteration Work.
            c) Access to alteration Work locations.
            d) Effectiveness of fire prevention plan.
            e) Quality and work standards of alteration Work.
            f) Change Orders for alteration Work.
        2) Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

C. Materials Ownership:
1. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property:
    a. Carefully dismantle and salvage each item or object in a manner to prevent damage and protect it from damage, then promptly deliver it to Owner where directed.
2. Alteration Work sub-schedule: Submit alteration Work sub-schedule within seven (7) days of date established for commencement of alteration Work.
3. Pre-construction documentation: Show preexisting conditions of adjoining construction and site improvements that are to remain, including finish surfaces, that might be

misconstrued as damage caused by Contractor's alteration Work operations.
4. Alteration Work program: Submit 30 days before Work begins.
5. Fire prevention plan: Submit 30 days before Work begins.

D. Regulatory Requirements:
1. Building code: Comply with the CBC and the IEBC for alteration Work.
2. Fire prevention plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire control devices during each phase or process. Coordinate plan with Owner's fire protection equipment and requirements. Include fire watch personnel's training, duties, and authority to enforce fire safety.
3. Safety and health standard: Comply with ANSI A10.6.
4. Title X requirement: Each firm conducting activities that disturb painted surfaces shall be a *Lead-Safe Certified Firm* according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe Work practices.
5. Accessibility requirements:
a. Comply with applicable requirements:
1) U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG).
2) ICC/ANSI A117.1 Accessible and Useable Building and Facilities.
3) Local Authorities.
4) 2025 California Building Code and the Division of the State Architect.

E. Specialist Qualifications:
1. An experienced firm having a minimum of ten (10) years' documented experience that is regularly engaged in specialty work similar in nature, materials, design, and extent to alteration Work specified:
a. Field supervisor qualifications:
1) Full time supervisors experienced in specialty work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on site when specialty work begins and during its progress. Supervisors shall not be changed during the Project except for causes beyond the control of the specialist firm:
a) Construct new mockups of required Work whenever a supervisor is replaced.

F. Alteration Work Program:
1. Prepare a written plan for alteration Work for the whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole Project alteration Work program with specific requirements of programs required in other alteration Work Sections:
a. Dust and noise control:
1) Include locations of proposed temporary dust and noise control partitions and means of egress from occupied areas coordinated with continuing onsite operations and other known Work in progress:
a) Debris hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.

1.5 STORAGE AND HANDLING OF SALVAGED MATERIALS

A. Salvaged Materials:
1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.

2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

B. Salvaged Materials for Reinstallation:
1. Repair and clean items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

D. Storage:
1. Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures:
a. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on Plans, elevations, sections, or photographs by annotating the identifying marks.
b. Secure stored materials to protect from theft.
c. Control humidity so that it does not exceed 85 percent. Maintain temperatures five (5) degrees F (three [3] degrees C) or more above the dew point.

E. Storage Space:
1. Owner will arrange for limited onsite location(s) for free storage of salvaged material. Storage space includes security and climate control for stored material.
2. Arrange for off-site locations for storage, protection, and insurance coverage of salvaged material that cannot be stored and protected onsite.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Survey of Existing Conditions:
1. Record existing conditions that affect the Work by use of measured drawings, pre-construction photographs, and pre-construction videotapes (when applicable):
a. Comply with requirements specified in Section 01 32 33: Photographic Documentation.

B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

C. Owner's Removals: Before beginning alteration Work, verify in correspondence with Owner that the all of the Owner’s items have been removed.

D. Size Limitations in Existing Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within existing spaces, areas, rooms, and openings, including temporary protection, by 12 inches (300 mm) or more.

3.2 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration Work:
   1. Use proven protection methods, appropriate to each area and surface being protected.
   2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration Work is being performed.
   3. Erect temporary barriers to form and maintain fire egress routes.
   4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration Work.
   5. Contain dust and debris generated by alteration Work and prevent it from reaching the public or adjacent surfaces.
   6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
   7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
   8. Provide supplemental sound control treatment to isolate demolition work from other areas of the building.

B. Temporary Protection of Materials to Remain:
   1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
   2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration Work program.

C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

D. Utility and Communications Services:
   1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration Work before commencing operations.
   2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration Work.
   3. Maintain existing services unless otherwise indicated; keep in service and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

E. Existing Drains:
   1. Prior to the start of Work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin Work in an area until the drainage system is functioning properly:
      a. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration Work.
      b. Protect drains from pollutants. Block drains or filter out sediments allowing only clean water to pass.

F. Existing Roofing: Prior to the start of Work in an area, install roofing protection.

3.3 PROTECTION FROM FIRE

A. Follow Fire Prevention Plan and the Following:
   1. Comply with NFPA 241 requirements unless otherwise indicated.
   2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate Work:
      a. If combustible material cannot be removed, provide fire blankets to cover materials.

B. Heat Generating Equipment and Combustible Materials:
   1. Comply with procedures while performing Work with heat generating equipment or combustible materials, including welding, torch cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
      a. Obtain Owner's approval for operations involving use of open flame or welding or other high heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
      b. As far as practicable, restrict heat generating equipment to shop areas or outside the building.
      c. Do not perform work with heat generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
      d. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
      e. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
      f. Fire watch:
         1) Before working with heat generating equipment or combustible materials, station personnel to serve as a fire watch at each location where work is performed. Fire watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
            a) Train each fire watch in the proper operation of fire control equipment and alarms.
            b) Prohibit fire watch personnel from other work that would be a distraction from fire watch duties.
            c) Cease work with heat generating equipment whenever fire watch personnel are not present.
            d) Have fire watch personnel perform final fire safety inspection each day beginning no sooner than 30 minutes after conclusion of Work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
            e) Maintain fire watch personnel at each area of site until 60 minutes after conclusion of daily work.

C. Fire Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire watch personnel are trained in fire extinguisher and blanket use.

D. Sprinklers:
   1. Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards:
      a. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

3.4 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for the Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration Work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.5 ALTERATION WORK

A. Have specialty work performed only by qualified specialists.

B. Ensure that supervisory personnel are present when Work begins and during its progress.

C. Record existing work before each procedure (pre-construction), and record progress during the Work. Use digital pre-construction documentation photographs or video recordings. Comply with requirements in Section 01 32 33: Photographic Documentation.

D. Perform surveys of site as the Work progresses to detect hazards resulting from alterations.

E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion:
   1. Do not proceed with the Work in question until directed by Architect.

END OF SECTION - 01 35 16

SECTION 01 35 46 | INDOOR AIR QUALITY PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Construction procedures to promote adequate indoor air quality after construction.
   2. Testing indoor air quality after completion of construction.

B. Related Sections:
   1. Section 01 60 00: Product Requirements.

C. Reference Standards:
   1. ASHRAE Std 52.2 – Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
   2. ASHRAE Std 62.1 – Ventilation For Acceptable Indoor Air Quality.
   3. ASHRAE Std 129 – Measuring Air-Change Effectiveness.
   4. ASTM E779 – Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.
   5. SMACNA (OCC) – IAQ Guideline for Occupied Buildings Under Construction.

D. Project Goals:
   1. Dust and airborne particulates:
      a. Prevent deposition of dust and other particulates in HVAC ducts and equipment:
         1) Establish condition of existing ducts and equipment prior to start of alterations.
         2) Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
   2. Airborne contaminants:
      a. Procedures and products have been specified to minimize indoor air pollutants:
         1) Furnish products meeting the Specifications.
         2) Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

E. Verification: HVAC system has been designed to achieve the minimum requirements for ventilation specified in ASHRAE 62.1, with verification provided by MEP Engineer of Record.

1.3 DEFINITIONS

A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics fibrous insulation, and other similar products.

B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.

C. Particulates: Dust, dirt, and other airborne solid matter.

D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.4 SUBMITTALS

A. See Section 01 33 00: Submittal Procedures.

B. Submittals provided by Owner and/or the Commissioning Agent: To be reviewed by Contractor and submitted to Architect for processing.

C. Indoor Air Quality Management Plan:
   1. Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA IAQ Guidelines for Occupied Buildings Under Construction as a guide (submit prior to pre-construction meeting):
      a. Submit not less than 60 days before enclosure of building.
      b. Identify potential sources of odor and dust.
      c. Identify construction activities likely to produce odor or dust.
      d. Identify areas of Project potentially affected, especially occupied areas.
      e. Evaluate potential problems by severity and describe methods of control.
      f. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters, and schedule for replacement of filters.
      g. Describe cleaning and dust control procedures.
      h. Describe measures to be taken for protection of absorptive materials.
      i. Outline requirement for filtration for air handling equipment used during construction to use media with a minimum of MERV 8 at each return grill if permanently installed air handlers are used during construction.

D. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors, or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.

E. Duct and Terminal Unit Inspection Report.

F. Air Contaminant Test Plan:
   1. Identify:
      a. Testing agency qualifications.
      b. Locations and scheduling of air sampling.
      c. Test procedures, in detail.
      d. Test instruments and apparatus.
      e. Sampling methods.

G. Air Contaminant Test Reports:
   1. Show:
      a. Location where each sample was taken, and time.
      b. Test values for each air sample; average the values of each set of three (3).
      c. HVAC operating conditions.
      d. Certification of test equipment calibration.
      e. Other conditions or discrepancies that might have influenced results.

H. Ventilation Effectiveness Test Plan:
   1. Identify:
      a. Testing agency qualifications.
      b. Description of test spaces, including locations or air sampling.
      c. Test procedures, in detail; state whether tracer gas decay or step-up will be used.

d. Test instruments and apparatus; identify tracer gas to be used.
e. Sampling methods.

I. Ventilation Effectiveness Test Reports:
1. Include preliminary tests of instruments, apparatus, and test spaces.
2. Calculation of ventilation effectiveness, E.
3. Location where each sample was taken, and time.
4. Test values for each air sample.
5. HVAC operating conditions.
6. Other information specified in ASHRAE 129.
7. Other conditions or discrepancies that might have influenced results.

PART 2 PRODUCTS

2.1 MATERIALS

A. Low VOC Materials: See other Sections for specific requirements for materials with low VOC content.

B. Auxiliary Air Filters: MERV of 8, minimum, when tested in accordance with ASHRAE 52.2.

PART 3 EXECUTION

3.1 CONSTRUCTION PROCEDURES

A. Prevent the absorption of moisture and humidity by adsorptive materials:
1. Sequence the delivery of such materials so that they are not present in the building until wet work is completed and dry.
2. Deliver and store such materials in fully sealed moisture-impermeable packaging.
3. Provide sufficient ventilation for drying within reasonable time frame.

B. Begin construction ventilation when building is substantially enclosed.

C. If extremely dusty or dirty, work must be conducted inside the building:
1. Shut down HVAC systems for the duration.
2. Remove dust and dirt completely before restarting systems.

D. HVAC equipment and supply air ductwork may be used for ventilation during construction:
1. Operate HVAC system on 100 percent outside air, with 1.5 air changes per hour, minimum.
2. Ensure that air filters are correctly installed prior to starting use:
a. Replace filters when they lose efficiency (for corridor HVAC only).
3. Do not use return air ductwork for ventilation.
4. Seal return air inlets or otherwise positively isolate return air system to prevent recirculation of air:
a. Provide alternate return air pathways (for corridor HVAC only).

E. Do not store construction materials or waste in mechanical or electrical rooms.

F. Prior to use of return air ductwork without intake filters, clean up and remove dust and debris generated by construction activities:
1. Inspect duct intakes, return air grilles, and terminal units for dust.
2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes, and conduit.

3. Clean tops of doors and frames.
4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
5. Clean return plenums of air handling units.
6. Remove intake filters last after cleaning is complete.

G. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.

H. Use other relevant recommendations of SMACNA IAQ Guideline for Occupied Buildings Under Construction for avoiding unnecessary contamination due to construction procedures.

END OF SECTION - 01 35 46

SECTION 01 40 00 | QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated and paid by the District (or refer to Section 01 45 23: Testing and Inspecting Services). These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements:
   1. Specific quality assurance and quality control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and quality control procedures that facilitate compliance with Contract Document requirements.
   3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions.
   4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, experienced means having successfully completed a minimum of five (5) years' documented experience with projects similar in nature, size, and extent; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality Control Testing: Tests and inspections performed onsite for installation of the Work and for completed Work.

C. Installer/Applicator/Erector:
   1. Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operations, including installation, erection, application, and similar operations:
      a. Use of trade specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

D. Mockups:
   1. Full size physical assemblies that are constructed onsite. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will

be judged:

a. Laboratory mockups: Full size physical assemblies constructed at testing facility to verify performance characteristics.
b. Integrated exterior mockups: Mockups of exterior envelope erected separately from the building but on the Project site, consisting of multiple products, assemblies, and subassemblies.
c. Room mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

E. Pre-Construction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

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

H. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include Contract enforcement activities performed by Architect.

I. Source Quality Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

J. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two (2) or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

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

1.5 SUBMITTALS

A. Shop Drawings:
1. Submit Plans, Sections, and elevations, indicating materials and size of mockup construction:
   a. Indicate manufacturer and model number of individual components.
   b. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

B. Contractor's Statement of Responsibility:
   1. When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
      a. Seismic force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by Architect.
      b. Main wind force resisting system or wind resisting component listed in the wind force resisting system quality assurance plan prepared by Architect.

C. Schedule of Tests and Inspections:
   1. Prepare in tabular form and include the following:
      a. Specification Section number and title.
      b. Entity responsible for performing tests and inspections.
      c. Description of test and inspection.
      d. Identification of applicable standards.
      e. Identification of test and inspection methods.
      f. Number of tests and inspections required.
      g. Time schedule or time span for tests and inspections.
      h. Requirements for obtaining samples.
      i. Unique characteristics of each quality control service.

1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports:
   1. Prepare and submit certified written reports specified. Include the following:
      a. Date of issue.
      b. Project title and number.
      c. Name, address, and telephone number of testing agency.
      d. Dates and locations of samples and tests or inspections.
      e. Names of individuals making tests and inspections.
      f. Description of the Work and test and inspection method.
      g. Identification of product and Specification Section.
      h. Complete test or inspection data.
      i. Test and inspection results and an interpretation of test results.
      j. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
      k. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
      l. Name and signature of laboratory inspector.
      m. Recommendations on retesting and reinspecting.

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

C. Factory Authorized Service Representative's Reports:

1. Prepare written information documenting manufacturer's factory authorized service representative's tests and inspections specified in other Sections. Include the following:
   a. Name, address, and telephone number of factory authorized service representative making report.
   b. Statement that equipment complies with requirements.
   c. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   d. Statement whether conditions, products, and installation will affect warranty.
   e. Other required items indicated in individual Specification Sections.

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

E. Trade Pre-Installation Conferences: Meeting minutes to be Contractor provided.

1.7 QUALITY ASSURANCE

A. Qualifications establish the minimum qualification levels required; refer to individual Specification Sections for additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated and sufficient production capacity to produce required units.

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

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

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

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

G. Testing Agency Qualifications:
1. A NRTL, a NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, documented according to ASTM E329; with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities:
   a. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
   b. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of the manufacturer who is trained and approved by the manufacturer to observe and inspect installation of the manufacturer's products.

I. Factory Authorized Service Representative Qualifications: An authorized representative of the manufacturer who is trained and approved by the manufacturer to inspect installation of the manufacturer's products.

J. Pre-Construction Testing:
   1. Where testing agency is indicated to perform pre-construction testing for compliance with specified requirements for performance and test methods, comply with the following:
      a. Contractor responsibilities include the following:
         1) Provide test specimens representative of proposed products and construction.
         2) Submit specimens with sufficient time for testing and analyzing results to prevent delaying the Work.
         3) Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
         4) Build site assembled test assemblies and mockups using installers who will perform same tasks for the Project.
         5) Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
         6) When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on the Project.
   2. Testing agency responsibilities: Submit certified written report of each test, inspection, and similar quality assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

K. Mockups:
   1. Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
      a. Build mockups in location and of size indicated, or if not indicated, as directed by Architect.
      b. Notify Architect a minimum of seven (7) days in advance of dates and times when mockups will be constructed.
      c. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction.
      d. Demonstrate the proposed range of aesthetic effects and workmanship.
      e. Obtain Architect's approval of mockups before starting Work, fabrication, or construction. Allow seven (7) days for initial review and each re-review of each mockup.
      f. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
      g. Demolish and remove mockups when directed unless otherwise indicated.

L. Integrated Exterior Mockups: Mockup of the exterior envelope erected separately from the building but on the Project site, consisting of multiple products, assemblies, and subassemblies. Mockup, if not specifically shown on the Drawings, shall be minimum eight feet by eight feet (8’x8’). Mockup shall include all major façade elements and at least one (1) window a minimum of two feet by two feet (2’x2’) in size. Prior to constructing mockup, verify requirements with Architect. Pre-installation conferences for trades involved in integrated exterior mockup shall be held after mockup is completed.

M. Laboratory Mockups: Comply with requirements of pre-construction testing and those specified in individual Specification Sections.

N. Trade Pre-Installation Conferences: Meeting minutes to be Contractor provided.

1.8 QUALITY CONTROL

A. Owner Responsibilities:
   1. Where quality control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform the services:
      a. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
      b. Costs for retesting and re-inspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities:
   1. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality control activities required to verify that the Work complies with requirements, whether specified or not:
      a. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Contractor by authorities having jurisdiction, whether specified or not.
      b. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform the quality control services. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
      c. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
      d. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
      e. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
      f. Submit additional copies of each written report directly to authorities having jurisdiction when they so direct.
      g. Provide documentation for construction safety as required by CBC Chapter 33 and CFC Chapter 33. Show representation for construction safeguards through the life of the Project.

C. Manufacturer's Field Services: Where indicated, engage a factory authorized service representative to inspect field assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00: Submittal Procedures.

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

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

F. Testing Agency Responsibilities:

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

G. Associated Services:
   1. Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
      a. Access to the Work.
      b. Incidental labor and facilities necessary to facilitate tests and inspections.
      c. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
      d. Facilities for storage and field curing of test samples.
      e. Delivery of samples to testing agencies.
      f. Preliminary design mix proposed for use for material mixes that require control by testing agency.
      g. Security and protection for samples and for testing and inspecting equipment at the Project site.

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

I. Schedule of Tests and Inspections:
   1. Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses:
      a. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections:
   1. Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections, as required by authorities having jurisdiction, as the responsibility of Owner, and as indicated in individual Specification Sections:
      a. Verifying that manufacturer maintains detailed fabrication and quality control procedures, and reviews the completeness and adequacy of those procedures to perform the Work.
      b. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
      c. Submitting a certified written report of each test, inspection, and similar quality

control service to Architect with copy to Contractor and to authorities having jurisdiction.

d. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
e. Interpreting tests and inspections and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
f. Retesting and re-inspecting corrected Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

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

B. Maintain log at site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes:
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 29: Cutting and Patching.

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

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

END OF SECTION - 01 40 00

SECTION 01 42 00 | REFERENCES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. General: This Section specifies procedural and administrative requirements for compliance with governing regulations and codes and standards imposed upon the Work. These requirements include the obtaining of permits, licenses, inspections, releases, and similar statements, as well as payments, associated with regulations, codes, and standards.

B. Governing Regulations:
   1. Refer to General and Supplementary Conditions for requirements related to compliance with governing regulations:
      a. The Division of the State Architect (DSA), State of California provides design and construction oversight for this Project and as such is subject to the rules and regulations.

1.3 DEFINITIONS

A. Approved: When used to convey Architect's action on Contractor's submittals, applications, and requests, approved is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

B. Basic Contract: Definitions are included in the Conditions of the Contract.

C. Directed: A command or instruction by Architect. Other terms including requested, authorized, selected, required, and permitted have the same meaning as directed.

D. Furnish: Supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

E. Indicated: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including shown, noted, scheduled, and specified have the same meaning as indicated.

F. Install: Operations at the Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

G. Project Site: Space available for performing construction activities. The extent of the Project site is shown on Drawings and may or may not be identical with the description of the land on which the Project is to be built.

H. Provide: Furnish and install, complete and ready for the intended use.

I. Regulations: Includes laws, statutes, ordinances, and lawful orders issued by governing authorities, as well as those rules, conventions, and agreements within the construction industry that effectively control the performance of the Work regardless of whether they are

lawfully imposed by a governing authority or not.

J. Testing Agencies: An independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, to report on and, if required, to interpret results of those inspections or tests.

1.4 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference. Individual Specification Sections indicate which codes and standards Contractor must keep available at the Project site for reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Conflicting Requirements: Where compliance with two (2) or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents specifically indicate a less stringent requirement. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to Architect/Engineer for a decision before proceeding.

D. Minimum Quantities or Quality Levels: In every instance the quantity or quality level shown or specified is intended to be the minimum for the Work to be provided or performed. Unless otherwise indicated, the actual Work may either comply exactly, within specified tolerances, with the minimum quantity or quality specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are either minimum or maximum values, as noted, or as appropriate for context of the requirements. Refer instances of uncertainty to Architect/Engineer for decision before proceeding.

1.5 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the trade association, standards-producing organization, authorities having jurisdiction, or other entity applicable to the context of the text provision:
   1. AABC - Associated Air Balance Council; www.aabc.com.
   2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
   3. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
   4. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
   5. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
   6. ACI - American Concrete Institute (formerly ACI International); www.concrete.org.
   7. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
   8. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
   9. AGA - American Gas Association; www.aga.org.
   10. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
   11. AI - Asphalt Institute; www.asphaltinstitute.org.
   12. AIA - American Institute of Architects (The); www.aia.org.
   13. AISC - American Institute of Steel Construction; www.aisc.org.
   14. AISI - American Iron and Steel Institute; www.steel.org.

15. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
16. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
17. ANSI - American National Standards Institute; www.ansi.org.
18. APA - The Engineered Wood Association; www.apawood.org.
19. APA - Architectural Precast Association; www.archprecast.org.
20. API - American Petroleum Institute; www.api.org.
21. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
22. ASCE - American Society of Civil Engineers; www.asce.org.
23. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
24. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
25. ASME - ASME International (American Society of Mechanical Engineers); www.asme.org.
26. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
27. ASSP - American Society of Safety Professionals (The); www.assp.org.
28. ASTM - ASTM International (American Society for Testing and Materials International); www.astm.org.
29. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
30. AWI - Architectural Woodwork Institute; www.awinet.org.
31. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
32. AWPA - American Wood Protection Association (formerly American Wood-Preservers' Association); www.awpa.com.
33. AWS - American Welding Society; www.aws.org.
34. AWWA - American Water Works Association; www.awwa.org.
35. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
36. BIA - Brick Industry Association (The); www.gobrick.com.
37. BICSI - BICSI, Inc.; www.bicsi.org.
38. BIFMA - BIFMA International (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
39. BOCA - BOCA (Building Officials and Code Administrators International Inc.); (See ICC).
40. CEA - Consumer Electronics Association; www.ce.org.
41. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
42. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
43. CGA - Compressed Gas Association; www.cganet.com.
44. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
45. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
46. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
47. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
48. CPA - Composite Panel Association; www.pbmdf.com.
49. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
50. CRRC - Cool Roof Rating Council; www.coolroofs.org.
51. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
52. CSA - Canadian Standards Association; www.csa.ca.
53. CSA - CSA International (formerly IAS - International Approval Services); www.csa-international.org.
54. CSI - Construction Specifications Institute (The); www.csinet.org.
55. CTI - Cooling Technology Institute (formerly Cooling Tower Institute); www.cti.org.
56. CWC - Composite Wood Council; (See CPA).
57. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
58. DHI - Door and Hardware Institute; www.dhi.org.
59. DSA – Division of the State Architect, State of California.

60. ECA - Electronic Components Association; www.ec-central.org.
61. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
62. EIA - Electronic Industries Alliance; (See TIA).
63. EIMA - EIFS Industry Members Association; www.eima.com.
64. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
65. ESD - ESD Association (Electrostatic Discharge Association); www.esda.org.
66. ESTA - Entertainment Services and Technology Association; (See PLASA).
67. EVO - Efficiency Valuation Organization; www.evo-world.org.
68. FM Approvals - FM Approvals LLC; www.fmglobal.com.
69. FM Global - FM Global (formerly FMG - FM Global); www.fmglobal.com.
70. FSC - Forest Stewardship Council U.S.; www.fscus.org.
71. GA - Gypsum Association; www.gypsum.org.
72. GANA - Glass Association of North America; www.glasswebsite.com.
73. GS - Green Seal; www.greenseal.org.
74. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
75. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
76. HPW - H.P. White Laboratory, Inc.; www.hpwhite.com.
77. ICBO - International Conference of Building Officials; (See ICC).
78. ICC - International Code Council; www.iccsafe.org.
79. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
80. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
81. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
82. IEC - International Electrotechnical Commission; www.iec.ch.
83. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
84. IES - Illuminating Engineering Society (formerly Illuminating Engineering Society of North America); www.ies.org.
85. IESNA - Illuminating Engineering Society of North America; (See IES).
86. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
87. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
88. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
89. Intertek - Intertek Group (formerly ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
90. ISA - International Society of Automation (The) (formerly Instrumentation, Systems, and Automation Society); www.isa.org.
91. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
92. ISFA - International Surface Fabricators Association (formerly International Solid Surface Fabricators Association); www.isfanow.org.
93. ISO - International Organization for Standardization; www.iso.org.
94. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
95. ITU - International Telecommunication Union; www.itu.int/home.
96. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
97. LMA - Laminating Materials Association; (See CPA).
98. LPI - Lightning Protection Institute; www.lightning.org.
99. MBMA - Metal Building Manufacturers Association; www.mbma.com.
100. MCA - Metal Construction Association; www.metalconstruction.org.
101. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
102. MHIA - Material Handling Industry of America; www.mhia.org.
103. MIA - Marble Institute of America; www.marble-institute.com.
104. MMPA - Moulding & Millwork Producers Association (formerly Wood Moulding & Millwork Producers Association); www.wmmpa.com.
105. MPI - Master Painters Institute; www.paintinfo.com.
106. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
107. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.

108. NACE - NACE International (National Association of Corrosion Engineers International); www.nace.org.
109. NADCA - National Air Duct Cleaners Association; www.nadca.com.
110. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
111. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
112. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
113. NCMA - National Concrete Masonry Association; www.ncma.org.
114. NEBB - National Environmental Balancing Bureau; www.nebb.org.
115. NECA - National Electrical Contractors Association; www.necanet.org.
116. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
117. NEMA - National Electrical Manufacturers Association; www.nema.org.
118. NETA - InterNational Electrical Testing Association; www.netaworld.org.
119. NFHS - National Federation of State High School Associations; www.nfhs.org.
120. NFPA - NFPA (National Fire Protection Association); www.nfpa.org.
121. NFPA - NFPA International; (See NFPA).
122. NFRC - National Fenestration Rating Council; www.nfrc.org.
123. NHLA - National Hardwood Lumber Association; www.nhla.com.
124. NLGA - National Lumber Grades Authority; www.nlga.org.
125. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
126. NRCA - National Roofing Contractors Association; www.nrca.net.
127. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
128. NSF - NSF International (National Sanitation Foundation International); www.nsf.org.
129. NSPE - National Society of Professional Engineers; www.nspe.org.
130. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
131. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
132. NWFA - National Wood Flooring Association; www.nwfa.org.
133. PDI - Plumbing & Drainage Institute; www.pdionline.org.
134. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
135. RFCI - Resilient Floor Covering Institute; www.rfci.com.
136. RIS - Redwood Inspection Service; www.redwoodinspection.com.
137. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
138. SDI - Steel Deck Institute; www.sdi.org.
139. SDI - Steel Door Institute; www.steeldoor.org.
140. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
141. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
142. SIA - Security Industry Association; www.siaonline.org.
143. SJI - Steel Joist Institute; www.steeljoist.org.
144. SMA - Screen Manufacturers Association; www.smainfo.org.
145. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
146. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
147. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
148. SPIB - Southern Pine Inspection Bureau; www.spib.org.
149. SPRI - Single Ply Roofing Industry; www.spri.org.
150. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
151. SSINA - Specialty Steel Industry of North America; www.ssina.com.
152. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
153. STI - Steel Tank Institute; www.steeltank.com.
154. SWI - Steel Window Institute; www.steelwindows.com.
155. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
156. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
157. TCNA - Tile Council of North America, Inc. (formerly Tile Council of America); www.tileusa.com.

158. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
159. TIA - Telecommunications Industry Association (formerly TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
160. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
161. TMS - The Masonry Society; www.masonrysociety.org.
162. TPI - Truss Plate Institute; www.tpinst.org.
163. TPI - Turfgrass Producers International; www.turfgrasssod.org.
164. TRI - Tile Roofing Institute; www.tileroofing.org.
165. UBC - Uniform Building Code; (See ICC).
166. UL - Underwriters Laboratories Inc.; www.ul.com.
167. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
168. USAV - USA Volleyball; www.usavolleyball.org.
169. USGBC - U.S. Green Building Council; www.usgbc.org.
170. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
171. WASTEC - Waste Equipment Technology Association; www.wastec.org.
172. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
173. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
174. WDMA - Window & Door Manufacturers Association; www.wdma.com.
175. WI - Woodwork Institute (formerly WIC - Woodwork Institute of California); www.wicnet.org.
176. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
177. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
178. WPA - Western Wood Products Association; www.wwpa.org.

B. Standards and Regulations - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations:
   1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
   2. FED-STD - Federal Standard; (See FS).
   3. USAB - United States Access Board; www.access-board.gov.
   4. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

C. Code Agencies - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the Agency:
   1. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
   2. ICC - International Code Council; www.iccsafe.org.
   3. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. State Government Agencies - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents:
   1. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
   2. CCR - California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
   3. CDHS - California Department of Health Services; (See CDPH).
   4. CDPH - California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
   5. CPUC - California Public Utilities Commission; www.cpuc.ca.gov.
   6. CBC – California Building Code (2025 Edition).

7. CEC – California Electrical Code (2025 Edition).
8. CMC – California Mechanical Code (2025 Edition).
9. CFC – California Fire Code (2025 Edition).

1.6 SUBMITTALS

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

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION - 01 42 00

SECTION 01 45 23 | TESTING AND INSPECTING SERVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements and qualifications including but not limited to:
   1. Professional testing and laboratory services.
   2. Accessories necessary for the completion of testing and laboratory services.

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

C. A Qualified Independent Testing Laboratory and/or Geotechnical Engineering Service Selected and Paid by Owner:
   1. Owner will pay for the initial laboratory services of materials that comply with the requirements of the Contract Documents. Contractor shall pay for testing and retesting of materials that do not comply with the requirements of the Contract Documents.

D. Inspecting agency shall perform inspections and tests in accordance with the rules and regulations of the building code, local authorities, specifications of ASTM, and the Contract Documents.

E. Materials and workmanship found not in compliance with required standards or performance obligations shall be removed and replaced. Replacement and subsequent testing shall be at Contractor’s expense.

F. Where terms “Inspector” and “Laboratory” are used, it is meant and in reference to an officially designated and accredited inspector of the testing laboratory or geotechnical service engaged by Owner.

G. Laboratory inspections shall not relieve Contractor or fabricator of his responsibility to furnish materials and workmanship in accordance with the Contract Documents.

H. Contractor or fabricator shall cooperate with the testing laboratory in matters pertaining to the Work.

I. Contractor to address deficiency and failed reports.

1.3 SUBMITTALS

A. Schedule of Tests and Inspections:
   1. Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses:
      a. Prepare in tabular form and include the following:
         1) Specification Section number and title.
         2) Entity responsible for performing test and inspection.
         3) Description of test and inspection.
         4) Identification of applicable standards.
         5) Identification of test and inspection methods.
         6) Number of tests and inspections required.
         7) Time schedule or time span for tests and inspections.
         8) Requirements for obtaining samples.
         9) Unique characteristics of each quality control service.

B. Test and Inspection Reports:
   1. Prepare and submit certified written reports specified. Include the following:
      a. Date of issue.
      b. Project title and number.
      c. Name, address, and telephone number of testing agency.
      d. Dates and locations of samples and tests or inspections.
      e. Names of individuals making tests and inspections.
      f. Description of the Work and test and inspection method.
      g. Identification of product and Specification Section.
      h. Complete test or inspection data.
      i. Test and inspection results and an interpretation of test results.
      j. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
      k. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
      l. Name and signature of laboratory inspector.
      m. Recommendations on retesting and re-inspecting.

C. Submit copies of reports of each inspection and test:
   1. Owner, program or project manager, Architect, and each engineer or outside consultants regarding their particular phase of the Project: One (1) copy each.
   2. Construction Manager (CM) and Contractor: Two (2) copies each.

D. In addition to furnishing a written report, notify the CM and Contractor verbally of uncorrected conditions or failures to comply with requirements of the Contract Documents, and immediately fax and email corresponding report to Architect and the engineer.

E. At completion of each trade or branch of Work requiring inspecting and testing, submit a final certificate attesting to satisfactory completion of Work.

F. Report full compliance with requirements of the Contract Documents.

G. Submit copies of test results sealed by a registered engineer to municipal authorities having jurisdiction, as required.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. The 2025 California Administrative Code (Title 24, Part 1) describes the general administrative requirements for the Project under the jurisdiction of the Division of the State Architect (DSA). These provisions require that a structural test for construction projects under DSA jurisdiction be performed by testing laboratories acceptable to DSA. DSA administers the Laboratory Evaluation and Acceptance Program to evaluate laboratories for structural testing and special inspection services. A NRTL, a NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, documented according to ASTM E329 and ASTM E534, and with additional qualifications specified in individual Sections:
    a. NRTL: A Nationally Recognized Testing Laboratory according to 29 CFR 1910.7.
    b. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
    c. Laboratory Evaluation and Acceptance program to evaluate laboratories acceptable to DSA.
    d. Testing agencies shall be insured against errors and omissions by a professional liability insurance policy having a minimum limit of liability of $500,000.00.

B. Inspection and testing services for the testing agency shall be under the direction of a California Registered Engineer, charged with engineering managerial responsibility, and having a minimum of five (5) years' engineering experience in inspection and testing of construction materials.

C. Concrete Inspectors: Inspecting personnel monitoring concrete work shall be ACI certified inspectors.

D. Structural Steel:
1. Primary inspectors performing structural steel inspection shall be currently certified AWS Certified Welding Inspectors (CWI), in accordance with the provisions of AWS QCI, *Standard and Guide for Qualification and Certification of Welding Inspectors*:
    a. Inspector may be supported by assistant inspectors who perform specific inspection functions under the direct supervision of the primary inspector. Assistant inspectors shall be currently certified AWS Certified Associate Welding Inspectors (CAWI). Work of assistant inspectors shall be monitored daily by the inspector.

E. Testing Equipment: Equipment shall be calibrated at intervals not exceeding 12 months by devices of accuracy traceable to the National Bureau of Standards.

F. Referenced Standards: Latest adopted edition of standards referenced apply to the Work. In the event of conflict between the Contract Documents and referenced standards, the Contract Documents shall govern. In case of conflict between Contract Documents and the California Building Code, the more stringent shall govern.

G. Owner Responsibilities:
1. Where quality control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform the services:
    a. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
    b. Costs for retesting and re-inspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

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

a. Refer to individual Specification Sections for specific requirements.
b. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Contractor by authorities having jurisdiction, whether specified or not.
c. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform the quality control services. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
d. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
e. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
f. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
g. Submit additional copies of each written report directly to authorities having jurisdiction when they so direct.
h. Associated responsibilities and services - Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel:
    1) Provide the following:
        a) Provide access to the Work.
        b) Deliver of samples to testing laboratory, without cost to Owner, in adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
        c) Advise laboratory and Architect sufficiently in advance of construction operations to allow laboratory to complete required inspections or tests and to assign personnel for field inspection and testing as specified.
        d) Provide facilities for storage and curing of concrete test samples on site for the first 24 hours and for subsequent field curing required by ASTM C31.
        e) Incidental labor, facilities, and equipment necessary to assist laboratory personnel in obtaining and handling samples at the site.
        f) Preliminary design mix proposed for use for material mixes that require control by testing agency.
        g) Provide concrete mix designs in accordance with ACI 301 made by an independent testing laboratory or qualified concrete supplier. Where mix designs by an independent testing laboratory are required, select and pay for laboratory.
        h) Obtain required inspections or approvals of the building official. Inspection requests and notifications required by building code are responsibility of Contractor.
        i) Provide current welder certificates for each welder employed.
        j) Provide fabrication and erection inspection and testing of welds in accordance with AWS D1.1, Chapter 6.
        k) Use prequalification of welding procedures in executing the Work.
        l) Security and protection for samples and for testing and inspecting equipment at the Project site.
i. Retesting/re-inspecting: Regardless of payment responsibility of the original tests or inspections, provide quality control services, including retesting and re-inspecting, for construction that replaced Work failing to comply with the Contract Documents, code requirements, or what is required from DSA.

I. Testing Agency Responsibilities:
1. Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections:
    a. Notify Architect and Contractor promptly of irregularities or deficiencies observed in

the Work during performance of its services.
   b. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   c. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
   d. Submit a certified written report, in duplicate, of each test, inspection, and similar quality control service through Contractor.
   e. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   f. Do not perform any duties of Contractor.

J. Authority and Duties of Laboratory Personnel:
   1. A representative of the testing laboratory, who has reviewed and is familiar with the Project and Specifications, shall participate in pre-construction conferences. The representative shall coordinate material testing and inspection requirements with Contractor and its subcontractors consistent with the planned construction schedule. The laboratory representative shall attend conferences required or requested to address quality control issues.
   2. Laboratory personnel shall inspect and test materials, assemblies, specimens, and Work performed, including design mixes, methods and techniques, and report the progress to Architect.
   3. If material or Work fails to meet requirements of the Contract Documents, the laboratory inspector shall notify the CM, Architect, engineers, supplier, or Subcontractor providing or preparing the materials or Work being tested of such failure.
   4. Laboratory personnel shall not perform the work of Contractor or act as foremen or superintendents. Work will be inspected as it progresses, but failure to detect defective Work or materials shall not prevent later rejection when a defect is discovered.
   5. Laboratory personnel are not authorized to revoke, alter, relax, enlarge, or release the requirements of the Contract Documents or approve or accept portions of Work, except where approval is specifically specified in the Specifications.
   6. Comply with building code requirements for special inspections.

K. Testing Laboratory Guidelines and Procedures:
   1. Technicians scheduled to perform specific testing services must be qualified to review and perform other services that overlap, i.e. earthwork, foundation inspections, rebar inspection, and concrete when scheduled concurrently at the site.
   2. Technician time for services performed will be reimbursed at a regular time rate. Compensation at the overtime rate will be considered for hours over eight (8) hours spent at the site on a single day, field testing services performed on a Saturday or Sunday, and field services performed on a recognized holiday.
   3. There shall be a three (3) hour minimum for each scheduled testing service. Vehicle charges will be included on a $25.00 per trip basis.
   4. Cylinder pick up will be controlled by the technician performing test on a scheduled pick up day. If there are no testing services scheduled, the cylinder pick up fee is $40.00 on week days and $50.00 on weekends and holidays with no technician or vehicle charge.
   5. Contractor shall bear the responsibility of scheduling the testing services. Contractor and the testing laboratory shall assume full responsibility to coordinate the testing services. Cancellations or failed test shall be reimbursable to the Owner by the responsible party for the cancellations or failure of a test or service.

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

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

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

B. Maintain log at site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 TESTING AND INSPECTION SERVICES

A. Testing services shall include, but not be limited to those specified below or which are necessary or required during course of construction to ascertain Specification compliance and which may be deemed necessary by Architect, the engineer, or Owner to ensure the quality of the Work.

B. Owner reserves the right to add to or delete any or all inspection and testing specified, excluding testing required by the applicable building codes.

C. If conflicts arise between Drawings and Specifications, notify Architect immediately. The most stringent requirements shall dictate procedure.

3.3 TESTING OF EARTHWORK

A. Testing Services (as specified or required):
   1. References (as applicable for tests required):
      a. American Society for Testing and Materials (ASTM):
         1) D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft^3 (600 kN-m/m^3).
         2) D2922 - Standard Test Method for Density of Soil and Soil-Aggregate In Place By Nuclear Methods (Shallow Depth).
         3) D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
      b. American Association of State Highway and Transportation Officials (AASHTO):
         1) T89 - Determining the Liquid Limit of Soils.
         2) T90 - Determining the Plastic Limit and Plasticity Index of Soils.
         3) T99 - Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305-mm (12-in) Drop.
         4) T238 - Density of Soil and Soil Aggregates In Place By Nuclear Methods (Shallow Depth).
   2. Perform sieve analysis to develop grain size distribution curves for materials to be used for subgrade, fill under slab on grade, and backfills.
   3. Establish the moisture density relation of soils to be used as fill using the method best suited to the type of fill material.
   4. Determine moisture content of all fill materials before placement and advise Contractor when it is or is not suitable to achieve required compaction.
   5. Determine Liquid Limit in accordance with ASTM D4318 or AASHTO T89, Plastic Limit

in accordance with ASTM D4318, and Plasticity Index in accordance with ASTM D4318 of all fill material,

6. Perform one (1) in place density test for each 2,500 square feet (280 square yards) of existing subgrade material.
7. Perform Moisture-Density curve in accordance with ASTM D698 or AASHTO T99 for one type of fill material. If the original choice of material does not meet the Specifications, Contractor shall pay for additional testing.
8. Perform in place density tests of each lift of compacted fill at locations adequate to evaluate the degree of compaction of all fill areas. Conduct one test for each 2,500 square feet (280 square yards) of each lift of compacted fill.
9. Perform testing at a frequency of one (1) in-place density and moisture test for each 75 lineal feet or less of utility trench, with a minimum of three (3) tests per lift

B. Reports:
   1. Submit reports with the following information:
      a. Type and condition of soil at footing bottoms.
      b. Level of water table in the excavated areas.
      c. Grain size distribution of fill materials (average of three [3] tests).
      d. Moisture density test results.
      e. In place density test results with moisture content and relative density of each layer of compacted fill. Include with in place density test results, a plan showing location of each test.
      f. Notify Architect by telephone within one (1) hour of the discovery of the following conditions and follow up telephone notification with written report:
         1) Materials used or degree of soil compaction not meeting specified requirements.
         2) Frost and freeze protection requirements for excavation bottoms not being complied with.
         3) Water in excavations not being removed prior to Work being performed in excavation.

3.4 INSPECTION OF PIPED SITE UTILITIES

A. Laboratory representative shall observe and report on the following:
   1. Proper alignment and grade of trenches.
   2. Pipe bedding and supports.
   3. Pipe, joints, jointing material, and thrust blocks prior to installation of pipe.
   4. Installation of pipe and joints.
   5. Testing of piped utilities performed by Contractor.

3.5 PAVING

A. Testing Services:
   1. Perform field tests for moisture density properties:
      a. Provide field testing of the subgrade as specified.
      b. Paving sub-base: Provide one (1) field test for every 5,000 square feet of area of crushed limestone or caliche sub-base.
      c. Lime treated subgrade: Provide one (1) field test for every 5,000 square feet of area of lime treated subgrade for content of lime and subgrade compaction.
      d. Cement soil stabilization: Provide one (1) field test for every 5,000 square feet of area of cement stabilized subgrade for content of cement and subgrade compaction.

3.6 PIER DRILLING OPERATION

A. A representative of a qualified geotechnical laboratory shall provide services specified.

B. Laboratory representative shall make continuous inspections to determine that proper bearing stratum is obtained and utilized for bearing and that shafts are properly clean and dry before placing concrete.

C. Laboratory shall furnish complete pier log showing the diameter, top and bottom elevations of each pier, casing required or not required, actual penetration into bearing stratum, elevation of top of bearing stratum, volume of concrete used, and deviations from specified tolerances.

D. Laboratory representative shall make continuous inspections of drilled pier construction to check the following:
1. Verify soundness of bearing stratum and desired penetration.
2. Verify pier dimensions and reinforcing used.
3. Monitor condition of hole and removal of water and loose material from bottom.
4. Monitor placement of concrete and use of tremie or pumps.
5. Monitor the extraction of casing, if used.

E. Request probe holes when deemed necessary to confirm safe bearing capacity.

3.7 CONCRETE REINFORCING STEEL AND EMBEDDED METAL ASSEMBLIES

A. Inspect concrete reinforcing steel prior to placing concrete for compliance with Contract Documents and approved shop drawings. Noncompliance with Contract Documents and approved shop drawings shall be immediately brought to the attention of Contractor for correction and, if left uncorrected, reported to Architect.

B. Laboratory representative shall observe and report on the following:
1. Number and size of bars.
2. Bending and lengths of bars.
3. Splicing.
4. Clearance to forms, including chair heights.
5. Clearance to sides and bottom of trench if soil formed.
6. Clearance between bars or spacing.
7. Rust, form oil, and other contamination.
8. Grade of steel.
9. Securing, tying, and chairing of bars.
10. Excessive congestion of reinforcing steel.
11. Installation of anchor bolts and placement of concrete around such bolts.
12. Fabrication and installation of embedded metal assemblies, including visual inspection of all welds.
13. Visually inspect studs and deformed bar anchors on embedded assemblies for compliance with Contract Documents. Check number, spacing, and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360-degree fillet has not been obtained for a particular stud or bar, such stud or bar shall be struck with a hammer and bent 15 degrees off perpendicular and then bent back into position. Anchors failing this test shall be replaced.

C. Provide a qualified, experienced inspector to inspect reinforcing steel. Inspector shall have a minimum of three (3) years of experience inspecting reinforcing steel in projects of similar size.

3.8 CONCRETE INSPECTION AND TESTING

A. Receive and evaluate proposed concrete mix designs submitted by Contractor. If mix designs comply with Drawings and Specifications, the laboratory shall submit a letter to the

Architect certifying compliance. Mix designs not complying with Drawings and Specifications shall be returned by the laboratory as being unacceptable. Check the proposed mixes for proportions, water cement ratio, and slump in accordance with ACI 613 and 318.

B. Comply with ACI 311 *Guide For Concrete Inspection* and ACI *Manual of Concrete Inspection*.

C. Sample and test concrete placed at the site in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis.

D. Test concrete:
   1. Mold and cure five (5) specimens from each sample:
      a. For each 50 cubic yards or fraction thereof of structural building concrete.
      b. For each 100 cubic yards or fraction thereof of nonstructural concrete and site Work paving and sidewalks.
      c. Laboratory cure two (2) cylinders in accordance with ASTM C192.
      d. Field cure remaining cylinders in accordance with ASTM C31.
   2. Two (2) specimens shall be tested at seven (7) days for information, two (2) shall be tested at 28 days for acceptance.
   3. Store one (1) cylinder for testing at 56 days in the event the 28-day strength tests do not meet strength requirements.

E. Deviations from the requirements of ASTM specifications shall be recorded in the test report. Test concrete specimens in accordance with ASTM C39.

F. Specimens for pumped concrete shall be taken at the discharge end of pumping equipment.

G. Supervise curing and protection provided for test specimens in field and transportation from the field to laboratory. Test cylinders shall be stored in the field for 24 hours and then carefully transported to laboratory and cured in accordance with ASTM C31.

H. Make one (1) strength test (four [4] cylinders) of each mix design of concrete placed in any one (1) day.

I. Make one (1) slump test for each set of cylinders following procedural requirements of ASTM C143 and ASTM C172. Make additional slump tests whenever consistency of concrete appears to vary. Slump tests corresponding to samples from which strength tests are made shall be reported with strength test results. Other slump tests need not be reported.

J. Determine total air content of air entrained normal weight concrete sample for each strength test in accordance with ASTM C231.

K. Determine air content and unit weight of lightweight concrete sample for each strength test in accordance with ASTM C173 and ASTM C567.

L. Determine temperature of concrete sample for each strength test.

M. Inspect each batch of concrete and monitor addition of mixing water to assure uniform consistency from truck to truck. Check mixing form mixers before mix begins to set and within time limits set forth in ASTM C94:
   1. Monitor addition of water and high range water reducer to concrete at job site and length of time concrete is allowed to remain in truck during placement.

N. Testing agency shall furnish and maintain a competent inspector at the mixing plant at the start of each day’s mixing. Inspector shall examine concrete materials for compliance with

Specifications and approved mix design, weighing and measuring devices, proportioning and mixing of materials, water and cement content of each batch, general operation of the plant, and transportation of concrete to jobsite. Inspector shall verify that the amount of free surface moisture contained in fine and course aggregate has been properly accounted for in the concrete mixing to achieve required consistency and water cement ratio.

O. Testing laboratory shall monitor addition of water to concrete at the jobsite and the length of time concrete is allowed to remain in the truck before placement. Inspector shall compare mixture with criteria on the approved mix design and report any significant deviation to Architect, Contractor, and concrete supplier. Do not permit addition of water that will exceed maximum water/cement ratio for the mix as given on the approved mix design.

P. Observe placing of concrete except nonstructural slabs on grade and site Work. Observe and report on placing method, consolidation, cold joints, length of drop, and displacement of reinforcement. Report deficiencies to Contractor immediately for corrective action. Inspections may be reduced to a periodic basis when all procedures have been deemed satisfactory by the laboratory.

Q. Test reports shall include but not be limited to the following information:
1. Date of concrete placement.
2. Concrete mix identification number or proportion of ingredients.
3. Truck ticket number.
4. Time test was made.
5. Time of batching.
6. Location of each placement.
7. Slump, unit weight, water content (microwave test), and air content of concrete sampled.
8. Date and results of strength test.

R. Report promptly to Architect all details of reasons for rejection of any and all quantities of concrete. Give all information concerning locations of the concrete pours, quantities, date of pours, and other pertinent facts concerning concrete represented by the specimens.

S. Testing laboratory shall certify each delivery ticket indicating class of concrete delivered (or placed), amount of water added and time at which cement and aggregate were dispensed into the truck, and time at which concrete was discharged from the truck.

T. Evaluation and Acceptance:
1. If measured slump or air content of air entrained concrete falls outside specified limits, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, concrete shall be considered to have failed to meet the requirements of the Specifications, and shall not be used in the structure.
2. Strength level of concrete will be considered satisfactory if the averages of sets of three (3) consecutive strength test results are equal to, or exceed, specified strength and no individual test result (average of two [2] cylinders) is below specified strength by more than 500 psi.
3. Completed concrete work will be accepted when requirements of ACI 301 Chapter 18 *Specifications for Structural Concrete for Buildings* have been met.

U. Concrete Test Reports:
1. Reports shall be made and distributed immediately after respective tests or inspections are made:
   a. Where reports indicate deviations from Contract Documents, they shall also include a determination of the probable cause of deviation and where applicable, a recommendation for corrective action.

V. Furnish a statistical analysis for each class of concrete placed on the Project in accordance with ACI 214 and ACI 318. Information shall be updated and distributed once a month as directed by the Architect. Information shall include, but not be limited to, the following:
   1. Strength tests at seven (7) days.
   2. Strength tests at 28 days of two (2) cylinder averages.
   3. 28-day moving average strength tests of last three (3) test groups.
   4. Standard deviation and coefficient of variation based on 28-day strength tests.
   5. Average strength and number of 28-day tests for most recent month.
   6. Strength test one (1) cylinder at 56 days in the event the 28-day strength tests do not meet strength requirements.

W. Test Footings (Shafts; Piers; Caissons): Same diameter and type specified for footings, placed in same manner. Accepted test footings may be used in the Work.

X. Noncompliant Test Reports: Fax test reports indicating noncompliance immediately to each party on the test report distribution list. Copies shall be on different colored paper.

Y. Inspect application of curing compound and monitor curing conditions to assure compliance with Specification requirements. Report curing deficiencies to Contractor immediately and submit a written report to Architect.

3.9 TESTING OF NONSHRINK GROUT

A. Make one (1) strength test for all plates grouted and for all grout used in joints between members.

B. Each test shall consist of four (4) cubes, two (2) tested at seven (7) days and two (2) at 28 days, made and tested in accordance with ASTM C109, with the exception that grout shall be restrained from expansion by a top plate.

3.10 STRUCTURAL STEEL

A. Inspect structural steel during and after erection for compliance with Contract Documents and shop drawings. Review and report on fabricator’s quality control procedures and capabilities.

B. Field Inspection:
   1. Proper erection of pieces.
   2. Proper touch up painting of shop primed structural steel exposed to view or in crawl space.
   3. Proper installation of bolts.
   4. Plumbness of structure and proper bracing.
   5. Proper field painting.
   6. Initial inspection of welding process and periodically thereafter as necessary.
   7. Visual examination of completed welds.
   8. Ultrasonic testing of penetration field welds.
   9. Installation of field welded shear studs.
   10. Inspect shop fabricated members, upon arrival at the site, for defects incurred during transit and handling.
   11. Measure and record camber of beams upon arrival and before erection for compliance with specified camber. Measure lying flat with web horizontal. Return members outside specified camber tolerance to shop for correction.

C. Qualifications of Welders: Fabricator and erector shall provide the testing laboratory with names of welders employed on Work, along with certification that each welder has passed

qualification tests within the past 12 months, using procedures covered in AWS D1.1 *Structural Welding Code - Steel*. Verify welder qualifications.

D. Inspection of Field Welding shall Include:
1. Visually inspect fillet welds for size, soundness, and proper return around ends. Inspect seams, folds, and delaminations.
2. Visually inspect welds for proper repair of painting.
3. Ultrasonically test penetration welds in accordance with ASTM E164.
4. Inspect surfaces to be welded. Note surface preparations, fit up, and cleanliness of surface. Verify electrodes for size, type, and condition.
5. Welding inspector shall be present during alignment and fit up of members being welded, and shall verify for correct surface preparation of root openings, sound weld metal, and proper penetration in the root pass. Where weld has not penetrated completely, inspector shall order the joint to be chipped down to sound metal, or gouged out, and rewelded. Thoroughly inspect root passes for cracks. Gouge out cracks and rewelded to two inches (2") beyond each end of crack.
6. Inspector shall verify that welds have been marked with welder's symbol and shall mark welds requiring repairs and re-inspection. Inspector shall maintain a written record of welds. Work completed and inspected shall receive an identification mark by the inspector. Identify unacceptable material and Work identified by word *reject* or *repair* marked directly on the material.
7. Testing agency shall advise the Owner and Architect of any shop and/or field conditions that may require further tests and examination by means other than those specified. Additional tests and examinations shall be performed as authorized by the Owner and Architect.
8. Owner reserves the right to use ultrasonic or radiographic inspection to verify adequacy of welds. Testing procedures and acceptance criteria shall be as specified in AWS D1.1.
9. Weld quality to comply with the American Institute of Steel Construction (AISC) Manual of Steel Construction.
10. Determine percentage of weld tested by the number of welds that fail the initial testing.
11. Reweld and retest welds that fail until the welds pass. Test two (2) additional welds for every weld failure.

E. Inspect bolted construction in accordance with AISC *Specification for Structural Steel Buildings*:
1. Visually inspect bolts ensuring that plies have been brought into snug contact.
2. Inspect high strength bolt in accordance with Section 9 of the *Specifications for Structural Joints Using ASTM A325 Bolts*.

F. Inspect stud welding in accordance with AWS D1.1 *Structural Welding Code*:
1. Weld at least two (2) shear studs at the start of each production period to determine correct generator, control unit, and stud welder setting. The studs shall be capable of being bent 45 degrees from vertical without weld failure.
2. When the temperature is below 32 degrees F, test one (1) stud in each 100 after cooling. Do not weld studs at temperatures below zero (0) degrees F or when surface is wet with rain or snow. If stud fails in the weld, two (2) new studs shall pass the test before resumption of welding.
3. Visually inspect studs for compliance with the requirements of the Contract Documents. Verify number, spacing, and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360-degree fillet has not been obtained for a particular stud, that stud shall be struck with a hammer and bent 15 degrees off perpendicular in the direction away from the missing weld. Studs failing test shall be replaced.

3.11 REINFORCING STEEL MECHANICAL SPLICES

A. Inspection and Observation Services:
   1. Visually inspect and report on completed condition of each mechanical splice of reinforcing steel.
   2. Visually inspect each mechanical splice to ensure compliance with the ICC-ES Reports and the manufacturer's published criteria for acceptable completed splices.
   3. Place special emphasis on the inspection of the end preparation of each bar to be spliced required by the ICC-ES Report.

B. Reports:
   1. Submit reports to Architect:
      a. Copies of manufacturer's published criteria for acceptable completed splices prior to observing mechanical splices.
      b. Reports on each mechanical splice shall indicate location of the splice, size of bars spliced, and acceptability or rejection of splice. Indicate reasons for rejection on each report.

3.12 OPEN WEB JOISTS AND JOIST GIRDERS

A. Inspect joists at jobsite for compliance with specified fabrication requirements. Verify welded connections between web and chord, splices, and straightness of members.

B. Inspect installation of joists at jobsite. Check connections to supporting members, chord extensions, number of rows of bridging, and bridging connections for compliance with Contract Documents and referenced standards.

C. Verify welder qualification certificates for both shop and field welding operators.

3.13 METAL FLOOR DECK

A. Field inspection shall consist of:
   1. Verifying types, gauges, and finishes for compliance with Contract Documents and shop drawings.
   2. Examine composite floor deck exposed to crawl space for damage to galvanizing due to welding or construction activities. Repair galvanized composite floor deck in accordance with the Specifications.
   3. Examine the erection of metal deck, fastenings, reinforcing of holes, deck reinforcing, miscellaneous deck supports, hanger tabs, shear studs, deck closures, painting, or other coating.
   4. Certification of welders.
   5. Inspect and test field welded shear studs used to fasten metal floor decking to supporting steel as specified for structural steel.

3.14 METAL ROOF DECK

A. Field inspection shall consist of:
   1. Verify types, gauges, and finishes for compliance with Contract Documents and shop drawings.
   2. Examine the erection of the metal deck, including fastenings at supports and side laps, reinforcing of holes, and miscellaneous deck supports.
   3. Certification of welders.
   4. Visual inspection of at least 25 percent of welds.

3.15 SPRAYED FIREPROOFING

A. Verify that applied thickness, density, and bond strength of sprayed fireproofing meets fire

rating requirements of approved design.

B. Verify that installation complies with fire rating requirements of approved design.

C. Inspect and test for thickness:
1. Test 25 percent of structural frame columns and beams in each building level.
2. Test ten percent (10%) of beams other than structural frame in each building level.
3. Test one (1) slab per 5,000 square feet of building area.

D. Inspect and test in accordance procedures of ASTM E605 and ASTM E736.

3.16 EXPANSION BOLT INSTALLATION

A. Inspect drilling of each hole and installation of each expansion bolt for compliance with Contract Documents and shop drawings.

B. Verify installation torque for each expansion bolt for compliance with manufacturer's installation instructions.

3.17 LIGHTWEIGHT INSULATING CONCRETE FILL

A. Inspection and Observation Services (As Required):
1. Inspection of roof deck prior to start of Work.
2. Inspection during installation of insulation and lightweight insulating concrete fill Work to ascertain compliance with Contract Documents.
3. Observation of base ply fastener pull tests performed by Contractor to ascertain minimum withdrawal resistance of 40 pounds per fastener.

B. Testing Services (As Required):
1. References (as applicable for tests required):
   a. American Society for Testing and Materials (ASTM):
      1) C177 - Standard Test Method for Steady State Heat Flux Measurements and Thermal Transmission Properties By Means of the Guarded Hot Plate Apparatus.
      2) C495 - Test Method for Compressive Strength of Lightweight Insulating Concrete.
      3) C578 - Specification for Rigid, Cellular Polystyrene Thermal Insulation.
2. Test EPS insulation board for thermal insulation value in accordance with ASTM C177.
3. Test lightweight insulating concrete fill in accordance with ASTM C495 for:
   a. Mix design compressive strength.
   b. Mix design wet and dry density range.
   c. Number of Tests:
      1) One (1) per 5,000 square feet.
      2) Not less than one (1) for each day's Work.
4. Test EPS insulation board for density in accordance with ASTM C578.

3.18 TESTING OF ROOFING

A. Inspection and Observation Services (As Required):
1. Inspection of roof deck prior to start of Work.
2. Inspect onsite condition of stored roofing materials.
3. Inspection during roofing, roof insulation, and sheet metal Work to ascertain compliance with Contract Documents.
4. Observation of roof test cuts performed by Contractor to ascertain that they are properly made.

5. Observation of patching of roof test cuts to ascertain that they are properly made.

B. Testing Services (As Required):
1. Perform dissection and analysis on cuts provided by Contractor to confirm number of plies, bonding of plies, weight of bitumen and softening temperature to ascertain compliance with Specifications.

3.19 MASONRY

A. Inspection and Observation Services:
1. Inspection of placement of reinforcement including condition, grade, size, location, spacing, and lap splices.
2. Review mortar design mixes.
3. Inspection of laying, mortaring, and grouting of concrete masonry units and elements.

B. Testing Services:
1. References (as applicable for tests required):
   a. ASTM International (ASTM):
      1) C140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units.
      2) C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
      3) C1019 - Standard Test Method for Sampling and Testing Grout.
2. Testing of Concrete Masonry Units (CMU):
   a. Pre-construction - Perform the following tests in accordance with ASTM C140:
      1) Compressive Strength.
      2) Absorption.
      3) Weight.
      4) Moisture Content.
      5) Dimensions.
3. Mortar Tests:
   a. Pre-construction - Perform the following tests in accordance with ASTM C780 on each type of mortar mix used on the Project:
      1) 28-day compressive strength.
      2) Water retention.
   b. Construction: Perform 28-day compressive strength test in accordance with ASTM C780 on each type of mortar mix used on the Project at the rate of one (1) test per 2,000 square feet of masonry.
4. Refer to and include Work for reinforcing steel specified.
5. Grout tests:
   a. Pre-construction - Perform the following tests in accordance with ASTM C1019 on each type of grout mix used on the Project:
      1) Slump test.
      2) 28-Day compressive strength.
   b. Construction: Perform 28-day compressive strength test in accordance with ASTM C1019 on each type of grout mix used on the Project at the rate of one (1) test per 2,000 square feet of masonry.
6. Prism test: Perform pre-construction 28-day compressive strength test on concrete masonry walls.

3.20 REPAIR AND PROTECTION

A. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes:
1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched

areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 29: Cutting and Patching.

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

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

END OF SECTION - 01 45 23

SECTION 01 45 24 | IMPORT MATERIALS TESTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies the requirements for the sampling, testing, transportation, and certification of imported fill materials to school sites.

B. This Specification defines:
1. Contractor requirements for use of imported materials on Project sites.
2. Contractor requirements for stockpiling materials for use on Project sites.
3. Testing requirements for all materials imported, stockpiled, or generated for use on a Project site.
4. Contractor testing and reporting requirements.
5. Contractor submittal requirements.

C. Objectives:
1. Ensure that fill materials imported to Project sites are safe for students, staff, and visitors.
2. Ensure that representative data be collected so that analytical determinations can be made in regard to the first objective.
3. Require Contractor to contract with and pay for the services of a licensed environmental professional (licensed State of California Professional Engineer [PE Civil], Professional Geologist [PG] or Registered Environmental Assessor II [REA II]) familiar with environmental site assessment and waste classification.
4. Require Contractor to contract with and pay for an independent, approved California Department of Health Services certified testing laboratory to perform sampling and testing of imported and site generated fill materials.
5. Require Contractor to pay all fees required by authorities having jurisdiction over area.
6. Require Contractor to post bonds required by authorities having jurisdiction over area.

1.3 SUBMITTALS

A. Contractor shall submit to Owner's Authorized Representative (OAR):
1. A qualifications statement for Contractor's independent California certified testing laboratory and required licensed environmental professional (California Professional Engineer [PE civil], Professional Geologist [PG], or Registered Environmental Assessor II [REA II]) prior to the start of Work. Contractor's licensed environmental professional must possess recent demonstrated environmental experience in soil sampling and waste classification:
   a. Testing laboratory must be pre-approved by the Division of State Architect.
2. A draft import Sampling Strategy Plan (SSP) prepared by Contractor's licensed environmental professional for review and concurrence by the OAR. The objective of the SSP is to obtain representative sample data. The draft SSP must be submitted at least 72 hours prior to all proposed import sampling activities:
   a. At a minimum, the draft SSP shall include a site map which shows the location of the proposed import and the location and number of the proposed stockpile samples. The draft SSP shall also contain information pertaining to the total volume of the stockpile proposed for sampling and the rationale in support of the proposed sampling approach. Existing environmental documentation specific to the import site shall be utilized by Contractor's environmental professional to support the proposed sampling approach and analytical method suite. For new Project sites, this information would include a DTSC approved site

investigation report, e.g., Preliminary Environmental Assessment (PEA). It is the responsibility of Contractor to request this information in advance from the OAR if they do not already have access to a copy at the jobsite.

b. Lacking this information or rationale, samples shall be analyzed for all analytical methods described in this Section. Guidance for the minimum number of samples per stockpile volume is provided in Table 1 (supplemental samples may be required by the OAR if pothole stockpile sampling is utilized). In addition, the draft SSP shall contain all necessary contact information for the import site and a proposed schedule for the sampling activities.
c. To expedite the review process, the draft SSP shall be submitted electronically to the OAR in MS Word format.
d. Upon revision of the draft SSP by Contractor's licensed environmental professional and acceptance by the OAR, four (4) revised copies of the final SSP will be provided to the OAR for distribution to OEHS and the Project file.

3. A draft certification/sample data report prepared by Contractor's licensed environmental professional for review and concurrence. At a minimum, the draft certification/sample data report shall contain:
   a. A site map showing the location of the stockpile and stockpile sample locations.
   b. A detailed discussion and evaluation of the laboratory results.
   c. A summary of findings and recommendations that provide a determination on the waste classification of the subject materials, based on the representative sample results.
   d. Recommendations for additional steps, if any.
   e. Chain-of-custody forms and all laboratory data with respective QA/QC sheets.
   f. To expedite the review process, the draft SSP shall be submitted electronically to the OAR in MS Word format.
   g. Upon revision of the draft certification report by Contractor's licensed environmental professional and acceptance by the OAR, three (3) copies of the final report will be submitted to the OAR.
4. The environmental compliance manager shall confirm that the proposed waste classification for the proposed import material is appropriate.
5. Written documentation, in the form of a memo or e-mail from Contractor to OAR, prior to import, verifying that the hauling contract specifies "clean" trucks and that the actual haul trucks utilized for import activities will be clean of visible contamination or deleterious materials.
6. Written documentation that the trucks went directly from the source location to the recipient location with no detours or stops at other locations and that short loads were not augmented by other materials that were not tested as part of the final import SSP. It is Contractor's responsibility to document that no other trips or short-load augmentation occurred and submit to the documentation within five (5) business days of the completion of the import activities. All import transportation activities shall be conducted in accordance with all applicable (local, State, and Federal) rules and regulations.
7. The independent approved testing laboratory shall perform the required tests and report results of all tests noting if the tested material passed or failed such tests and shall furnish copies to the IOR, Architect, OAR, DSA, Contractor, and others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer and the material was tested in accordance with applicable provisions of the Contract Documents, Title 24, CCR, and DSA. Upon completion of the Work of this Section, the independent testing laboratory and geotechnical engineer shall submit a verified report to DSA as required by Title 24, CCR.
8. Certification, in the form of haul tickets or completed waste manifests, documenting the volume and recipient of all import materials and activities. This documentation shall be coordinated through the OAR environmental compliance manager:
   a. For approved import to new Project sites, unregulated facilities (landfill) or non-Project sites, haul tickets may be utilized, but shall contain the following minimum information:
      1) Date of haul activity.
      2) Address of source.
      3) Address of recipient.
      4) Load volume.
      5) Time of departure from source.

6) Time of arrival at recipient site.
7) Signature of recipient or recipient's agent.

1.4 QUALITY ASSURANCE

A. No import of earth or geotechnical grading or fill materials can occur at the Project site without prior approval by the OAR.

PART 2 PRODUCTS

2.1 MATERIALS

A. Imported:
1. Soils: Soils proposed for import shall be tested pursuant to the requirements of this Section.
2. Gravels: Clean gravel, consisting of native rock from a commercial source, shall be tested pursuant to the requirements of this Section.
3. Sands: Clean sand from a commercial source shall be tested pursuant to the requirements of this Section. Contractor shall provide written documentation, which identifies the source, volume, and proposed transport date(s) of the material for review.
4. Miscellaneous material: No miscellaneous material containing crushed concrete, asphalt, construction debris, or other potential deleterious materials may be utilized or imported to the Project site for use as fill or grading material.

B. Pre-Tested Sites:

Vulcan Materials Company
1709 Sherbon Street
Corona, CA 92879
Materials Tested: Sand, CAB, and 3/4 " Rock

LB Crushing Company
3100 Horseless Carriage Road
Norco, CA
Materials Tested: Sand

El Toro Materials
Rocky Road & Portola Parkway
Lake Forest, CA
Materials Tested: Sand

Hanson Aggregates North America-Inland Plant
12000 Banyan Street
Rancho Cucamonga CA 91730
Materials Tested: Sand

Hanson Aggregates North America-Irwindale
13550 Live Oak Avenue
Irwindale, CA 91706 Materials
Tested: Sand

Inland Empire Regional Composting Authority (IERCA)
12645 Sixth Street
Rancho Cucamonga, CA 91739 Materials
Tested: Top Soil and Mulch

C. Import of Fill Materials:
1. Fees: Contractor shall pay as required by authorities having jurisdiction over area.
2. Bonds: Contractor shall post as required by authorities having jurisdiction over area.

PART 3 EXECUTION

3.1 GRADING/EXCAVATION

A. If Contractor encounters an area(s) with discolored, stained, and/or odorous soils or any other evidence of contamination during excavation/grading work, Contractor must immediately notify District Representative, cease work in the aforementioned area(s), and secure the area(s) with fencing, tape, stakes, or other suitable means to prevent entry by personnel or equipment. In turn, the District Representative will initiate a construction response to address the contamination, in accordance with pertinent regulatory requirements.

3.2 SAMPLING AND TESTING

A. Contractor shall contract with, and pay for, the services of a licensed environmental professional (licensed State of California Professional Engineer [PE Civil], Professional Geologist [PG], or Registered Environmental Assessor II [REA II]).

B. Contractor shall contract with, and pay for, an independent, approved California Department of Health Services certified testing laboratory to perform sampling and testing of imported, exported, and site generated fill materials:
   1. Note: Utilization of portable, onsite crushing equipment on the Project site also requires prior notification and approval by the OAR.

C. All imported fill/grading material, unless otherwise specified in writing by the OAR, must be tested at the site of origin. Import testing and certification process shall include the following steps:
   1. Stockpile all materials for sampling (standard stockpile or backhoe pothole stockpile). Crushed fill materials generated by Contractor at a Project site must be segregated by material (e.g., separate stockpiles for concrete, asphalt, etc.).
   2. Submit draft SSP for review and concurrence by OAR.
   3. Collect and analyze samples (see Table 1 for number of samples per volume) per SSP. Once fill materials for export have been stockpiled and tested, they may not be used onsite for any purpose without prior approval by OAR.
   4. Submit draft import sample data report for review and concurrence by OAR.
   5. Submit final import sample data report (certification report) to OAR's environmental compliance manager for concurrence of proposed waste classification.
   6. Submit required pre-import documentation/record to the OAR (e-mail).
   7. Submit post import certifications to the OAR.
   8. In addition to the preceding, requirements, certifications, and submittals as indicated in previous subsections above.

D. Owner retains the right to refuse any fill material proposed for use at a Project site.

E. Import fill materials shall be stockpiled by Contractor and are deemed acceptable for import or reuse only when it is demonstrated to the satisfaction of the OAR's environmental compliance manager that the subject materials meet the requirements of this Section.

F. As described in this Section, lacking site-specific data or sample rationale to support a more focused analytical approach, Contractor shall analyze all samples for the following substances according to the methods indicated below. Table 3 is a waste classification flowchart for use by Contractor's environmental professional. In all cases, detection levels and quality assurance/quality control methods shall be in accordance with standard Method reporting limits and best laboratory practices and the following USEPA (EPA) methods:
   1. Total Petroleum Hydrocarbons, utilizing EPA Method 8015M, for gasoline and diesel.
   2. Volatile Organic Compounds, utilizing EPA Method 8260B/5035.
   3. Polychlorinated biphenyls, utilizing EPA Method 8082.
   4. Semi-Volatile Compounds, utilizing EPA Method 8270C.
   5. Organochlorine Pesticides, utilizing EPA Method 8081A.

6. Organophosphorous Pesticides, utilizing EPA Method 8141A.
7. Chlorinated Herbicides, utilizing EPA Method 8151A.
8. California Code of Regulations Title 22 (CAM 17) Metals, utilizing EPA Method 6010B/7470A.
9. Hexavalent Chromium, utilizing EPA Method 7199.
10. Arsenic/Thallium, utilizing EPA Method 6020.

G. Import fill material may be deemed defective for use by the OAR at the Project site if any of the following results are obtained:
1. Total petroleum hydrocarbons are present at concentrations exceeding 100 milligrams per kilogram (mg/kg) for gasoline and 1,000 mg/kg for oil/diesel and long chain hydrocarbons.
2. Solvents and other volatile organic compounds are present at concentrations exceeding the laboratory reporting limit.
3. Polychlorinated biphenyls are present at concentrations exceeding the laboratory reporting limit.
4. Semi-volatile compounds are present at concentrations exceeding the laboratory reporting limit.
5. Organochlorine pesticides are present at concentrations exceeding the laboratory reporting limit.
6. Organophosphorous pesticides are present at concentrations exceeding the laboratory reporting limit.
7. Chlorinated herbicides are present at concentrations exceeding the laboratory reporting limit.
8. California Code of Regulations Title 22 (CAM 17) Metals at concentrations exceeding site-specific background.
9. Hexavalent chromium is present at concentrations exceeding 15 mg/kg.

H. In addition to screening for hazardous materials, the imported soil must be tested and certified to be free of:
1. Organics and debris.
2. Infestation by vermin or insects, in particular fire ants.
3. Boron.

I. Imported materials must be suitable for engineered fill, even if used at landscaping, free from large rocks.

J. Imported materials shall not have a high clay content and must meet the permeability requirements of the Project's hardscape if there is such requirement.

K. Evaluate concentrations of metals in import fill by conducting the analysis set forth below:
1. Compare the maximum detected metal concentrations in import fill samples to the Threshold Criteria listed in Table 4. If any metal concentration exceeds its listed background value, the fill material fails and shall be deemed defective and unacceptable for use at the Project site unless supported by a site-specific health risk assessment.
2. In addition to otherwise specified in this Section, import fill shall be deemed environmentally defective and unacceptable for use if any of the following results are obtained:
   a. Arsenic concentrations exceed 12.0 mg/kg.
   b. Lead concentration exceeds 255 mg/kg or fails TTLC/STLC.
   c. Import materials at new Project sites with total chromium concentrations greater than or equal to 100 mg/kg shall be tested for hexavalent chromium.

L. All import fill material shall be characterized, handled, and documented in accordance with applicable US EPA and State of California hazardous waste and hazardous materials regulations (see Table 2). For the purpose of this Specification, "contaminated" shall mean any soil or geotechnical material at a concentration that would require disposal at a regulated facility (i.e., California hazardous or RCRA hazardous). OAR must be notified at least 72 hours prior to the disposal of any hazardous waste or hazardous material. No material disposal or reuse can take place without prior written approval of the OAR.

M. Specification test results and OAR approvals shall be valid for a period of 120 days from the date of the subject testing unless a variance is requested by Contractor and approved by OAR. Previously approved materials shall not be utilized or disposed off-site after the 120-day limit without prior review

and approval by the OAR.

N. Requests for variances to this Specification shall be submitted in writing to the OAR a minimum of two (2) weeks in advance of need for review and approval. The request for variance must provide all available testing data, a rationale to support the request and have an active funding line (provided by OAR) to facilitate review by the OAR. OAR will review the request for variance and will provide its preliminary determination within two weeks. Certain requests may require final approval by the Department of Toxic Substances Control (DTSC).

O. Soils with concentrations above screening levels may, upon prior approval by the OAR, be reused at other Project sites if supported by a site-specific human health risk assessment.

P. Details of the samples and testing must be submitted to and approved by the OAR's environmental compliance manager before transportation.

Q. Haul Routes and Regulations/Restrictions: Contractor must comply with requirements of Project EIR (CEQA) and authorities having jurisdiction over the Project area and the proposed activities (e.g. Regional Water Quality Control Board, Department of Toxic Substances Control, etc.).

3.3 TRANSPORTATION

A. Contractor shall pay all fees required by authorities having jurisdiction over area.

B. Contractor shall pay all fees for disposal and/or processing of contaminated and/or hazardous fill materials at a regulated facility.

C. Contractor shall post and pay for all bonds required by authorities having jurisdiction over area.

SECTION CONTINUES ON NEXT PAGE

TABLE 1: MINIMUM SAMPLING FREQUENCY	
Volume (Cubic Yards)	Sampling Frequency
0 – 1,000	1 per 250 CY
1,001 - 5,000	4 samples per first 1,000 CY and 1 sample per each additional 500 CY
Greater then 5,000	12 samples for first 5000 CY and 1 sample per each additional 1,000 CY

Chemicals of Potential Concern	TABLE 2 WASTE CHARACTERIZATION Hazardous Waste if Exceed Criteria - TTLC Level* (mg/kg)	Additional WET Leaching Tests if Exceed Hazardous Waste Criteria - 10 times STLC Level** (mg/kg)	California-Regulated Hazardous Waste - Soluble Threshold Limit Concentration -STLC Level (mg/l)	Additional TCLP Leaching Tests if Exceed Hazardous Waste Criteria - 20 times TCLP Level** (mg/kg)	Federally-Regulated (RCRA) Hazardous Waste - Toxicity Characteristic Leaching Procedure - TCLP Level (mg/l)
CAM 17 Metals					
Antimony	500	150	15	NA	NA
Arsenic	500	50	5	100	5
Barium	10,000	1,000	100	2,000	100
Beryllium	75	7.5	0.75	NA	NA
Cadmium	100	10	1	20	1
Chromium	2,500	50	5	100	5
Cobalt	8,000	800	80	NA	NA
Copper	2,500	250	25	NA	NA
Lead	1,000	50	5	100	5
Mercury	20	2	0.2	4	0.2
Molybdenum	3,500	3,500	350	NA	NA
Nickel	2,000	200	20	NA	NA
Selenium	100	10	1	20	1
Silver	500	50	5	100	5
Thallium	700	70	7	NA	NA
Vanadium	2,400	240	24	NA	NA
Zinc	5,000	2,500	250	NA	NA
Chromium (VI)	500	50	5	NA	NA

TABLE 3 – WASTE CLASSIFICATION FLOWCHART

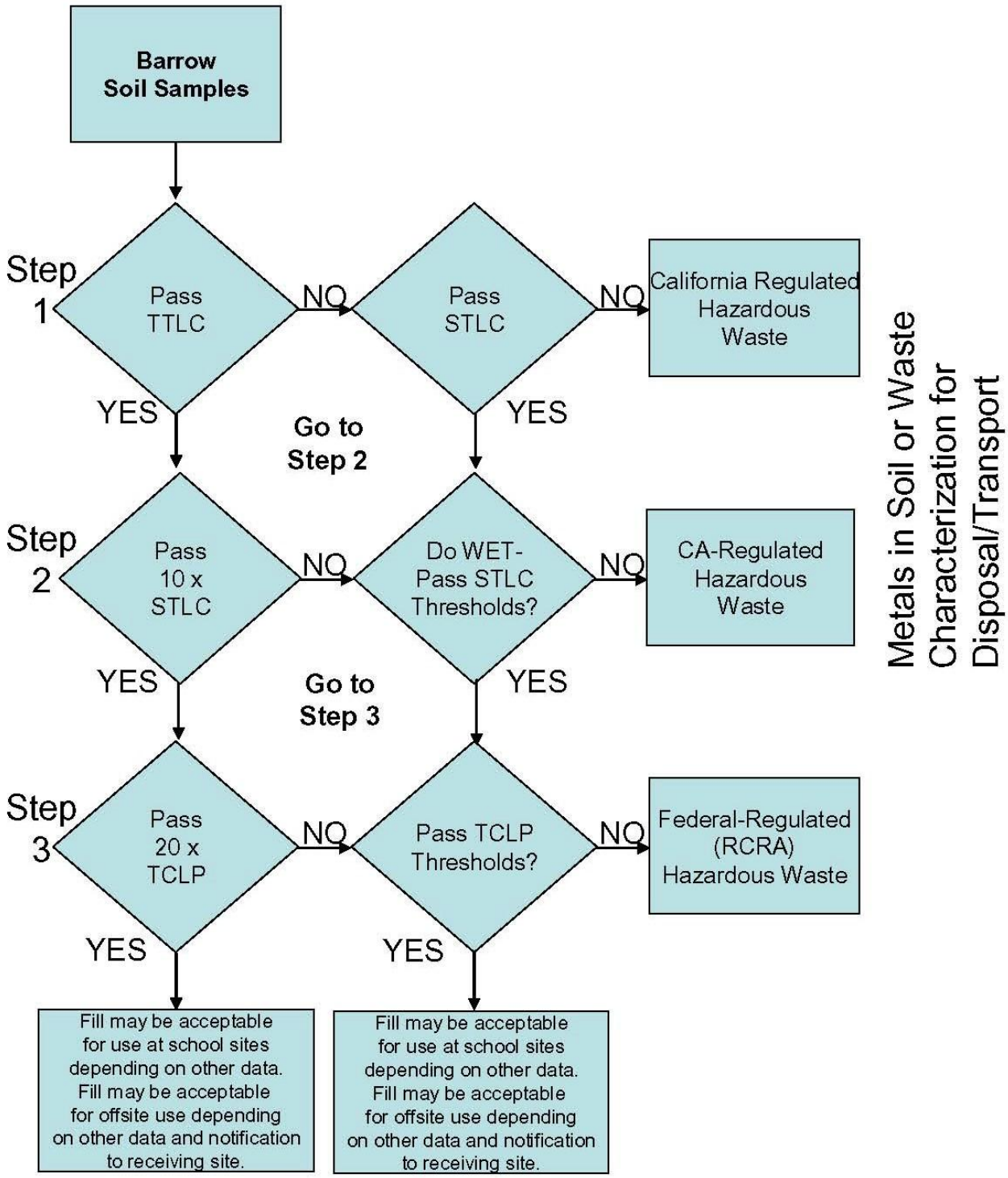

TABLE 4: THRESHOLD CRITERIA FOR METALS IN SOIL - LOOK UP VALUES

CAM 17 Metals	Soil Threshold Criteria (mg/kg)	Basis
Antimony	28	NC
Arsenic	11.3	BK
Barium	2330	NC
Beryllium	16	C
Cadmium	1.4	C
Chromium	106656	NC
Cobalt	4266	NC
Copper	2631	NC
Lead	255	PbB
Mercury	21	NC
Molybdenum	356	NC
Nickel	148	C
Selenium	356	NC
Silver	356	NC
Thallium	4.7	NC
Vanadium	498	NC
Zinc	21331	NC

NC = Non-Cancer Health Effects

BK = Background

C = Cancer Risk

PbB = Blood Lead Levels

END OF SECTION - 01 45 24

SECTION 01 50 00 | TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities, including but not limited to:
   1. Water service and distribution.
   2. Sanitary facilities, including toilets, wash facilities, and drinking water facilities.
   3. Heating and cooling facilities.
   4. Ventilation.
   5. Electric power service.
   6. Lighting.
   7. Telephone service (land line)
   8. Waste disposal facilities.
   9. Field office.
   10. Storage and fabrication sheds.
   11. Lifts and hoists.
   12. Construction aids and miscellaneous services and facilities.
   13. Environmental protection.
   14. Pest control.
   15. Enclosure fence.
   16. Security enclosure and lockup.
   17. Barricades, warning signs, and lights.
   18. Temporary partitions.
   19. Fire protection.
   20. Accessories necessary for a complete installation.
   21. Temporary signage.

B. Use Charges:
   1. Installation, 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, occupants of the Project, testing agencies, and authorities having jurisdiction.
   2. Water and sewer service: Pay sewer service use charges for water used and sewer usage by all entities for construction operations.
   3. Electric power service: Pay electric power service use charges for electricity used by all entities for construction operations.

1.3 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Moisture Protection Plan:
   1. Describe procedures and controls for protecting materials and construction from water absorption and damage:

a. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
b. Indicate procedures for discarding water damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged work.
c. Indicate sequencing of work that requires water, such as sprayed fire resistive materials, plastering, and tile grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

C. Dust and HVAC Control Plan:
1. Submit coordination drawing and narrative that indicates the dust and HVAC control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
a. HVAC system isolation schematic drawing.
b. Location of proposed air-filtration system discharge.
c. Waste handling procedures.
d. Other dust control measures.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Accessible Temporary Egress:
a. Comply with 2025 California Building Code (CBC) CCR Title 24, Part 2, (as adopted and amended by DSA).
b. Comply with applicable provisions in the U.S. Architectural and Transportation Barriers Compliance Board ADA-ABA Accessibility Guidelines (ADAAG), ICC/ANSI A117.1.

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

C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.

B. Chain Link Fencing: Minimum 2 inches (50 mm), 0.148-inch (3.8 mm) thick, galvanized steel, chain link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch (60 mm) OD line posts and 2-7/8 inch (73 mm) OD corner and pull posts.

C. Polyethylene Sheet: Reinforced, fire-resistive sheet, ten (10) mils (0.25 mm) minimum thickness, with flame spread rating of 15 or less per ASTM E84.

D. Dust Control Adhesive Surface Walk-off Mats: Provide mats a minimum of 36 inches by 60 inches (914 mm x 1624 mm).

E. Insulation: Unfaced mineral fiber blanket, manufactured from glass, slag wool, or rock wool;

with maximum flame spread and smoke developed indexes of 25 and 50, respectively.

F. Lumber and Plywood: Comply with requirements in Section 06 10 53: Miscellaneous Rough Carpentry.

G. Gypsum Board: Minimum 1/2-inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; Type X or Type C panels with tapered edges. Comply with Section 09 21 16: Gypsum Board Assemblies.

H. Paint: Comply with requirements in Section 09 90 00: Painting and Coating.

I. Tarpaulins: Fire resistive labeled with flame-spread rating of 15 or less.

J. Water: Potable.

2.2 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, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
1. Furniture required for Project site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F
6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations. Store combustible materials apart from building.

2.3 EQUIPMENT

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

B. Drinking Water: Containerized, tap dispenser, bottled water drinking water units, including paper cup supply. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 degrees F to 55 degrees F (7.2 degrees C to 12.7 degrees C).

C. Electrical Outlets: Properly configured, NEMA polarized outlets to prevent insertion of 110V to 120V plugs into higher voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

D. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

E. HVAC Equipment:
   1. Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid propane gas or fuel oil heaters with individual space thermostatic control:
      a. Heating units: Listed and labeled for type of fuel being consumed by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.
      b. Permanent HVAC system: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction. Clean HVAC system as required in Section 01 77 00: Closeout Procedures and install new filter with MERV 11 or greater.

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

PART 3 EXECUTION

3.1 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.

3.2 INSTALLATION

A. Locate facilities where they will serve the 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.

3.3 TEMPORARY UTILITY INSTALLATION

A. Install temporary service. 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:
   1. Provide temporary utilities to remove effluent lawfully:
      a. 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. Sanitary Facilities:
   1. Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type,

number, location, operation, and maintenance of fixtures and facilities:

a. Disposable supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
b. Wash facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

E. 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.

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

G. Ventilation and Humidity Control:
1. 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:
   a. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

H. Electric Power Service:
1. Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Install electric power service underground unless otherwise indicated:
   a. Electric distribution - Provide receptacle outlets adequate for connection of power tools and equipment:
      1) Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length voltage ratio.
      2) Provide warning signs at power outlets other than 110 to 120-V.
      3) Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or traffic areas.
      4) Provide metal conduit enclosures or boxes for wiring devices.
      5) Provide four (4) gang outlets, spaced so 100-foot (30 m) extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.

I. Lighting:
   1. Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions:
      a. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
      b. Install lighting for Project identification sign.

J. Telephone Service:
   1. Provide temporary telephone service in common use facilities for use by construction personnel, Architect, and inspection services. Install a minimum of one (1) telephone line(s) for each field office:
      a. Provide dedicated telephone line for each facsimile machine in each field office.
      b. At each telephone, post a list of important telephone numbers:
         1) Police and fire departments.
         2) Ambulance service.
         3) Contractor's home office.
         4) Contractor's emergency after-hours telephone number.
         5) Architect's office.
         6) Engineers' offices.
         7) Owner's office.
         8) Principal subcontractors' field and home offices.
      c. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

K. Electronic Communication Service:
   1. Provide a desktop computer and printer/scanner in the primary field office adequate for use by Architect, inspection services, and Owner to access Project electronic documents and maintain electronic communications:
      a. Internet service: Broadband modem, router, and ISP equipped with hardware firewall.
      b. Internet security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
      c. Backup: External hard drive, minimum one (1) terabyte, with automated backup software providing daily backups.

3.4 SUPPORT FACILITIES INSTALLATION

A. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E136. Comply with NFPA 241:
   1. 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 Use of Permanent Roads and Paved Areas:
   1. 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:
      a. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
      b. Prepare subgrade and install sub-base and base for temporary roads and paved areas.
      c. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.

d. Delay installation of final course of permanent pavement until immediately before Substantial Completion.

C. Traffic Controls:
1. Comply with requirements of authorities having jurisdiction:
a. Protect existing site improvements to remain including curbs, pavement, and utilities.
b. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Provide temporary parking areas for construction personnel.

E. Dewatering Facilities and Drains:
1. Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water:
a. Dispose of rainwater in a lawful manner that will not result in flooding the Project or adjoining properties, or endanger permanent Work or temporary facilities.

F. Project Signs: Not listed in 3.5 Below.
1. Provide Project signs as indicated. Unauthorized signs are not permitted:
a. Identification signs: Provide Project identification signs as indicated on Drawings.
b. Temporary signs:
1) Provide other signs as indicated and as required to inform public and individuals seeking entrance to the Project:
a) Provide temporary, directional signs for construction personnel and visitors.
c. Maintain and touchup signs so they are legible at all times.

G. 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 73 00: Execution.

H. Lifts and Hoists:
1. Provide facilities necessary for hoisting materials and personnel:
a. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

I. Temporary Elevator Use: Use of elevators is not permitted.

J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

K. 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.

3.5 SIGNS

A. Furnish and install a project sign 6’-0” by 8’-0” in size. Image will be provided to the graphics printing company by the Architect after Award of Contract. Contractor will be responsible for the cost of printing the image, mounting the sign on an aluminum substrate and installing the sign at the site. The sign will include the name of the project, District, name and title of Board of Trustees, District Superintendent, Contractor, Architect, and each of the project consultants.

B. Other signs permitted at the site:

1. Warning signs.
2. Directional signs.
3. Identification signs at field offices.
4. Emergency medical services sign.
5. Signs required by Authorities Having Jurisdiction
6. Storm Water Pollution Prevention Plan sign (SWPPP)

C. Contractor shall allow no other signs to be displayed at the project site, unless authorized by the Owner/District.

3.6 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities:
1. Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities to the satisfaction of Owner and Architect.

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

C. Temporary Erosion and Sedimentation Control:
1. 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 requirements of authorities having jurisdiction:
   a. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree or plant protection zones.
   b. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
   c. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
   d. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control:
1. 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.

E. Tree and Plant Protection:
1. Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Pest Control:
1. Engage pest control services 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:
1. Before construction operations begin, provide site enclosure fence to prevent people and animals from easily entering site except by entrance gates:

a. Extent of fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

H. Security Enclosure and Lockup:
1. 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:
1. Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Egress:
1. Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

K. Temporary Enclosures:
1. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior:
   a. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

L. Temporary Partitions:
1. Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate occupied areas from fumes and noise:
   a. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side and fire retardant treated plywood on construction operations side.
   b. Construct dustproof partitions with two layers of 6-mil (0.14 mm) polyethylene sheet on each side. Cover floor with two (2) layers of 6-mil (0.14 mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire retardant treated plywood. Do not apply tape to finish floor surfaces:
      1) Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water dampened foot mats in vestibule.
   c. Where fire resistance rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
   d. Insulate partitions to control noise transmission to occupied areas.
   e. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
   f. Protect air handling equipment.
   g. Provide walk-off mats at each entrance through temporary partition.

M. Temporary Fire Protection:
1. Install and maintain temporary fire protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program:
   a. Prohibit smoking in construction areas.
   b. Supervise welding operations, combustion type, temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
   c. 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.

d. 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.

3.7 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture Protection Plan:
   1. Avoid trapping water in finished Work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase:
   1. Before installation of weather barriers, when materials are subject to wetting and exposure to airborne mold spores, protect as follows:
      a. Protect porous materials from water damage.
      b. Protect stored and installed material from flowing or standing water.
      c. Keep porous and organic materials from coming into prolonged contact with concrete.
      d. Remove standing water from decks.
      e. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase:
   1. 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:
      a. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
      b. Keep interior spaces reasonably clean and protected from water damage.
      c. Periodically collect and remove waste containing cellulose or other organic matter.
      d. Discard or replace water-damaged material.
      e. Do not install material that is wet.
      f. Discard, replace, or clean stored or installed material that begins to grow mold.
      g. 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 Condition Phase of Construction:
   1. After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
      a. Control moisture and humidity inside building by maintaining effective dry-in conditions.
      b. Use permanent HVAC system to control humidity.
      c. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits and moisture control:
         1) Hygroscopic materials that may support mold growth, including wood and gypsum based products, which become wet during the course of construction and remain wet for 48 hours are considered defective and are to be removed and replaced.
         2) Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
         3) Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.8 OPERATION, TERMINATION, AND REMOVAL

A. Supervision:
   1. 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:
   1. Maintain facilities in good operating condition until removal:
      a. 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:
   1. Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion unless otherwise required and approved by Owner and Architect.

D. Termination and Removal:
   1. Remove each temporary facility when need when 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:
      a. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
      b. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
      c. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 22: Substantial Completion Procedures.

END OF SECTION - 01 50 00

SECTION 01 55 26 | TRAFFIC CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Work consists of furnishing traffic control devices and services for the control and protection of traffic through the area of construction in accordance with the Drawings and Specifications and in conformity with the details and at the locations shown on the approved plans for Temporary Traffic Control or as established by local ordinances and/or CalTrans Engineer.

B. Safe Traffic Flow to and through the Project site shall be maintained at all times.

C. Traffic control shall conform to CalTran's encroachment permit requirements or as designated by local ordinances.

1.3 SUBMITTALS

A. Prior to beginning construction, Contractor shall apply for any and all traffic related permits and/or encroachments required by CalTrans or local jurisdictions. Provide detailed plans, indicating direction and placement of traffic altering devices, including advanced warning signage and detour signage required for Project. Temporary Traffic Control plan must be approved by Architect, subjected to CalTrans permitting prior to beginning construction activities.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

A. There will be no interruption of traffic on adjacent and feeder roads to the residential and commercial usage by maintaining a minimum of one-way traffic.

B. No construction shall begin until all traffic control signs and devices are installed by Contractor.

END OF SECTION - 01 55 26

SECTION 01 57 13 | EROSION CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE OF WORK

A. General: Provide all materials, equipment and labor necessary to furnish and install straw wattles at locations shown on the Drawings and on Contractors Storm Water Pollution Prevention Plan.

B. Storm Water Pollution Prevention Plan: Contractor will be required to prepare a Storm Water Pollution Prevention Plan (SWPPP), and submit to the State Water Resource Control Board to obtain Notice of Intent approval and a WDID number. Comply with State Water Resources Control Board requirements. The SWPPP shall be provided by the Contractor prior to the start of work. The SWPPP shall be tailored to the contractor's approach to the work in this contract. The SWPPP shall be prepared by a Qualified SWPPP Developer (QSD). The Contractor shall as a minimum address:
   1. Cut and fill operations.
   2. Temporary stockpiles.
   3. Vehicle and equipment storage, maintenance and fueling operations.
   4. Concrete, plaster, mortar and paint disposal.
   5. Dust control.
   6. Tracking of dirt, mud on off-site streets.
   7. Erosion Controls
   8. Sediment Controls

1.3 SUBMITTALS

A. SWPPP: Contractors Qualified SWPPP Developer (QSD) shall submit to the State Water Resources Control Board via Storm water Multi Application and Report Tracking System (SMARTS) and obtain a Notice of Intent and WDID number prior to beginning work on site.

1.4 QUALITY ASSURANCE

A. General: Comply with governing codes and regulations.

PART 2 PRODUCTS

2.1 MATERIALS

A. A. Straw Wattles: Shall be new manufactured straw roles in compliance with state requirements for sediment control.

B. Hydroseed: Shall be a 3 step seeding rate consisting of:
   1. Step 1:
   2. Fiber Mulch @ 500 lbs/ac
   3. Fertilizer (16-20-0) @ 250lbs/ac
   4. Tacikfier (Plantago) @ 50lbs/ac
   5. Seed (Blandon Brome) @ 12lbs/ac

6. Seed (Annual Rye) @ 9lbs/ac
7. Step 2:
8. Blown Straw @ 3500lbs/ac
9. Step 3:
10. Fiber Mulch @ 500lbs/ac
11. Tacikfier (Plantago) @ 200lbs/ac

PART 3 EXECUTION

3.1 INSTALLATION

A. All BMPS shall be installed per the drawings, CASQA standards and as required by the SWPPP.

3.2 MAINTENANCE AND REMOVAL:

A. General: Maintain and repair existing and new erosion control facilities throughout the construction period. Remove silt build up at straw wattles and/or silt fences as needed. Repair damage to earth slopes and banks. Erosion control measures shall be left in place until hydroseed is placed.

B. Monitoring: Based on determined Risk Level of Contractor's SWPPP provide monitoring of erosion and sediment control measures before, during and after storm events. Site monitoring shall be performed by a Qualified SWPPP Practitioner. Update SWPPP continuously throughout construction period and provide reporting and testing as required by the current NPDES permit. Testing and reporting of turbidity and ph will be required for a project determined to be Risk Level 2. Contractor's QSD/QSP will be required to prepare AdHoc reports of all testing on the State Water Resources Control Board's SMARTS database

C. Cleaning: Keep area clean of debris.

D. Remove all sediment control measures following site stabilization.

E. The Contractor's QSD and QSP will be responsible for preparing and gaining approval of the annual report(s) and Notice of Termination on the State Water Resources Control Board's SMARTS database following project completion.

END OF SECTION - 01 57 13

SECTION 01 57 23 | TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Requirements:
1. Contractor shall exercise every reasonable precaution to protect channels, storm drains, and bodies of water from pollution.
2. Schedule and conduct operations to minimize or avoid muddying and silting channels, drains, and waters.
3. As required, obtain permits for erosion and water pollution control from the appropriate jurisdictional agency before starting Work.
4. Provide any necessary water pollution control devices to prevent, control, and abate water pollution, and implement good housekeeping pollution control measures to reduce the discharge of pollutants from Work sites to the maximum extent practicable. These water pollution control devices include drains, gutters, slope protection blankets and retention basins, and shall be constructed concurrently with other Work at the earliest practicable time.
5. Exercise care in preserving vegetation and protecting property to avoid disturbing areas beyond the limits of the Work. Promptly repair any damage caused by Contractor operations.
6. Comply with the specific requirements based on acreage of disturbed soil.
7. Penalties: Failure to comply with this Section may result in significant fines and possible imprisonment. The RWQCB or other prosecuting authority may assess fines of up to $32,500 per day for each violation. Should Owner be fined or penalized as a result of Contractor failing to comply with this Section, Contractor shall reimburse Owner for any and all fines, penalties and related costs.
8. Notification and report: If pollution occurs in the Work area for any reason or when Contractor becomes aware of any violation of this Section, correct the problem and immediately notify the Inspector. In addition, submit a written report to the Engineer within seven (7) calendar days describing the incident and the corrective actions taken. If either the Inspector or Engineer is first to observe pollution or a violation, Contractor shall also explain in the written report why the Work was inadequately monitored.
9. The provisions of this Section describe minimum compliance and do not preclude other more stringent stormwater pollution control measures that may be required in the Contract.

1.3 DEFINITIONS

A. Construction Activity: Operations such as clearing; grading; disturbances to the ground, such as stockpiling; or excavation that results in soil disturbances. If construction activity is part of a larger common plan of development, the amount of disturbed soil is the total land area of disturbed soil that results under the common plan.

1.4 LIABILITIES AND PENALTIES

A. Payment of penalties for noncompliance by Contractor shall be the sole responsibility of Contractor.

B. Compliance with the Clean Water Act is the sole responsibility of Contractor. Owner shall recover all costs of any fine against Owner due to noncompliance by Contractor by appropriate Owner Assessment.

PART 2 (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

A. Construction activity:
1. Comply with the following minimum water quality protection requirements:
   a. Retain eroded sediments and other pollutants onsite and do not allow transportation from the site by sheet flow, swales, area drains, natural drainage, or wind. Control slope and channel erosion by implementing an effective combination of best management practices (BMPs). Such BMPs include scheduling grading during non-rainy seasons, planting and maintaining vegetation on slopes, and covering erosion-susceptible slopes.
   b. Protect stockpiles of earth and other construction-related materials from being transported from the site by wind or water.
   c. Properly store and handle fuels, oils, solvents, and other toxic materials to not contaminate the soil or surface waters, enter the groundwater, or be placed where they may enter a live stream, channel, drain, or other water conveyance facility. Protect all approved toxic storage containers from weather. Clean spills immediately and properly dispose of cleanup materials. Spills shall not be washed into live streams, channels, drains, or other water conveyance facilities:
      1) If rain or storm water runoff comes in contact with pollutants (such as soil stabilizers, paint, or fluid from vehicles) report to Inspector immediately. Contractor will be required to sample and remediate contaminated water.
   d. Do not wash excess or waste concrete into the public way or any drainage system. Retain concrete wastes onsite until they can be appropriately disposed of or recycled.
   e. Deposit trash and construction-related solid wastes in covered receptacles to prevent contamination of rainwater and dispersal by wind.
   f. Do not allow sediments and other materials to be tracked from the site by vehicle traffic. Stabilize construction entrance roadways to inhibit sediments from being deposited onto public ways. Immediately sweep up accidental depositions. Do not allow depositions to be washed away by rain or by any other means.
   g. Contain non-stormwater runoff from equipment or vehicle washing and any other activity at the worksite.
   h. At completion of the Work, clear the worksite of debris and restore to a condition at least equal to or better than prior to construction.

3.2 MAINTENANCE

A. To ensure the proper implementation and functioning of control measures, Contractor shall regularly inspect and maintain the construction site. Contractor shall identify corrective actions and time needed to address any deficient measures or reinitiate any measures that have been discontinued. Inspections of the construction site shall be conducted by Contractor to identify deficient measures, as follows:
1. Prior to a forecasted storm.
2. At 24-hour intervals during extended precipitation events.
3. After all precipitation that causes runoff capable of carrying sediment from the construction site.

4. Routinely, at a minimum of once every week during the rainy season (October 1st – April 30th) and once every month during the non-rainy season (May 1st – September 30th).

B. All temporary and/or permanent post-construction control measures shall be maintained and regularly inspected by Project Contractor after all improvements are in place and accepted by Owner. Temporary and/or permanent post-construction landscaping maintenance shall include, but not be limited to, watering, seeding, hydro-seeding, matting, slope stabilization, re-vegetation, and any other maintenance control measures recommended by Owner to insure proper erosion control and plant growth.

END OF SECTION 01 57 23

SECTION 01 60 00 | PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products, including but not limited to:
   1. Product delivery, storage, and handling.
   2. Manufacturers' written warranties on products.
   3. Special warranties.
   4. Comparable products.

1.3 DEFINITIONS

A. Basis of Design Product Specification:
   1. A Specification in which a specific manufacturer's product is named and accompanied by the words *basis of design*, including make, model number, or other designation to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the Specification.

B. Products:
   1. Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term *product* includes the terms *material*, *equipment*, *system*, *assembly*, and terms of similar intent:
      a. Named products: Items identified by manufacturer's product name, including make, model number, or other designation shown or listed in manufacturer's published product literature current as of date of the Contract Documents.
      b. New products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
      c. Comparable product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

1.4 SUBMITTALS

A. Comparable Product Requests:
   1. Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title, and Drawing number(s) and title(s):
      a. Include data to indicate compliance with the specified requirements.
      b. Architect's action: If necessary, Architect will request additional information or documentation for evaluation within one (1) week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven (7) days

of receipt of additional information or documentation, whichever is later:
1) Form of Approval: As specified in Section 01 33 00: Submittal Procedures.
2) Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis of Design Product Specification Submittal:
1. Comply with requirements in Section 01 33 00: Submittal Procedures. Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options:
1. If Contractor is given option of selecting between two (2) or more products for use on Project, select a product compatible with products previously selected, even if previously selected products were also options:
a. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
b. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 WARRANTY

A. Warranties specified in other Sections 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:
1. Manufacturer's warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Warranties:
1. Prepare a written document that contains appropriate terms and identification, ready for execution:
a. Specified form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
b. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time:
1. Comply with requirements in Section 01 77 00: Closeout Procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original

sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents, and to determine that products are undamaged and properly protected.

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store materials in a manner that will not endanger Project structure.
   3. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   6. Protect stored products from damage and liquids from freezing.
   7. Provide a secure location and enclosure at site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. Product Requirements:
   1. Provide products that comply with the Contract Documents, are undamaged, and unless otherwise indicated, are new at time of installation:
      a. Provide products complete with accessories, trim, finish, fasteners, and items needed for complete installation and indicated use and effect.
      b. Standard products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
      c. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
      d. Where products are accompanied by the phrase *as selected*, Architect will make selection.
      e. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:
   1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   3. Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

5. Basis of Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and characteristics based on the product named. Comply with requirements for consideration of an unnamed product by one of the named manufacturers.

C. Visual Matching Specification:
   1. Where Specifications require *match Architect's sample*, provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches:
      a. If no product available within specified category matches and complies with specified requirements, comply with requirements of Section 01 25 00: Substitution Procedures and Form for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase *selected by Architect* or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration:
   1. Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
      a. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
      b. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
      c. Evidence that proposed product provides specified warranty.
      d. List of similar installations for completed projects with project names and addresses, and names and addresses of architects and owners, if requested.
      e. Samples, if requested.

PART 3 EXECUTION (NOT USED)

END OF SECTION - 01 60 00

SECTION 01 64 00 OWNER-FURNISHED PRODUCTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

A. Unless otherwise defined in the GENERAL CONDITIONS, the following definitions apply for this project:
   1. CFCI: CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
      a. When and if the indication "CFCI" is noted on the drawings or listed in the specifications, such items are shown or listed for information and will be furnished by and installed by the Contractor. Such a designation is listed only for clarity, in order to set the item(s) apart from the OFCI, OFOI, and OFVI related item(s).

      All item(s) shown or listed in the drawings and specifications without any indication are in the Contract and are part of the Work unless specifically noted otherwise.
   2. OFCI: OWNER FURNISHED, CONTRACTOR INSTALLED
      a. When and if the indication "OFCI" is noted on the drawings or listed in the specifications, such item(s) are shown or listed for information and will be furnished by Owner and installed by the Contractor. The Contractor shall coordinate and verify all dimensions and details necessary for the proper installation.
   3. OFOI: OWNER FURNISHED, OWNER INSTALLED
      a. When and if the indication "OFOI" is noted on the drawings or listed in the specifications, such item(s) are shown or listed for the purpose of general information and will be furnished and installed by Owner. The Contractor shall coordinate and verify all dimensions and details necessary for proper installation.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Coordination Drawings:
      a. Submit installer's coordination drawings or other documents indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
   2. Closeout Submittals in accordance with Specification Sections in Division One:
      a) Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

1.5 QUALITY ASSURANCE

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

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

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

C. Storage and protection:
   1. Owner Furnished Equipment: The Owner will coordinate and inform the Contractor as to delivery dates for Owner Furnished Equipment to the Project Site. The Contractor shall be responsible for unloading, uncrating, and protecting such equipment.

When only a supporting device, or sub-assembly is to be installed by the Contractor the Owner shall provide only that portion and shall store and safeguard those portions to be installed later by others.

All products shall be protected, handled, and stored in complete compliance with the manufacturer's printed instructions to protect the Owner from warranty infringements or loss of the full function of the item specified.

1.7 PROJECT CONDITIONS OR SITE CONDITIONS

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

Examine all preparatory work to determine its suitability and completeness. Notify the responsible Contractor of any deficiencies which must be corrected prior to installation.

Be satisfied that all conditions affecting installation, operation or function are suitable for installation of the items scheduled.

After installation, and acceptance by the inspector and the Architect, the Contractor shall provide protective guards, covers or barricades as required by the manufacturer.

The Contractor shall promptly repair, refurbish, or replace items damaged by his operations to a condition satisfactory to the Owners representatives and at no cost to the Owner.

1.8 WARRANTY

1. The Contractor shall provide access to the installed items or prepared substrates for the inspection of the manufacturers representatives, for the purpose of affirming the warranties scheduled.

All work shall be performed in full accordance with the manufacturers warranty requirements and all governing codes.

PART 2 PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

A. Installing Contractor’s Responsibilities:
1. Verify mounting and utility requirements for Owner-furnished materials and equipment items.
2. Provide mounting and utility rough in for all items where required:
   a. Rough in locations, sizes, capacities, and similar type items shall be as indicated and required by product manufacturer.

B. Owner and Installing Contractor(s) Responsibilities:
1. Owner-Furnished/Contractor Installed (OFCI) - Furnished by the Owner; installed by the Installing Contractor:
   a. General: Owner and Installing Contractor(s) will coordinate deliveries of materials and equipment to coincide with the construction schedule.
   b. Owner will furnish specified materials and equipment delivered to the site. Owner/vendor’s representative shall be present on Site at the time of delivery to comply with the contract requirements and Specifications Section 01 43 00: Materials and Equipment.
   c. The Owner furnishing specified materials and equipment is responsible to provide manufacturer guarantees as required by the Contract to the Installing Contractor.
   d. The Installing Contractor shall:
      1) Review, verify and accept the approved manufacturer’s submittal/Shop Drawings for all materials and equipment required to be installed by the

Installer Contractor and furnished by the Owner. Any discrepancies, including but not limited to possible space conflicts, should be brought to the attention of the Project Manager and/or Program Manager, if applicable.

2) Coordinate timely delivery. Installing Contractor shall receive materials and equipment at Site when delivered and give written receipt at time of delivery, noting visible defects or omissions; if such declaration is not given, the Installing Contractor shall assume responsibility for such defects and omissions.
3) Store materials and equipment until ready for installation and protect from loss and damage. Installing Contractor is responsible for providing adequate storage space.
4) Coordinate with other bid package contractors and field measurement to ensure complete installation.
5) Uncrate, assemble, and set in place.
6) Provide adequate supports.
7) Install materials and equipment in accordance with manufacturer's recommendations, instructions, and Shop Drawings, supply labor and material required, and make mechanical, plumbing, and electrical connections required to operate equipment.
8) Be certified by equipment manufacturer for installation of the specific equipment supplied by the Owner.
9) Provide anchorage and/or bracing as required for seismic restraint per Title 24, UBC Standard 27-11 and all other applicable codes.
10) Provide the contract-required warranty and guarantee for all work, materials and equipment, and installation upon its completion and acceptance by the District. Guarantee includes all costs associated with the removal, shipping to and from the Site, and re-installation of any equipment found to be defective.

C. Compatibility with Space and Service Requirements:
1. Equipment items shall be compatible with space limitations indicated and as shown on the Contract Documents and specified in other sections of the Specifications.
2. Modifications to equipment items required to conform to space limitations specified for rough in shall not cause additional cost to the District.

D. Manufacturer's printed descriptions, specifications, and instructions shall govern the Work unless specifically indicated or specified otherwise.

2.2 FURNISHED MATERIALS AND EQUIPMENT

A. All furnished materials and equipment are indicated or scheduled on the Contract Documents.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install equipment items in accordance with the manufacturer's instructions.

B. Set equipment items securely in place, rigidly or flexibly mounted in accordance with manufacturers' directions.

C. Make electrical and mechanical connections as indicated and required.

D. Touch-up and restore damaged or defaced finishes to the Owner's satisfaction.

3.2 CLEANING AND PROTECTION

A. Repair or replace items not acceptable to the Architect or Owner.

B. Upon completion of installation, clean equipment items in accordance with manufacturer's recommendations, and protect from damage until final acceptance of the Work by the Owner.

3.3 SCHEDULES

A. This schedule is provided for the convenience of the General Contractor for items not scheduled elsewhere on the drawings or in the Specification Sections. Refer to Drawings for additional items not listed below:

1. TOILET ACCESSORIES:
   a. Soap Dispensers — OFCI
   b. Mirrors — CFCI
   c. Toilet Paper Dispensers (At Typical Non-Accessible Toilet Stalls) — OFCI
   d. Paper Towel Dispensers (At Staff Single Occupancy Restrooms) — OFCI
   e. Grab Bars: Typical Accessible Toilet Stalls — CFCI
   f. Sanitary Napkin Dispensers (At Girls and Single occupancy Restrooms) — CFCI
   g. Sanitary Napkin Disposal (At Girls and Single occupancy Restrooms) — OFCI
   h. Mop and Broom Holder — CFCI
   i. Electric Hand Dryers — CFCI
   j. Diaper Changing Stations — CFCI
   k. Seat Cover Dispenser — OFCI

2. WASHER AND DRYERS (Storage/Laundry):
   a. Washer (total of 2) — CFCI
      B&C Technologies: Model HE-65
   b. Dryer (total of 2) — CFCI
      Huebsch: Model HT075E

3. PROJECTOR (Team Room):
   a. Projector — OFCI
   b. Projector Support — CFCI

4. FOOD SERVICE EQUIPMENT:
   a. Reach-In Refrigerator (total of 1) — OFCI
   b. Warming Cabinet (total of 1) — OFOI
   c. Ice Machine and Bin - Remote (total of 2) — OFCI
   d. Stainless Steel Worktable (total of 1) — CFCI
   e. Stainless Steel Three Comp. Sink (total of 1) — CFCI
   f. Stainless Steel Hand Sink (total of 1) — CFCI
   g. 24"x48" Dry Storage Shelving (total of 5) — OFCI
   h. Refer to Specification Section 11 40 00 – "FOODSERVICE EQUIPMENT" Part 4 "Schedule" for a complete list and description of the food service Equipment under this project.

5. FULL GROWN OLIVE TREES (TOTAL OF 7) — OFOI
   a. Refer to Landscape and Irrigation Plans for locations. Contractor is responsible for prep. work to receive the trees including a 7'x7'x2' deep hole for each tree.

6. TV SCREEN (Building M):
   a. Samsung 85” 4K UHD Display — OFCI
   b. SmartMount Universal Tilt Wall Mount ST680 — OFCI
   c. TV Shield Outdoor Enclosure, Quad Receptacle — OFCI

7. SCOREBOARD (North of Football Field):
   a. Specifications Section 11 66 43 - 3 — CFCI

8. SPORTS FIELD LIGHTING:
   a. Specifications Section 26 56 68 - 1 — OFCI

9. BLEACHERS AND PRESSBOX / PERMANENT GRANDSTAND:
   a. Specifications Section 13 12 05 - 1 — OFCI

10. GRAPHICS AND SIGNAGE:
    a. DIMENSIONAL LETTERS — CFCI
    b. BACKLIT DIMENSIONAL LETTERS — CFCI
    c. ILLUMINATED PAN CHANNEL LETTERING — CFCI
    d. PAN CHANNEL LETTERING — CFCI
    e. PAN CHANNEL LOGO BOX — OFCI
    f. ALUMINUM 3D LOGO — OFCI
    g. DOUBLE FACED LED ILLUMINATED HANGING BLADE — OFCI

END OF SECTION 01 64 00

SECTION 01 71 23 | FIELD ENGINEERING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Layout of the Work.
   2. Verification of Work:
      a. Owner reserves the right to verify any Work that Inspector deems necessary.
      b. Other Sections that require surveyor to verify or measure installed Work and related item: Surveyor shall perform such verifications or measurements at Contractor's expense. Contractor shall furnish a certification, signed by both surveyor and Contractor, to Inspector.

B. Related Sections:
   1. Section 01 10 00: Summary.
   2. Section 01 31 00: Project Management and Coordination.
   3. Section 01 33 00: Submittal Procedures.

1.3 SURVEY CONTROLS

A. Vertical control shall use same benchmark used in the preparation of topographic survey. When Work consists of both onsite and off-site, and benchmarks differ, an equation shall be indicated on Drawings.

B. Horizontal control for existing structures shall be the property line.

1.4 LAYOUT OF WORK

A. All work related to staking shall be by a land surveyor, or Civil Engineer, registered with the State of California to perform land surveying and employed by Contractor.

B. Before commencement of Work, surveyor shall locate all reference points and benchmarks to be used for vertical and horizontal control.

C. Surveyor shall lay out entire Work, set grades, lines, levels, control points, elevations, grids and positions.

1.5 RECORD DOCUMENTS

A. Maintain complete and accurate log of all control and survey documentation as work progresses.

B. Record, by coordinates, all utilities onsite with top of pipe elevations, at major grade and alignment changes, rim, grate, or top of curb and flow line elevations of all drainage structures and sewer manholes.

C. Indicate reference and control points on record drawings. The basis of elevation shall be

one of the established benchmarks.

D. Upon Beneficial Occupancy, obtain and pay for reproducible Plans. Deliver Plans to District representative. Clearly indicate all differences between original drawings and completed Work within specified tolerances.

1.6 SUBMITTALS

A. Surveyor: Submit name, address, and license number to Owner, including any changes as they occur.

B. Field Notes: Upon request by District representative, submit copies of cut sheets, coordinate plots, data collector printouts, marked-up construction staking plans, and other documentation as available to verify accuracy of field engineering work during and at completion of Project. Submittals to Owner must be signed and sealed by surveyor and counter-signed by Contractor

C. Statement of Compliance: Contractor shall submit a statement of certification signed and sealed by surveyor, counter-signed by Contractor, indicating compliance with grades and alignment of construction Plans at rough grade, fine grade, and top of rock stages. Inspector shall approve survey submittals for each stage of construction prior to proceeding with work.

D. Upon Beneficial Occupancy: Contractor shall obtain and pay for reproducible survey drawings (or “As Built”).

E. Completed record drawings shall be signed and certified as correct and within specified tolerances by licensed surveyor. Originals and two (2) sets of blueprints shall be submitted to Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PREPARATION

A. Pre-mark areas of excavation in accordance with the requirements of “Dig-Alert.” Request locators two (2) days before commencing excavation.

B. Before commencing Work, establish all horizontal and vertical reference points used in Contract Documents according to existing field conditions.

C. Preserve established reference lines and benchmarks.

D. Differentiate school and city datum as applicable.

E. Relocate benchmarks that may interfere with Work.

F. Reset and re-establish reference marks damaged or lost during construction.

3.2 SURVEY REQUIREMENTS GENERAL

A. Establish a minimum of two (2) permanent horizontal and vertical control points on Project site, remote from construction area, referenced to data established by control points.

B. Indicate reference points, relative to benchmark elevation, on record drawings.

C. Provide grade stakes and elevations to construct over excavation and re-compaction, rough and final grades, paved areas, curbs, gutters, sidewalks, building pads, landscaped areas, and other areas as required.

D. Calculate and layout proposed finished elevations and intermediate controls, as required, to provide smooth transitions between spot elevations indicated on Drawings.

E. Provide stakes and elevations for grading, fill, and topsoil placement.

F. Provide adequate horizontal and vertical control to locate utility lines, including but not limited to, storm, sewers, water mains, gas and electric, and signal and provide vertical control in proportion to the slope of the line as required for accurate construction. Dry utilities will be based upon adequate horizontal and vertical control layout. Prior to trench closure, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished concrete or asphaltic concrete (AC), and surfaces at key locations such as beginning-of-curve (BC), end-of-curve (EC), grade breaks, corners, or angle points in sufficient number to demonstrate the Work complies with the intent of the Contract Documents.

G. Provide horizontal and vertical control for batter boards for drainage, utility, and other onsite structures as required.

H. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within the building pad perimeter adequate to control both over excavation and re-compaction and the final sub-grade elevation of the building pad.

I. Submit a certification signed by the surveyor confirming the elevations and locations of improvements are in conformance with the Contract Documents. The statement shall include survey notes for the finish floor and building pad, showing the actual measured elevations on the completed sub-grade, recorded to the nearest 0.01 of a foot. Building pad tolerance will be plus or minus 0.1 of a foot.

J. Establish a minimum of two (2) permanent horizontal and vertical control points on Project site, remote from building area, referenced to data established by survey control points.

K. Mark boundaries for rights-of-way dedications and easements for utilities prior to marking location of buildings and utilities.

L. Layout all lines, elevations, and measurements needed for construction or installation of buildings, grading, paving, and utilities according to the following:
   1. Identify site boundary and property lines.
   2. Provide working benchmarks.
   3. Set stakes for Bottom of Excavated Plane (BEP).
   4. Set gridlines, radii, working points, etc. for foundation.
   5. Set and verify building pad elevations.
   6. Set finish floor elevations.
   7. Stake location and elevations for exterior ramps and stairs.
   8. Set gridlines, radii, working points, etc., for all floors of multi-story buildings.
   9. Set storm drain, sanitary sewer inverts, and other utilities as needed at five-foot (5') off-set from building lines.
   10. For new facilities, establish permanent onsite benchmark with two-inch (2") diameter brass disk. Location of benchmark to be determined by Owner.

3.3 SURVEY REQUIREMENTS FOR GRADING

A. Provide grade stakes and elevations as follows:
   1. Removal limits (cut lines).
   2. Rough grade staking: 60-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines, and grade breaks.
   3. Fine grade for top of dirt: 30-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines, and grade breaks.
   4. Verify fine grade for top of rock: 30-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines, and grade breaks.
   5. Finish grade marks on all buildings, structures, and at pertinent locations.
   6. Finish grades and offsets for all concrete work, utilities, landscape areas, and structures.
   7. Provide controls and baselines for playground striping.
   8. Off-site improvements: Set grades and provide grade sheets as required by local authorities.

B. Provide a minimum of two (2) permanent horizontal and vertical control points onsite, remote from building area, referenced to data established by survey control points.

3.4 SURVEY REQUIREMENTS FOR UTILITIES

A. Locate “wet” utility lines and provide vertical control proportionate to slope of line as required for accurate construction. “Dry” utilities shall have adequate horizontal and vertical control layout supplied by others.

B. Prior to back-filling trench, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished surfaces at key locations (such as back of curbs, grade breaks, corners, or angle points) in sufficient number to demonstrate Work complies with intent of Contract Documents.

C. Provide horizontal and vertical control for batter boards for drainage, utility, and other onsite structures as required:
   1. Set grades for vaults one inch (1”) higher than adjacent surrounding design grades, unless noted otherwise.

D. Leave all trenches open until required inspection is completed.

3.5 SURVEY REQUIREMENTS FOR STRUCTURES

A. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within building pad perimeter adequate to control both over excavation and re-compaction and final sub-grade elevation of building pad.

B. Submit a certification signed by surveyor confirming elevations and locations of improvements are in conformance with Contract Documents. Statement shall include survey notes for finish floor and building pad, showing actual measured elevations on completed sub-grade, recorded to nearest 0.01 of a foot. Building pad tolerance will be plus or minus 0.1 of a foot.

END OF SECTION - 01 71 23

SECTION 01 73 00 | EXECUTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.
   3. Installation of the Work.
   4. Coordination of Owner-installed products.
   5. Progress cleaning.
   6. Starting and adjusting.
   7. Protection of installed construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

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

1.4 SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor or professional Engineer certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit two (2) copies signed by land surveyor.

D. Final Property Survey: Submit ten (10) copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor legally qualified to practice in the State of California, who is experienced in providing land surveying services of the kind indicated.

B. Manufacturer's Installation Instructions: Obtain and maintain onsite manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 PRODUCTS

2.1 MATERIALS

A. Comply with requirements specified in other Sections.

B. In-Place Materials:
   1. Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible:
      a. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Existing Conditions:
   1. The existence and location of underground and other utilities and construction indicated as existing are not warranted. Before beginning site Work, investigate and verify existence and location of underground utilities, mechanical and electrical systems, and construction affecting the Work:
      a. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water service piping, underground electrical services, and other utilities.
      b. Furnish location data for work related to the Work that must be performed by public utilities serving the site.

B. Examination and Acceptance of Conditions:
   1. Before proceeding with each component of the Work, examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations:
      a. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
      b. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
      c. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report:
   1. Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
      a. Description of the Work.
      b. List of detrimental conditions, including substrates.
      c. List of unacceptable installation tolerances.
      d. Recommended corrections.

D. Proceed with installation after correcting unsatisfactory conditions. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

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

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction

progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00: Project Management and Coordination.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. Engage a land surveyor or professional Engineer to lay out the Work using accepted surveying practices:
1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as necessary to locate each element of Project.
2. Establish limits on use of site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level, and plumb of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two (2) or more locations.

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

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points:
1. Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations:
   a. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
   b. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks:
   1. Establish and maintain a minimum of two (2) permanent benchmarks on site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark:
      a. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
      b. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
      c. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey:
   1. Engage a land surveyor or professional Engineer to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor or professional Engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey:
      a. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
      b. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated:
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
   4. Maintain minimum headroom clearance of 96 inches (2,440 mm) in occupied spaces and 90 inches (2,300 mm) in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions ensuring the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items onsite and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check shop drawings of other Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment:

1. Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions:
   a. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   b. Allow for building movement, including thermal expansion and contraction.
   c. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous. Materials containing asbestos and BCPs are prohibited.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to site for Owner's construction personnel.

B. Coordination:
1. Coordinate construction and operations of the Work with Work performed by Owner's construction personnel:
   a. Construction schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
   b. Pre-installation conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's Work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. Clean site and Work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully:
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven (7) days during normal weather or three (3) days if the temperature is expected to rise above 80 degrees F (27 degrees C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
4. Use containers intended for holding waste materials of type to be stored.
5. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain site free of waste materials and debris.

C. Work Areas:
1. Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work:
   a. Remove liquid spills promptly.
   b. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire Work area, as appropriate.

D. Installed Work: Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials onsite. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 50 00: Temporary Facilities and Controls.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with mechanical, plumbing, and electrical requirements.

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00: Quality Requirements.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION - 01 73 00

SECTION 01 73 29 | CUTTING AND PATCHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes procedural requirements for cutting and patching.

1.3 DEFINITIONS

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

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

1.4 SUBMITTALS

A. Cutting and Patching Plan:
   1. Submit plan describing procedures at least ten (10) days prior to the time cutting and patching will be performed. Include the following information:
      a. Extent: Describe reason for and extent of each occurrence of cutting and patching.
      b. Changes to in-place construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
      c. Products: List products used for patching and firms or entities that will perform patching work.
      d. Dates: Indicate when cutting and patching will be performed.
      e. Utilities and mechanical and electrical systems:
         1) List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted:
            a) Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

B. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

C. Operational Elements:
   1. Do not cut and patch operating elements and related components that results in

reducing the capacity to perform as intended or that results in increased maintenance or decreased operational life or safety:
a. Primary operational systems and equipment.
b. Fire separation assemblies.
c. Air or smoke barriers.
d. Fire suppression systems.
e. Mechanical systems' piping and ducts.
f. Control systems.
g. Communication systems.
h. Fire detection and alarm systems.
i. Conveying systems.
j. Electrical wiring systems.
k. Operating systems of special construction.

D. Miscellaneous Elements:
1. Do not cut and patch the following elements or related components that change the load bearing capacity, resulting in a reduction of capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety:
a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Exterior curtain wall construction.
d. Equipment supports.
e. Piping, ductwork, vessels, and equipment.
f. Noise and vibration control elements and systems.
g. Sprayed fire resistive material.

E. Visual Requirements:
1. Do not cut and patch construction resulting in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner:
a. If possible, retain original installer or fabricator to cut and patch exposed Work. If possible, engage original installer or fabricator. If original installer is not available, engage recognized, experienced, and specialized firm for the Work:
1) Processed concrete finishes.
2) Ornamental metal.
3) Matched veneer woodwork.
4) Preformed metal panels.
5) Roofing.
6) Firestopping.
7) Window system.
8) Fluid applied flooring.
9) Wall covering.
10) HVAC enclosures, cabinets, or covers.

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

1.6 WARRANTY

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

PART 2 PRODUCTS

2.1 MATERIALS

A. Comply with specified requirements.

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

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

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

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

D. Existing Services: Where removal, relocation, or abandonment is necessary, bypass existing services before cutting to avoid interruption of services to occupied areas.

3.3 CUTTING AND PATCHING

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

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

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

D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of

free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00: Summary and what is shown on Drawings.

E. Cutting:
1. Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original installer; comply with original installer's written recommendations:
    a. Use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
    b. Finished surfaces: Cut or drill from exposed or finished side into concealed surfaces.
    c. Concrete and masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
    d. Excavating and backfilling: Comply with requirements in applicable earthwork specifications by cutting and patching operations.
    e. Mechanical and electrical services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
    f. Proceed with patching after construction operations requiring cutting are complete.

F. Patching:
1. Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications:
    a. Inspection:
        1) Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
    b. Exposed finishes:
        1) Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction to eliminate evidence of patching and refinishing:
            a) Clean piping, conduit, and similar features before applying paint or other finishing materials.
            b) Restore damaged pipe covering to its original condition.
2. Floors and walls: Where walls or partitions are removed, extend one finished area into another, patch and repair surfaces in new space. Provide even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
3. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior building enclosure: Patch components and restore enclosure to a weathertight condition.

END OF SECTION - 01 73 29

SECTION 01 74 19 | CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Salvaging nonhazardous demolition and construction waste.
   2. Recycling nonhazardous demolition and construction waste.
   3. Disposing of nonhazardous demolition and construction waste.

1.3 DEFINITIONS

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

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

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

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

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

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 SUBMITTALS

A. Waste Management Plan: Submit plan within ten (10) days of date established for commencement of the Work.

B. Waste Reduction Progress Reports:
   1. Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:
      a. Material category.
      b. Generation point of waste.
      c. Total quantity of waste in tons (tons).
      d. Quantity of waste salvaged, both estimated and actual in tons (tons).
      e. Quantity of waste recycled, both estimated and actual in tons (tons).
      f. Total quantity of waste recovered (salvaged plus recycled) in tons (tons).
      g. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total

waste.

C. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end of Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Firm having minimum ten (10) years of documented experience in specializing in waste management coordination.

B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference:
   1. Conduct conference at site. Review methods and procedures related to waste management including, but not limited to, the following:
      a. Review and discuss waste management plan including responsibilities of waste management coordinator.
      b. Review requirements for documenting quantities of each type of waste and its disposition.
      c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
      d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
      e. Review waste management requirements for each trade.

1.6 PERFORMANCE REQUIREMENTS

A. Conform to County regulations regarding Solid Waste Control.

B. Achieve end of Project rates for salvage/recycling of 50 percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in

the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials**:**

1. Demolition waste:
    a. Asphalt paving.
    b. Concrete.
    c. Concrete reinforcing steel.
    d. Brick.
    e. Concrete masonry units.
    f. Wood studs.
    g. Wood joists.
    h. Plywood and oriented strand board.
    i. Wood paneling.
    j. Wood trim.
    k. Structural and miscellaneous steel.
    l. Rough hardware.
    m. Roofing.
    n. Insulation.
    o. Doors and frames.
    p. Door hardware.
    q. Windows.
    r. Glazing.
    s. Metal studs.
    t. Gypsum board.
    u. Acoustical tile and panels.
    v. Carpet.
    w. Carpet pad.
    x. Demountable partitions.
    y. Equipment.
    z. Cabinets.
    aa. Plumbing fixtures.
    bb. Piping.
    cc. Supports and hangers.
    dd. Valves.
    ee. Sprinklers.
    ff. Mechanical equipment.
    gg. Refrigerants.
    hh. Electrical conduit.
    ii. Copper wiring.
    jj. Lighting fixtures.
    kk. Lamps.
    ll. Ballasts.
    mm. Electrical devices.
    nn. Switchgear and panelboards.
    oo. Transformers.
2. Construction waste:
    a. Masonry and CMU.
    b. Lumber.
    c. Wood sheet materials.
    d. Wood trim.
    e. Metals.
    f. Roofing.
    g. Insulation.
    h. Carpet and pad.
    i. Gypsum board.
    j. Piping.

k. Electrical conduit.
l. Packaging - Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
    1) Paper.
    2) Cardboard.
    3) Boxes.
    4) Plastic sheet and film.
    5) Polystyrene packaging.
    6) Wood crates.
    7) Plastic pails.

1.7 WASTE MANAGEMENT PLAN

A. Develop a waste management plan and requirements. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition site clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan:
    1. List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste and Form CWM-4 for demolition waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures:
        a. Salvaged materials for reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
        b. Salvaged materials for sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
        c. Salvaged materials for donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
        d. Recycled materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
        e. Disposed materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
        f. Handling and transportation procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

D. Cost/Revenue Analysis:
    1. Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste and Form CWM-6 for demolition waste. Include the following:
        a. Total quantity of waste.
        b. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
        c. Total cost of disposal (with no waste management).
        d. Revenue from salvaged materials.

e. Revenue from recycled materials.
f. Savings in hauling and tipping fees by donating materials.
g. Savings in hauling and tipping fees that are avoided.
h. Handling and transportation costs. Include cost of collection containers for each type of waste.
i. Net additional cost or net savings from waste management plan.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PLAN IMPLEMENTATION

A. Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract:
   1. Comply with operation, termination, and removal requirements in Section 01 50 00: Temporary Facilities and Controls.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training:
   1. Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work:
      a. Distribute waste management plan to everyone concerned within three (3) days of submittal return.
      b. Distribute waste management plan to entities when they first begin work onsite. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls:
   1. Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities:
      a. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
      b. Comply with Section 01 50 00: Temporary Facilities and Controls for the control of dust and dirt, environmental protection, and noise control.

E. Waste Management in Historic Zones or Areas: Hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12 inches (300 mm) or more.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:
   1. Salvage items for reuse and handle:
      a. Clean salvaged items.
      b. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
      c. Store items in a secure area until installation.
      d. Protect items from damage during transport and storage.
      e. Install salvaged items to comply with installation requirements for new materials

and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: Not permitted on Project site.

C. Salvaged Items for Owner's Use:
1. Salvage items for Owner's use and handle as follows:
   a. Clean salvaged items.
   b. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
   c. Store items in a secure area until delivery to Owner.
   d. Transport items to Owner's storage area designated by Owner.
   e. Protect items from damage during transport and storage.

D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors, unless otherwise designated by Owner.

E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

F. Plumbing Fixtures: Separate by type and size.

G. Lighting Fixtures: Separate lamps by type and protect from breakage.

H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING WASTE

A. Recycle paper and beverage containers used by onsite workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures:
1. Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan:
   a. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin:
      1) Inspect containers and bins for contamination and remove contaminated materials if found.
   b. Stockpile processed materials onsite without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   c. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
   d. Store components off the ground and protect from the weather.
   e. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 DISPOSAL OF WASTE

A. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction:
   1. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate onsite.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning:
   1. Do not burn waste materials:
      a. Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

C. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.

3.5 ATTACHMENTS

A. Form CWM-1 for construction waste identification.

B. Form CWM-2 for demolition waste identification.

C. Form CWM-3 for construction waste reduction work plan.

D. Form CWM-4 for demolition waste reduction work plan.

E. Form CWM-5 cost/revenue analysis of construction waste reduction work plan.

F. Form CWM-6 cost/revenue analysis of demolition waste reduction work plan.

G. Form CWM-7 for construction waste

H. Form CWM-8 for demolition waste.

CWM FORMS ON FOLLOWING PAGES

FORM CWM-1: CONSTRUCTION WASTE IDENTIFICATION							
MATERIAL CATEGORY	**GENERATION POINT**	**EST. QUANTITY OF MATERIALS RECEIVED* (A)**	**EST. WASTE - % (B)**	**TOTAL EST. QUANTITY OF WASTE* (C = A x B)**	**EST. VOLUME CY (CM)**	**EST. WEIGHT TONS (TONNES)**	**REMARKS AND ASSUMPTIONS**
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Paint Cans							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Lumber: Cut-Offs							
Lumber: Warped Pieces							
Plywood or OSB (scraps)							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Insulation							
Roofing							
Joint Sealant Tubes							
Gypsum Board (scraps)							
Carpet and Pad (scraps)							
Piping							
Electrical Conduit							
Other:							

FORM CWM-2: DEMOLITION WASTE IDENTIFICATION				
MATERIAL DESCRIPTION	**EST. QUANTITY**	**EST. VOLUME CY (CM)**	**EST. WEIGHT TONS (TONNES)**	**REMARKS AND ASSUMPTIONS**
Asphaltic Concrete Paving				
Concrete				
Brick				
CMU				
Lumber				
Plywood and OSB				
Wood Paneling				
Wood Trim				
Miscellaneous Metals				
Structural Steel				
Rough Hardware				
Insulation				
Roofing				
Doors and Frames				
Door Hardware				
Windows				
Glazing				
Acoustical Tile				
Carpet				
Carpet Pad				
Demountable Partitions				
Equipment				
Cabinets				
Plumbing Fixtures				
Piping				
Piping Supports and Hangers				
Valves				
Sprinklers				
Mechanical Equipment				
Electrical Conduit				
Copper Wiring				
Light Fixtures				
Lamps				
Lighting Ballasts				
Electrical Devices				
Switchgear and Panelboards				
Transformers				
Other:				

FORM CWM-3: CONSTRUCTION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Packaging: Cardboard						
Packaging: Boxes						
Packaging: Plastic Sheet or Film						
Packaging: Polystyrene						
Packaging: Pallets or Skids						
Packaging: Crates						
Packaging: Paint Cans						
Packaging: Plastic Pails						
Site-Clearing Waste						
Masonry or CMU						
Lumber: Cut-Offs						
Lumber: Warped Pieces						
Plywood or OSB (scraps)						
Wood Forms						
Wood Waste Chutes						
Wood Trim (cut-offs)						
Metals						
Insulation						
Roofing						
Joint Sealant Tubes						
Gypsum Board (scraps)						
Carpet and Pad (scraps)						
Piping						
Electrical Conduit						
Other:						

FORM CWM-4: DEMOLITION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Asphaltic Concrete Paving						
Concrete						
Brick						
CMU						
Lumber						
Plywood and OSB						
Wood Paneling						
Wood Trim						
Miscellaneous Metals						
Structural Steel						
Rough Hardware						
Insulation						
Roofing						
Doors and Frames						
Door Hardware						
Windows						
Glazing						
Acoustical Tile						
Carpet						
Carpet Pad						
Demountable Partitions						
Equipment						
Cabinets						
Plumbing Fixtures						
Piping						
Supports and Hangers						
Valves						
Sprinklers						
Mechanical Equipment						
Electrical Conduit						
Copper Wiring						
Light Fixtures						
Lamps						
Lighting Ballasts						
Electrical Devices						
Switchgear and Panelboards						
Transformers						
Other:						

FORM CWM-5: COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN								
MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

FORM CWM-6: COST/REVENUE ANALYSIS OF DEMOLITION WASTE REDUCTION WORK PLAN

MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mech. Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								
Transformers								
Other:								

FORM CWM-7: CONSTRUCTION WASTE REDUCTION PROGRESS REPORT								
MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

FORM CWM-8: DEMOLITION WASTE REDUCTION PROGRESS REPORT								
MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mechanical Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								
Transformers								
Other:								

END OF SECTION - 01 74 19

SECTION 01 77 00 | CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 PRE-CLOSEOUT MEETING

A. Pre-Closeout Meeting: Schedule and convene a pre-closeout meeting with Owner and Architect in accordance with Section 01 31 00: Project Management and Coordination.

1.3 SUBSTANTIAL COMPLETION

A. The items identified in the Contract Documents, including the Supplementary Conditions and the following items shall be completed before Substantial Completion will be granted (also see Section 01 77 22: Substantial Completion Procedures):
   1. Contractor’s completion list (punch list): Submit a thorough list of items to be completed or corrected, along with a written request for Substantial Completion and for review of the Work or portion of the Work. Architect’s or Engineer’s Project representative, at their discretion, may attend and assist in the preparation of Contractor's punch list.
   2. Architect’s supplemental punch list: Architect/Engineer, along with Owner at Owner’s discretion, will inspect the Work utilizing Contractor's prepared punch list, noting completed items and incomplete items, and will prepare a supplemental list of items that have been omitted or incomplete items that were not previously noted.
   3. Operations and maintenance manuals: Submit as described.
   4. Final cleaning: Provide final cleaning and adequate protection of installed construction as described.
   5. Starting of systems: Start up equipment and systems as described.
   6. Testing and balancing: Testing and balancing of systems must be performed and completed by Owner’s forces, and the report submitted and accepted by Architect/Engineer and Owner, as described in the Contract Documents. Make adjustments to equipment as required to achieve acceptance.
   7. Demonstrations: If required by individual Specification Sections or by Owner, provide demonstrations and instructions for use of equipment as described.

B. Date of Substantial Completion: Complete or correct items identified on punch list and confirm that all items have been corrected prior to Architect’s re-inspection. Architect/Engineer, along with Owner, will re-inspect the corrected work to establish the Date of Substantial Completion. Incomplete items remaining will be appended to the Certificate of Substantial Completion (AIA G704). The Date of Substantial Completion represents day one of the closeout period and represents the date of commencement of Contractor’s correctional period and all warranty periods as described and required by the Contract Documents, except as amended in the Certificate of Substantial Completion and elsewhere in the Contract Documents.

C. Certificate of Substantial Completion: When the Work or designated portion thereof is substantially complete, Architect will prepare the Certificate of Substantial Completion to be executed by Owner and Contractor. Items on the appended punch list shall be completed or corrected within the time limits established in the Certificate.

1.4 PUNCH LIST

A. A comprehensive list prepared by Contractor prior to Substantial Completion, and attached thereto, to establish all items to be corrected, or limited items of work to be completed, if any. This list is intended to represent a limited number of items needing attention.

B. Punch lists shall be furnished to Architect in Microsoft Excel and PDF formats. The punch list shall be in matrix form and shall include the following information for each punch list item:
   1. Room number or other suitable location identifier.
   2. Description of the Work.
   3. Subcontractor/trade sign-off that the work has been verified to be 100 percent complete and in accordance with the Contract Documents.
   4. Subcontractor/trade sign-off date.
   5. General Contractor sign-off that the work has been verified to be 100 percent complete and in accordance with the Contract Documents.
   6. General Contractor/trade sign-off date.
   7. A/E consultant sign-off.
   8. A/E consultant sign-off date.
   9. If requested by Owner, provide two (2) additional similar columns for their sign-off.
   10. In the case of excessive repetition of the same item at various locations, the punch list may contain "general notes/items" that shall be applied to the entire Project. It shall be the responsibility of the Contractor/Subcontractor to thoroughly examine the entire Project and make corrective measures at all applicable locations.

C. Should Architect determine that Contractor's punch list lacks sufficient detail or requires extensive supplementation, the punch list will be returned to Contractor for re-inspection and revision. The date of Substantial Completion will be delayed until the punch list submitted is a reasonable representation of the Work to be done.

D. A significantly large number of items to be completed or corrected will preclude Architect from issuing a Certificate of Substantial Completion. Owner and Architect will be the sole judges of what constitutes a significantly large number of items. It is anticipated that the detailed list of items of Work to be completed or corrected at the Date of Substantial Completion will be no longer than five (5) typed pages.

E. Contractor's superintendent shall participate in the preparation of Contractor's punch list that is submitted to Architect and Owner for supplementation. Upon receipt, Architect and consultants shall perform a spot review to determine the adequacy and completeness of Contractor's punch list.

F. Upon receipt of an acceptable Contractor's punch list, Contractor's superintendent shall accompany Architect, his consultants and Owner (at his discretion) during their observation and the preparation of their supplements to Contractor's punch list:
   1. The superintendent shall record or otherwise take note of all supplementary items.
   2. Architect will endeavor to furnish to Contractor typed, hand written, or recorded supplements to the punch list in a prompt manner; however, any delay in Contractor receiving said supplements from Architect will not be cause for a claim for additional cost or extension of time as Contractor's superintendent shall have been in attendance during the inspections of Architect and his consultants and will have been expected to take his own notes.

1.5 OPERATIONS AND MAINTENANCE MANUAL

A. As a requirement for Substantial Completion, the final operation and maintenance manual shall be submitted to, and reviewed and accepted by Architect prior to issuance of the

Certificate.

B. Prepare a 3-ring D-slant binder cover and spline with printed title "OPERATIONS AND MAINTENANCE MANUAL," title of Project, and subject matter of binder when multiple binders are required.

C. Submit one (1) copy of preliminary operations and maintenance manuals to respective consultants (civil, MEP, structural, etc.) for review of conformance with Contract requirements prior to submitting final to Architect. Allow time for proper review.

D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

E. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

F. Contents:
   1. Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
      a. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.
      b. Part 2: Operation and Maintenance, arranged by system and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
         1) Significant design criteria.
         2) List of equipment.
         3) Parts list for each component.
         4) Equipment start-up instructions
         5) Operating instructions.
         6) Maintenance instructions for equipment and systems.
         7) Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
      c. Part 3: Project documents and certificates, including the following:
         1) Product data.
         2) Air and water balance reports.
         3) Photocopies of warranties, certificates and bonds. Submit originals with Closeout Documents as specified below.

G. Submit one (1) final original and two (2) copies to Architect.

H. Contractor shall provide a DVD, in PDF Format, the following documents after approval by Architect, consultants, and Owner: Closeout Manual, MSDS binder, O&M Manuals, Specifications and approved submittals. Documents shall be hyperlinked to the Table of Contents.

1.6 PROJECT CLOSEOUT

A. Final Payment will not be authorized by Architect until Architect finds the Work acceptable under the Contract Documents, subject to the completion and acceptance of the following requirements and other applicable Contract requirements:
   1. Close-out Documents: Provide bound closeout documents as described. Refer to the Supplementary Conditions for additional information.
   2. Record Documents: Submit as described.
   3. Extra materials: Provide extra stock, materials, and products as described when

required by individual Specification Sections.

4. Locks: Make final changeover of permanent locks and transmit keys to Owner. Advise Owner's personnel of changeover in security provisions.
5. Temporary Facilities: Discontinue and remove temporary facilities from the site, along with mockups, construction aids, and similar elements.
6. Warranties, Certificates and Bonds: Execute and assemble transferable warranty documents, certificates, and bonds from subcontractors, suppliers, and manufacturers as described.
7. Final Inspection and Acceptance by Architect is achieved as described.

1.7 CLOSEOUT DOCUMENTS

A. Coordinate the following items with the requirements of Document CB, Supplementary Conditions of the Contract.

B. Prepare 3-ring D-slant binder cover and spline with printed title "CLOSEOUT DOCUMENTS", title of Project, and subject matter of binder when multiple binders are required. Submit one (1) original and two (2) copies.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. The closeout documents shall be neatly organized and easily useable as determined by Architect and Owner. Separate closeout document binders from operations and maintenance manuals. Documents identified as "affidavit" shall be notarized.

E. Prepare a table of contents for each volume, with each item description identified, typed on white paper, in five (5) parts as follows:
   1. Part 1: Directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers. All General Contractor's vendors/suppliers and subcontractors that provided materials or performed any work related to this Project must be listed on this form. Submit final list of subcontractors on Document AD.
   2. Part 2: Closeout documents and affidavits, including the following:
      a. AIA G707 - Consent of Surety to Final Payment.
      b. AIA G706 - Contractor's Affidavit of Payment of Debts and Claims.
      c. AIA G706A - Contractor's Affidavit of Release of Liens.
   3. Part 3: Project documents and certificates, including the following:
      a. Copy of Certificate of Substantial Completion (AIA G704).
      b. Copy of All Permits.
      c. Copy of Final Utility Bill or letter of transfer.
      d. Copy of Certificate of Occupancy.
      e. Copy of Certification of Project Compliance: Submit on attached **Closeout Form "B"**. Owner and Architect will initiate form and forward to Contractor for signature once Substantial Completion is established (Owner to be provided original separately).
   4. Part 4: Warranties and Release of Liens; compile sequentially based on Specification Sections:
      a. General Contractor's warranty: Submit on company letterhead as described below. This Warranty shall state all sections of Work performed by General Contractor's own forces, and warranty period for each section of Work.
      b. Subcontractor's release of lien: Include Contractor's, Subcontractor's, and direct material and equipment supplier's separate final releases. Submit on attached **Closeout Form "A"** – Subcontractor's Affidavit of Release of Lien.
      c. Hazardous material certificate: Submit on attached **Closeout Form "C"**. Affidavits from Contractor, subcontractors and General Contractor's vendors or suppliers

stating that no hazardous materials/products have been used or installed in this Project.

d. Subcontractor's warranty: Notarized and submitted on attached **Closeout Form "D"**. This warranty shall state all sections of Work performed by the Subcontractor and warranty period.
e. Special/extended warranties: List and provide notarized warranties requested by Owner, or required by or incorporated in the Contract Documents.
f. Spreadsheet depicting all items and materials that carry a warranty longer than one (1) year. Include information consisting of material/supplier/installer/Specification Section/length of warranty and contact information.

5. Part 5: Receipts:
   a. Extra stock: Provide original receipts for delivery of "extra stock" items as described below. Receipts must be signed by an authorized Owner's representative.
   b. Keys: Provide original receipts for delivery of "keys." Receipts must be signed by an authorized Owner's representative.
   c. Sign-in sheets: Provide signatures of attendees from all demonstrations.

F. In addition to the three (3) required closeout binders listed above, provide Architect with one (1) separate binder for their records containing the following:
   1. Directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.
   2. All MSDS sheets for the Project.
   3. All warranties from Contractor, subcontractors, direct suppliers, and manufacturers.

G. Failure to complete and closeout Project after substantial completion may result in liquidated damages being assessed to Contractor. Refer to Conditions of the Contract for additional requirements and liquidated damages.

1.8 FINAL CLEANING

A. Execute final cleaning prior to final Project inspection and acceptance.

B. Clean interior and exterior glass, and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces, mop hard floor surfaces.

C. Remove smudges, marks, stains, fingerprints, soil, dirt, spots, dust, lint, and other foreign materials from finished and exposed surfaces

D. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.

E. Clean and replace filters of operating equipment as required by Contract Documents

F. Clean debris from roofs, gutters, downspouts, and drainage systems.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste and surplus materials, rubbish, and temporary construction facilities from site.

1.9 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual

Specification Sections until Work is accepted by Architect and Owner.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

1.10 STARTING OF SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect/Engineer and Owner 48 hours prior to start-up of each item.

C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of Contractors' personnel, and installer in accordance with manufacturers' instructions.

G. When specified in individual Specification Sections or required by manufacturer, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. When specified in individual Specification Sections or required by Owner or Architect/Engineer, submit a written report in accordance with Section 01 33 00, Submittal Procedures, that equipment or system has been properly installed and is functioning correctly.

1.11 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel a minimum of 48 hours prior to date of Final Completion in accordance with Owner’s requirements.

B. Demonstrate Project equipment instructed by qualified manufacturer's representative who is knowledgeable about the Project and equipment.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six (6) months.

D. Utilize maintenance manual as basis for instruction. Review contents of manual with

Owner's personnel to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment.

F. Prepare and insert additional data in maintenance manuals when needed for when additional data becomes apparent during instruction.

G. Review and verify proper start-up and operation of equipment prior to scheduling demonstrations with Owner.

H. All demonstrations are to be documented by video and submitted to Owner in DVD format along with the closeout documents. General Contractor is responsible for all video and compilation onto DVD with linked menus.

1.12 PROJECT RECORD DOCUMENTS

A. Project Record Documents, as described in Section 01 78 39: Project Record Documents, shall be submitted at Project closeout. Final payment will not be authorized by Architect until final review and acceptance by Architect and Engineers is achieved in accordance with Owner's requirements.

B. At Contractor's request, and with associated fee, Architect may provide electronic versions of the construction Drawing and Specification files for Contractor's use, subject to the terms and conditions of Architect's standard electronic document transfer agreement.

C. Submit reproducibles to respective consultants (civil, structural, MEP, etc.) for review. Consultant will mark-up corrections and return to Contractor for final revisions. Make final revisions prior to submitting to Architect:
   1. Format: One (1) set of film positive reproducibles and two (2) sets of bluelines of approved reproducibles.
   2. Provide Owner with one (1) set of Record Drawings on a non-rewritable CD in AutoCAD® latest release.
   3. Provide Owner with one (1) set of Record Drawings on a non-rewritable CD in PDF format.
   4. Label electronic CAD files and PDF files in the same manner as the sheets (example, A2.02 First Floor Area 'A', etc.)

1.13 EXTRA STOCK, MATERIALS, AND MAINTENANCE PRODUCTS

A. Furnish extra stock, maintenance, and extra products in quantities specified in individual Specification Sections.

B. Deliver to Project site or to District Maintenance Department as directed by Owner; obtain signed receipt from Owner's authorized representative prior to final application for payment. Delivery of materials to, or obtaining receipt from anyone other than Owner's authorized representative may constitute breach of this requirement and may require delivery of additional materials at no cost to Owner if original materials are misplaced.

C. Include signed receipts for delivery of extra stock and materials, including keys, with closeout documents.

1.14 WARRANTIES, CERTIFICATES, AND BONDS

A. Definitions:

1. Standard product warranties: Preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to Owner.
2. Special warranties: Written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide coverage of specific defects, or both.

B. In accordance with the general warranty obligations under the General Conditions as amended by the Supplementary Conditions, General Contractor's warranty shall be for a period of one (1) year following the date of Substantial Completion, hereinafter called the one-year warranty period. Contractor's one (1) year general warranty shall include all labor, material, and delivery costs required to correct defective material and installation. This warranty shall not limit Owner's rights with respect to latent defects, gross mistakes, or fraud.

C. Contractor's one (1) year warranty shall run concurrently with the one (1) year period for correction of Work required in the General Conditions.

D. No service charges or call out charges are allowed to investigate warranty claims.

E. In addition to Contractor's one (1) year warranty, special warranties, as described in individual Specifications Sections, shall extend the warranty period for the period specified without limitation in respect to other obligations for which Contractor has under the Contract Documents.

F. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of the warranty on the Work that incorporates the products, nor does it relieve the suppliers, manufacturers, and subcontractors required to countersign special warranties with Contractor.

G. Warranty Requirements:
1. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
2. When Work covered by a warranty has failed and been corrected by replacement or reconstruction, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
3. Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. Contractor is responsible for the cost of replacing defective Work regardless of whether Owner has benefited from use of the Work through a portion of its anticipated useful service life.
4. Written warranties made to Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which Owner can enforce such other duties, obligations, rights, or remedies.
5. Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or designated portion of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

H. Compile copies of each required warranty properly executed by Contractor and the Subcontractor, supplier, or manufacturer. Verify documents are in proper form, contain full information, and are notarized. Co-execute warranties, certificates, and bonds when required and include signed warrantees with Closeout Documents submitted to Architect.

1.15 FINAL COMPLETION AND FINAL PAYMENT

A. Final Notice and Inspection:
   1. When all items on the punch list have been corrected, final cleaning has been completed, and installed work has been protected, submit written notice to Architect that the Work is ready for final inspection and acceptance.
   2. Upon receipt of written notice that the Work is ready for final inspection and acceptance, Architect and Engineer will make final inspection.

B. Final Change Order: When the Project closeout items described above are successfully completed and the Work is found acceptable to Architect/Engineer and Owner, a Final Change Order will be executed. This Change Order will include any Allowance adjustments as required by the Contract Documents.

C. Final Application for Payment: When all of the above items are successfully complete, submit to Architect a final Application for Payment and request for release of retainage.

D. Release of Retainage: Release of retainage will not be authorized by Architect until Contractor completes all requirements for closeout to the satisfaction of Owner and Architect as described herein.

1.16 TERMINAL INSPECTION

A. Immediately prior to expiration of the one (1) year period for correction of the Work, Contractor shall make an inspection of the Work in the company of Architect and Owner. Architect and Owner shall be given not less than ten (10) days' notice prior to the anticipated date of terminal inspection.

B. Where any portion of the work has proven to be defective and requires replacement, repair, or adjustment, Contractor shall immediately provide materials and labor necessary to remedy such defective work and shall execute such work without delay until completed to the satisfaction of Architect and Owner, even if the date of completion of the corrective work may extend beyond the expiration date of the correction period.

C. Contractor shall not be responsible for correction of Work that has been damaged because of neglect or abuse by Owner, nor the replacement of parts necessitated by normal wear in use.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION - 01 77 00

CLOSE-OUT FORM "A"

SUBCONTRACTOR'S AFFIDAVIT OF RELEASE OF LIEN

STATE OF CALIFORNIA COUNTY OF _____

KNOW ALL MEN BY THESE PRESENTS:

_____, being first duly sworn, deposes and says:

1. That he / she is the _____ of _____, the subcontractor who supplied, installed, and /or erected the Work described below, and that, he /she is duly authorized to make this Affidavit and Subcontractor Release:

   Project: Parlier High School Stadium Replacement

   Owner: Parlier Unified School District Architect: PBK

   Work Performed: _____ Specification Section(s): _____

2. That all Work required under the subject subcontractor of the subject construction project has been performed in accordance with the terms thereof, that all material men, sub-subcontractors, mechanics, and laborers have been paid and satisfied in full and that there are no outstanding claims of any character arising out of the performance of said subcontractor which have not been paid and satisfied in full.

3. That to the best of his / her knowledge and belief, there are no unsatisfied claims for damages resulting from injury or death to any employees, sub-subcontractors, or the public at large arising out of the performance of said subcontract, or any suits or claims for any other damages of any kind, nature, or description which might constitute a lien upon the property of the Owner.

4. That he / she has received full payment of all sums due him / her for materials furnished and services rendered by the undersigned in connection with the performance of said subcontract and has and does hereby release the Owner and the Architect and his consultants and the Contractor from any and all claims of any character arising out of or in any way connected with performance of said subcontract.

ATTEST (If Corporation)

_____
Name of Subcontractor

_____ _____
Secretary (By) (Title)

STATE OF _____

COUNTY OF _____

Sworn to and subscribed before me on this _____ day of _____, 20_____.

(Seal)

_____
(Notary Public Signature)

CLOSE OUT FORM "B"

1. PROJECT INFORMATION

DISTRICT:

Facility:

ARCHITECT/ENGINEER:

Address:

CONTRACTOR/CM:

City:

CONTRACT DATE:

DATE DISTRICT AUTHORIZED PROJECT:

BRIEF DESCRIPTION OF PROJECT:

2. CERTIFICATION OF DESIGN AND CONSTRUCTION

The intent of this document is to assure that the school district has provided to the architect/engineer the required information and the architect/engineer has reviewed the School Facilities Standards as required by the State of California, Division of the State Architect Office and used his/her reasonable professional judgment and care in the architectural/engineering design and that the contractor has constructed the project in a quality manner in general conformance with the design requirements and that the school district certifies to project completion.

3. The District certifies that the educational program and the educational specifications of this facility along with the identified building code to be used have been provided to the architect/engineer.

DISTRICT: **BY:** **DATE:**

4. The Architect/Engineer certifies the above information was received from the school district, and that the building(s) were designed in accordance with the applicable building codes. Further, the facility has been designed to meet or exceed the design criteria relating to space (minimum square footage), educational adequacy, and construction quality as contained in the School Facilities Standards as adopted by the Commissioner of Education, June 9, 2003, and as provided by the district.

ARCHITECT/ENGINEER: **BY:** **DATE:**

5. The Contractor/CM certifies that this project has been constructed in general conformance with the construction documents as prepared by the architect/engineer listed above.

CONTRACTOR/CM: **BY:** **DATE:**

INSTRUCTIONS FOR CLOSE OUT FORM B:

Section 1. Identify the following:
- – name and address of the school facility
- – name of the school district
- – the Architect/Engineer and Contractor
- – the date of execution of the construction contract
- – the date that the school district authorized the superintendent to hire an architect/engineer
- – scope of the project.

Section 2. This section outlines the intent of the document. No action required.

Section 3. This section is to be executed by the school district upon transmittal of the information (as listed) to the architect/engineer and is to remain in the custody of the school district throughout the entire project.

Section 4. This section is to be executed by the architect/engineer upon completion of the plans and specifications and in conjunction with the completion of the DSA plan review for code compliance and returned to the school district's files.

Section 5. This section is to be executed by the contractor upon substantial completion of the project and retained in the school district's files. Included with this document a copy of the Certificate of Substantial Completion, found in the Project Manual.

Section 6. This section is to be executed by the school district upon acceptance and occupancy of the project along with the original Certificate of Substantial Completion form..

Attachment copy of: "Substantial Completion form"

CLOSE-OUT FORM "C"

SUBCONTRACTOR HAZARDOUS MATERIAL CERTIFICATE

THE STATE OF _____

COUNTY OF _____

PROJECT: Parlier High School Stadium Replacement

OWNER: Parlier Unified School District

ARCHITECT: PBK

SPECIFICATION SECTION(S):

KNOW ALL MEN BY THESE PRESENTS:

_____, being first duly sworn, deposes and says that he / she is the _____ of _____,the subcontractor / supplier who constructed or provided the section(s) of Work referenced above, and that he / she is duly authorized to certify to the best of his / her information, knowledge, and belief no asbestos, lead or PCB containing products have been incorporated into the project.

ATTEST (If Corporation)

_____
Name of Subcontractor / Supplier

_____ _____
Secretary (By)

_____
(Title)

JURAT

THE STATE OF _____

COUNTY OF _____

Sworn to and subscribed before me on this _____ day of _____, 20_____.

(Seal)

_____
(Notary Public Signature)

CLOSE-OUT FORM "D"

SUBCONTRACTOR WARRANTY

STATE OF _____

COUNTY OF _____

KNOW ALL MEN BY THESE PRESENTS:

_____, being first duly sworn, deposes and says:

1. That he / she is the Subcontractor (or the _____ of _____ the subcontractor) who supplied, installed, and / or erected the Work described below, and that, he / she is duly authorized to make this Subcontractor Warranty:

   Project: Parlier High School Stadium Replacement
   Owner: Parlier Unified School District Architect: PBK
   Work Performed: _____ Specification Section(s): _____

2. The undersigned Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract are of good quality and new except where otherwise required or permitted by the Contract Documents, that the Work is free from defects not inherent in the quality required or permitted, and that the Work conforms with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Subcontractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Subcontractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage.

3. In the event of failure of materials, products, or workmanship, during the specified warranty periods, the Subcontractor shall take appropriate measures to assure correction or replacement of the defective items, whether notified by the Contractor, Owner or Architect.

4. The Subcontractor warrants the Work performed for a period of _____ months from the date of Substantial Completion, except as follows: _____

ATTEST (If Corporation)

_____
Name of Subcontractor

_____
Secretary (By) (Title)

STATE OF _____

COUNTY OF _____

Sworn to and subscribed before me on this _____ day of _____, 20____.

_____
(Seal) (Notary Public Signature)

SECTION 01 77 00 CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 PRE-CLOSEOUT MEETING

A. Pre-Closeout Meeting: Schedule and convene a pre-closeout meeting with Owner and Architect in accordance with Section 01 31 00: Project Management and Coordination.

1.3 SUBSTANTIAL COMPLETION

A. The items identified in the Contract Documents, including the Supplementary Conditions and the following items shall be completed before Substantial Completion will be granted (also see Section 01 77 22: Substantial Completion Procedures):
   1. Contractor’s completion list (punch list): Submit a thorough list of items to be completed or corrected, along with a written request for Substantial Completion and for review of the Work or portion of the Work. Architect’s or Engineer’s Project representative, at their discretion, may attend and assist in the preparation of Contractor's punch list.
   2. Architect’s supplemental punch list: Architect/Engineer, along with Owner at Owner’s discretion, will inspect the Work utilizing Contractor's prepared punch list, noting completed items and incomplete items, and will prepare a supplemental list of items that have been omitted or incomplete items that were not previously noted.
   3. Operations and maintenance manuals: Submit as described.
   4. Final cleaning: Provide final cleaning and adequate protection of installed construction as described.
   5. Starting of systems: Start up equipment and systems as described.
   6. Testing and balancing: Testing and balancing of systems must be performed and completed by Owner’s forces, and the report submitted and accepted by Architect/Engineer and Owner, as described in the Contract Documents. Make adjustments to equipment as required to achieve acceptance.
   7. Demonstrations: If required by individual Specification Sections or by Owner, provide demonstrations and instructions for use of equipment as described.

B. Date of Substantial Completion: Complete or correct items identified on punch list and confirm that all items have been corrected prior to Architect’s re-inspection. Architect/Engineer, along with Owner, will re-inspect the corrected work to establish the Date of Substantial Completion. Incomplete items remaining will be appended to the Certificate of Substantial Completion (AIA G704). The Date of Substantial Completion represents day one of the closeout period and represents the date of commencement of Contractor’s correctional period and all warranty periods as described and required by the Contract Documents, except as amended in the Certificate of Substantial Completion and elsewhere in the Contract Documents.

C. Certificate of Substantial Completion: When the Work or designated portion thereof is substantially complete, Architect will prepare the Certificate of Substantial Completion to be executed by Owner and Contractor. Items on the appended punch list shall be completed or corrected within the time limits established in the Certificate.

1.4 PUNCH LIST

A. A comprehensive list prepared by Contractor prior to Substantial Completion, and attached thereto, to establish all items to be corrected, or limited items of work to be completed, if any. This list is intended to represent a limited number of items needing attention.

B. Punch lists shall be furnished to Architect in Microsoft Excel and PDF formats. The punch list shall be in matrix form and shall include the following information for each punch list item:
   1. Room number or other suitable location identifier.
   2. Description of the Work.
   3. Subcontractor/trade sign-off that the work has been verified to be 100 percent complete and in accordance with the Contract Documents.
   4. Subcontractor/trade sign-off date.
   5. General Contractor sign-off that the work has been verified to be 100 percent complete and in accordance with the Contract Documents.
   6. General Contractor/trade sign-off date.
   7. A/E consultant sign-off.
   8. A/E consultant sign-off date.
   9. If requested by Owner, provide two (2) additional similar columns for their sign-off.
   10. In the case of excessive repetition of the same item at various locations, the punch list may contain "general notes/items" that shall be applied to the entire Project. It shall be the responsibility of the Contractor/Subcontractor to thoroughly examine the entire Project and make corrective measures at all applicable locations.

C. Should Architect determine that Contractor's punch list lacks sufficient detail or requires extensive supplementation, the punch list will be returned to Contractor for re-inspection and revision. The date of Substantial Completion will be delayed until the punch list submitted is a reasonable representation of the Work to be done.

D. A significantly large number of items to be completed or corrected will preclude Architect from issuing a Certificate of Substantial Completion. Owner and Architect will be the sole judges of what constitutes a significantly large number of items. It is anticipated that the detailed list of items of Work to be completed or corrected at the Date of Substantial Completion will be no longer than five (5) typed pages.

E. Contractor's superintendent shall participate in the preparation of Contractor's punch list that is submitted to Architect and Owner for supplementation. Upon receipt, Architect and consultants shall perform a spot review to determine the adequacy and completeness of Contractor's punch list.

F. Upon receipt of an acceptable Contractor's punch list, Contractor's superintendent shall accompany Architect, his consultants and Owner (at his discretion) during their observation and the preparation of their supplements to Contractor's punch list:
   1. The superintendent shall record or otherwise take note of all supplementary items.
   2. Architect will endeavor to furnish to Contractor typed, hand written, or recorded supplements to the punch list in a prompt manner; however, any delay in Contractor receiving said supplements from Architect will not be cause for a claim for additional cost or extension of time as Contractor's superintendent shall have been in attendance during the inspections of Architect and his consultants and will have been expected to take his own notes.

1.5 OPERATIONS AND MAINTENANCE MANUAL

A. As a requirement for Substantial Completion, the final operation and maintenance manual shall be submitted to, and reviewed and accepted by Architect prior to issuance of the

Certificate.

B. Prepare a 3-ring D-slant binder cover and spline with printed title "OPERATIONS AND MAINTENANCE MANUAL," title of Project, and subject matter of binder when multiple binders are required.

C. Submit one (1) copy of preliminary operations and maintenance manuals to respective consultants (civil, MEP, structural, etc.) for review of conformance with Contract requirements prior to submitting final to Architect. Allow time for proper review.

D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

E. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

F. Contents:
   1. Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
      a. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.
      b. Part 2: Operation and Maintenance, arranged by system and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
         1) Significant design criteria.
         2) List of equipment.
         3) Parts list for each component.
         4) Equipment start-up instructions
         5) Operating instructions.
         6) Maintenance instructions for equipment and systems.
         7) Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
      c. Part 3: Project documents and certificates, including the following:
         1) Product data.
         2) Air and water balance reports.
         3) Photocopies of warranties, certificates and bonds. Submit originals with Closeout Documents as specified below.

G. Submit one (1) final original and two (2) copies to Architect.

H. Contractor shall provide a DVD, in PDF Format, the following documents after approval by Architect, consultants, and Owner: Closeout Manual, MSDS binder, O&M Manuals, Specifications and approved submittals. Documents shall be hyperlinked to the Table of Contents.

1.6 PROJECT CLOSEOUT

A. Final Payment will not be authorized by Architect until Architect finds the Work acceptable under the Contract Documents, subject to the completion and acceptance of the following requirements and other applicable Contract requirements:
   1. Close-out Documents: Provide bound closeout documents as described. Refer to the Supplementary Conditions for additional information.
   2. Record Documents: Submit as described.
   3. Extra materials: Provide extra stock, materials, and products as described when

required by individual Specification Sections.

4. Locks: Make final changeover of permanent locks and transmit keys to Owner. Advise Owner's personnel of changeover in security provisions.
5. Temporary Facilities: Discontinue and remove temporary facilities from the site, along with mockups, construction aids, and similar elements.
6. Warranties, Certificates and Bonds: Execute and assemble transferable warranty documents, certificates, and bonds from subcontractors, suppliers, and manufacturers as described.
7. Final Inspection and Acceptance by Architect is achieved as described.

1.7 CLOSEOUT DOCUMENTS

A. Coordinate the following items with the requirements of Document CB, Supplementary Conditions of the Contract.

B. Prepare 3-ring D-slant binder cover and spline with printed title "CLOSEOUT DOCUMENTS", title of Project, and subject matter of binder when multiple binders are required. Submit one (1) original and two (2) copies.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. The closeout documents shall be neatly organized and easily useable as determined by Architect and Owner. Separate closeout document binders from operations and maintenance manuals. Documents identified as "affidavit" shall be notarized.

E. Prepare a table of contents for each volume, with each item description identified, typed on white paper, in five (5) parts as follows:
   1. Part 1: Directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers. All General Contractor's vendors/suppliers and subcontractors that provided materials or performed any work related to this Project must be listed on this form. Submit final list of subcontractors on Document AD.
   2. Part 2: Closeout documents and affidavits, including the following:
      a. AIA G707 - Consent of Surety to Final Payment.
      b. AIA G706 - Contractor's Affidavit of Payment of Debts and Claims.
      c. AIA G706A - Contractor's Affidavit of Release of Liens.
   3. Part 3: Project documents and certificates, including the following:
      a. Copy of Certificate of Substantial Completion (AIA G704).
      b. Copy of All Permits.
      c. Copy of Final Utility Bill or letter of transfer.
      d. Copy of Certificate of Occupancy.
      e. Copy of Certification of Project Compliance: Submit on attached **Closeout Form "B"**. Owner and Architect will initiate form and forward to Contractor for signature once Substantial Completion is established (Owner to be provided original separately).
   4. Part 4: Warranties and Release of Liens; compile sequentially based on Specification Sections:
      a. General Contractor's warranty: Submit on company letterhead as described below. This Warranty shall state all sections of Work performed by General Contractor's own forces, and warranty period for each section of Work.
      b. Subcontractor's release of lien: Include Contractor's, Subcontractor's, and direct material and equipment supplier's separate final releases. Submit on attached **Closeout Form "A"** – Subcontractor's Affidavit of Release of Lien.
      c. Hazardous material certificate: Submit on attached **Closeout Form "C"**. Affidavits from Contractor, subcontractors and General Contractor's vendors or suppliers

stating that no hazardous materials/products have been used or installed in this Project.

d. Subcontractor's warranty: Notarized and submitted on attached **Closeout Form "D"**. This warranty shall state all sections of Work performed by the Subcontractor and warranty period.
e. Special/extended warranties: List and provide notarized warranties requested by Owner, or required by or incorporated in the Contract Documents.
f. Spreadsheet depicting all items and materials that carry a warranty longer than one (1) year. Include information consisting of material/supplier/installer/Specification Section/length of warranty and contact information.

5. Part 5: Receipts:
   a. Extra stock: Provide original receipts for delivery of "extra stock" items as described below. Receipts must be signed by an authorized Owner's representative.
   b. Keys: Provide original receipts for delivery of "keys." Receipts must be signed by an authorized Owner's representative.
   c. Sign-in sheets: Provide signatures of attendees from all demonstrations.

F. In addition to the three (3) required closeout binders listed above, provide Architect with one (1) separate binder for their records containing the following:
   1. Directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.
   2. All MSDS sheets for the Project.
   3. All warranties from Contractor, subcontractors, direct suppliers, and manufacturers.

G. Failure to complete and closeout Project after substantial completion may result in liquidated damages being assessed to Contractor. Refer to Conditions of the Contract for additional requirements and liquidated damages.

1.8 FINAL CLEANING

A. Execute final cleaning prior to final Project inspection and acceptance.

B. Clean interior and exterior glass, and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces, mop hard floor surfaces.

C. Remove smudges, marks, stains, fingerprints, soil, dirt, spots, dust, lint, and other foreign materials from finished and exposed surfaces

D. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.

E. Clean and replace filters of operating equipment as required by Contract Documents

F. Clean debris from roofs, gutters, downspouts, and drainage systems.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste and surplus materials, rubbish, and temporary construction facilities from site.

1.9 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual

Specification Sections until Work is accepted by Architect and Owner.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

1.10 STARTING OF SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect/Engineer and Owner 48 hours prior to start-up of each item.

C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of Contractors' personnel, and installer in accordance with manufacturers' instructions.

G. When specified in individual Specification Sections or required by manufacturer, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. When specified in individual Specification Sections or required by Owner or Architect/Engineer, submit a written report in accordance with Section 01 33 00, Submittal Procedures, that equipment or system has been properly installed and is functioning correctly.

1.11 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel a minimum of 48 hours prior to date of Final Completion in accordance with Owner’s requirements.

B. Demonstrate Project equipment instructed by qualified manufacturer's representative who is knowledgeable about the Project and equipment.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six (6) months.

D. Utilize maintenance manual as basis for instruction. Review contents of manual with

Owner's personnel to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment.

F. Prepare and insert additional data in maintenance manuals when needed for when additional data becomes apparent during instruction.

G. Review and verify proper start-up and operation of equipment prior to scheduling demonstrations with Owner.

H. All demonstrations are to be documented by video and submitted to Owner in DVD format along with the closeout documents. General Contractor is responsible for all video and compilation onto DVD with linked menus.

1.12 PROJECT RECORD DOCUMENTS

A. Project Record Documents, as described in Section 01 78 39: Project Record Documents, shall be submitted at Project closeout. Final payment will not be authorized by Architect until final review and acceptance by Architect and Engineers is achieved in accordance with Owner's requirements.

B. At Contractor's request, and with associated fee, Architect may provide electronic versions of the construction Drawing and Specification files for Contractor's use, subject to the terms and conditions of Architect's standard electronic document transfer agreement.

C. Submit reproducibles to respective consultants (civil, structural, MEP, etc.) for review. Consultant will mark-up corrections and return to Contractor for final revisions. Make final revisions prior to submitting to Architect:
   1. Format: One (1) set of film positive reproducibles and two (2) sets of bluelines of approved reproducibles.
   2. Provide Owner with one (1) set of Record Drawings on a non-rewritable CD in AutoCAD® latest release.
   3. Provide Owner with one (1) set of Record Drawings on a non-rewritable CD in PDF format.
   4. Label electronic CAD files and PDF files in the same manner as the sheets (example, A2.02 First Floor Area 'A', etc.)

1.13 EXTRA STOCK, MATERIALS, AND MAINTENANCE PRODUCTS

A. Furnish extra stock, maintenance, and extra products in quantities specified in individual Specification Sections.

B. Deliver to Project site or to District Maintenance Department as directed by Owner; obtain signed receipt from Owner's authorized representative prior to final application for payment. Delivery of materials to, or obtaining receipt from anyone other than Owner's authorized representative may constitute breach of this requirement and may require delivery of additional materials at no cost to Owner if original materials are misplaced.

C. Include signed receipts for delivery of extra stock and materials, including keys, with closeout documents.

1.14 WARRANTIES, CERTIFICATES, AND BONDS

A. Definitions:

1. Standard product warranties: Preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to Owner.
2. Special warranties: Written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide coverage of specific defects, or both.

B. In accordance with the general warranty obligations under the General Conditions as amended by the Supplementary Conditions, General Contractor's warranty shall be for a period of one (1) year following the date of Substantial Completion, hereinafter called the one-year warranty period. Contractor's one (1) year general warranty shall include all labor, material, and delivery costs required to correct defective material and installation. This warranty shall not limit Owner's rights with respect to latent defects, gross mistakes, or fraud.

C. Contractor's one (1) year warranty shall run concurrently with the one (1) year period for correction of Work required in the General Conditions.

D. No service charges or call out charges are allowed to investigate warranty claims.

E. In addition to Contractor's one (1) year warranty, special warranties, as described in individual Specifications Sections, shall extend the warranty period for the period specified without limitation in respect to other obligations for which Contractor has under the Contract Documents.

F. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of the warranty on the Work that incorporates the products, nor does it relieve the suppliers, manufacturers, and subcontractors required to countersign special warranties with Contractor.

G. Warranty Requirements:
1. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
2. When Work covered by a warranty has failed and been corrected by replacement or reconstruction, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
3. Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. Contractor is responsible for the cost of replacing defective Work regardless of whether Owner has benefited from use of the Work through a portion of its anticipated useful service life.
4. Written warranties made to Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which Owner can enforce such other duties, obligations, rights, or remedies.
5. Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or designated portion of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

H. Compile copies of each required warranty properly executed by Contractor and the Subcontractor, supplier, or manufacturer. Verify documents are in proper form, contain full information, and are notarized. Co-execute warranties, certificates, and bonds when required and include signed warrantees with Closeout Documents submitted to Architect.

1.15 FINAL COMPLETION AND FINAL PAYMENT

A. Final Notice and Inspection:
   1. When all items on the punch list have been corrected, final cleaning has been completed, and installed work has been protected, submit written notice to Architect that the Work is ready for final inspection and acceptance.
   2. Upon receipt of written notice that the Work is ready for final inspection and acceptance, Architect and Engineer will make final inspection.

B. Final Change Order: When the Project closeout items described above are successfully completed and the Work is found acceptable to Architect/Engineer and Owner, a Final Change Order will be executed. This Change Order will include any Allowance adjustments as required by the Contract Documents.

C. Final Application for Payment: When all of the above items are successfully complete, submit to Architect a final Application for Payment and request for release of retainage.

D. Release of Retainage: Release of retainage will not be authorized by Architect until Contractor completes all requirements for closeout to the satisfaction of Owner and Architect as described herein.

1.16 TERMINAL INSPECTION

A. Immediately prior to expiration of the one (1) year period for correction of the Work, Contractor shall make an inspection of the Work in the company of Architect and Owner. Architect and Owner shall be given not less than ten (10) days' notice prior to the anticipated date of terminal inspection.

B. Where any portion of the work has proven to be defective and requires replacement, repair, or adjustment, Contractor shall immediately provide materials and labor necessary to remedy such defective work and shall execute such work without delay until completed to the satisfaction of Architect and Owner, even if the date of completion of the corrective work may extend beyond the expiration date of the correction period.

C. Contractor shall not be responsible for correction of Work that has been damaged because of neglect or abuse by Owner, nor the replacement of parts necessitated by normal wear in use.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 77 00

SECTION 01 77 10 | DSA PROJECT CLOSEOUT AND CERTIFICATION PROCESS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Related Sections:
1. Section 01 31 00: Project Management and Coordination.
2. Section 01 32 10: Preconstruction Conference Notes
3. Section 01 42 00: References.
4. Section 01 73 00: Execution.
5. **Section 01 77 00: Closeout Procedures** (Including forms A, B, C, and D)
6. Section 01 77 22: Substantial Completion Procedures.

1.2 PRE-CONSTRUCTION

A. DSA Documents Required:
1. **SSS 103 Form** to provide DSA and General Contractor with a Structural Testing and Inspections list (T&I).
2. **DSA Form 5** is the be filled out for District to select a Project Inspector (P.I.) to be hired for the particular project type (Class 1, 2 or 3) required. This Project Inspector must be Interviewed and approved by the Architect of Record & Structural Engineer of Record. The Project Inspector and Special Testing Laboratory must be DSA Approved.
3. **Pre-Construction Meeting** will be conducted by the Design Professional. Use standard PBK-WLC Pre-Con Sheet and customize for your project. Identify and discuss regulatory responsibilities of Design Professionals, Project Inspector, Testing Lab, General Contractor, the District and DSA.
4. **Provide Documents** such as DSA Approved Plans & Specs, Soils Reports, Hazard Material Report, Addendums and any Material/Color Boards to the General Contractor and Project Inspector.
5. **DSA Approvals.** The Design Professionals responsibility to obtain timely DSA Approval of all Addendums, Construction Change Directives and any changes to the approved Construction Documents. These changes can be a CCD “A” or a CCD “B” to filled out on the DSA 140 Form. CCD “A” is work that effects changes to Structural Safety, Fire Life Safety or Access Compliance. CCD “B” is all other work that will make DSA aware of other important changes but do not affect Structural Safety, Fire Life Safety or Access Compliance. (Simple color of paint or floor finish, cabinet finishes for example are not to be submitted). Deferred Approvals by DSA will be the responsibility of the General Contractor.
6. **Submit DSA Form 102** for Construction Start Notice and Inspection Card Request. This form will include Notice of Construction Start Date, information on the School District, Scope of Work, Listing of Project Participants(Design Professionals, Project Inspector, In-Plant Inspector if any, General Contractor, Laboratory of Record, Geotechnical Engineer, Project Delivery Method, Collaborators for DSA Box Type of Access granted.

1.3 CONSTRUCTION

A. Project Review:
1. **Project Inspector** shall provide continuous inspection during construction, provide daily and semi-monthly reports of progress of the scope of work to the District, the

Design Professionals and DSA. Participate in resolutions for questions from the contractor and report the status of DSA Field Trip Note issues. Provide a current written record of all work inspected and monitor testing and special inspections required. The Project Inspector will notify contractor of any defective work or deviation from the DSA Approved Plans. If this work is not corrected a Deviation Notice will be issued by the P.I. This can sometimes require the Design Professionals to issue a CCD to DSA for Approval of additional or amended construction documents.

2. **Design Professional** shall observe the construction, obtain deviations from the approved documents by means of COs, CCDs, RFIs, PCOs, ASIs, etc. Resolve DSA Field Trip Note issues.
3. **General Contractors** shall construct the project per the approved plans, timely corrections of Deviations noted by the Project Inspector or Design Professionals and timely submission of Deferred Approvals.
4. **Testing Laboratory** shall provide material testing and special inspections, submit all materials testing and special inspections reports to DSA, Design Professional, Structural Engineer, and Project Inspector.

1.4 CLOSE OUT & CERTIFICATION

A. Project Closeout:

1. Contractor shall notify the Design Professional & the District when they are completed enough to have a Punch Walk conducted. After the Punch List items have been completed the contractor shall notify the Design Professionals for issuance of a Notice of Substantial Completion that will start the warranty process for work completed.
2. **Certification is a letter** issued by DSA Certifying that the building project has been completed in accordance with requirements as to the safety and design of the Education Code sections 17280-17316 and 81130-81147. Without Certification the School Board has liability for an future damage to public safety and DSA will be unable to approve plans affecting uncertified construction at any time in the future.
3. **Closing document** should be obtained and submitted to DSA as soon as they become obtainable. Close out is initiated by the DSA Field Engineer. DSA will issue a 90 Day Letter requesting outstanding documents or unresolved issued that are required. All these need to be resolved prior to DSA issuing letter of certification.
4. **District responsibilities** include issuing Notice of Completion and submit fee to DSA invoices. DSA Form 168 for final cost of construction and submit to DSA.
5. **Design Professionals responsibilities** include resolving any outstanding issues related to the DSA 90 Day Letter, and submit a Verified Report DSA Form 6A/E.
6. **Contractors & Project Inspectors responsibilities** include submit Verified Report DSA Form 6.
7. **Laboratories responsibilities** include submit Lab Verified Report DSA Form 291, Special Inspection Verified Report DSA Form 292, and submit Geotechnical Verified Report DSA Form 293.

END OF SECTION - 01 77 10

SECTION 01 77 22 | SUBSTANTIAL COMPLETION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, Substantial Completion procedures.

B. Related Sections:
   1. Section 00 00 49: Certificate of Substantial Completion.
   2. Section 01 77 00: Closeout Procedures.

1.3 SUBMITTALS

A. Contractor's List of Incomplete Items (Punch List): Initial submittal at Substantial Completion.

1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion:
   1. Minimum of ten (10) days prior to requesting an inspection for determining date of Substantial Completion. List items that are incomplete at time of request:
      a. Certificates of release: Obtain and submit releases from all (i.e. city, county, authorities) authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
      b. Submit closeout submittals, including Project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
      c. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
      d. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable:
         1) List of extra materials: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
      e. Submit test/adjust/balance records from Owner vendor.
      f. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion:
1. A minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion, submit list items that are incomplete at time of request:
   a. Advise Owner of pending insurance changeover requirements.
   b. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   c. Complete startup and testing of systems and equipment.
   d. Perform preventive maintenance on equipment used prior to Substantial Completion.
   e. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings as applicable.
   f. Advise Owner of changeover in heat and utilities.
   g. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
   h. Terminate and remove temporary facilities from site, including mockups, construction tools, and similar elements, and restore or configure area to required or original condition.
   i. Complete final cleaning requirements, including touchup painting.
   j. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
   k. Conditional lien regulations.

D. Inspection:
1. Submit written request for inspection to determine Substantial Completion a minimum of ten (10) days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued:
   a. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
   b. Results of completed inspection will form the basis of requirements for final completion.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 FINAL CLEANING

A. Perform Final Cleaning:
1. Conduct cleaning and waste-removal operations to comply with local laws and ordinances, and Federal and local environmental and antipollution regulations.
2. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions:
   a. Complete cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project. Cleaning activities include but are not limited to:
      1) Clean site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
      2) Sweep paved areas broom clean. Remove petrochemical spills, stains, and

foreign deposits.

3) Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
4) Remove tools, construction equipment, machinery, and surplus material from Project site.
5) Remove snow and ice to provide safe access to building.
6) Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
7) Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
8) Sweep concrete floors broom clean in unoccupied spaces.
9) Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
10) Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
11) Remove labels that are not permanent.
12) Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
13) Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
14) Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
15) Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection:
    a) Clean HVAC system in compliance with NADCA Standard ACR 2013. Provide written report on completion of cleaning.
16) Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
17) Leave Project clean and ready for occupancy.

B. Pest Control:
   1. Comply with pest control requirements in Section 01 57 15: Integrated Pest Management. Prepare written report.

C. Construction Waste Disposal:
   1. Comply with waste disposal requirements.

END OF SECTION - 01 77 22

SECTION 01 78 23 | OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory manuals.
   2. Emergency manuals.
   3. Systems and equipment operation manuals.
   4. Systems and equipment maintenance manuals.
   5. Product maintenance manuals.

1.3 DEFINITIONS

A. Subsystem: A portion of a system with characteristics similar to a system.

B. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

1.4 SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section:
   1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format:
   1. Submit operation and maintenance manuals in the following format:
      a. Submit on digital media acceptable to Architect or by uploading to web-based project software site or by email to Architect. Enable reviewer comments on draft submittals.
      b. Submit three (3) paper copies. Architect will return two (2) copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal:
   1. Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments:
      a. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of

receipt of Architect's comments and prior to commencing demonstration and training.

E. Comply with Section 01 77 00: Closeout Procedures for schedule for submitting operation and maintenance documentation. Where applicable use 01 91 13: General Commissioning Requirements.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files:
   1. Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required:
      a. Electronic files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
      b. File names and bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Manuals, Paper Copy:
   1. Submit manuals in the form of hard-copy, bound and labeled volumes:
      a. Binders:
         1) Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 by 11-inch (215 mm X 280 mm) paper, with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets:
            a) If two (2) or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
            b) Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
      b. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project manual.
      c. Protective plastic sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
      d. Supplementary text: Prepared on 8-1/2 by 11-inch (215 mm X 280 mm) white bond paper.
      e. Drawings:
         1) Attach reinforced, punched binder tabs on Drawings and bind with text:
            a) If oversize Drawings are necessary, fold Drawings to same size as text pages and use as foldouts.
            b) If Drawings are too large to be used as foldouts, fold and place Drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating Drawing titles, descriptions of contents, and Drawing locations.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals:
   1. Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
      a. Title page.
      b. Table of contents.
      c. Manual contents.

B. Title Page:
   1. Include the following information:
      a. Subject matter included in manual.
      b. Name and address of Project.
      c. Name and address of Owner.
      d. Date of submittal.
      e. Name and contact information for Contractor.
      f. Name and contact information for Construction Manager.
      g. Name and contact information for Architect.
      h. Name and contact information for commissioning authority.
      i. Names and contact information for major consultants to Architect that designed the systems contained in the manuals.
      j. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents:
   1. List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual:
      a. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory:
   1. Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
      a. List of systems and subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
      b. List of equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
      c. Tables of contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Content:
   1. Organize manual into a separate section for each of the following:
      a. Type of emergency.
      b. Emergency instructions.
      c. Emergency procedures.

C. Type of Emergency:
   1. Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
      a. Fire.
      b. Flood.
      c. Gas leak.
      d. Water leak.
      e. Power failure.
      f. Water outage.
      g. System, subsystem, or equipment failure.
      h. Chemical release or spill.

D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

E. Emergency Procedures:
   1. Include the following, as applicable:
      a. Instructions on stopping.
      b. Shutdown instructions for each type of emergency.
      c. Operating instructions for conditions outside normal operating limits.
      d. Required sequences for electric or electronic systems.
      e. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual:
   1. Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures:
      a. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
      b. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content:
   1. In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
      a. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
      b. Performance and design criteria if Contractor has delegated design responsibility.
      c. Operating standards.

d. Operating procedures.
e. Operating logs.
f. Wiring diagrams.
g. Control diagrams.
h. Piped system diagrams.
i. Precautions against improper use.
j. License requirements including inspection and renewal dates.

C. Descriptions:
1. Include the following:
a. Product name and model number. Use designations for products indicated on Contract Documents.
b. Manufacturer's name.
c. Equipment identification with serial number of each component.
d. Equipment function.
e. Operating characteristics.
f. Limiting conditions.
g. Performance curves.
h. Engineering data and tests.
i. Complete nomenclature and number of replacement parts.

D. Operating Procedures:
1. Include the following, as applicable:
a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Instructions on stopping.
f. Normal shutdown instructions.
g. Seasonal and weekend operating instructions.
h. Required sequences for electric or electronic systems.
i. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation and diagram controls as installed.

F. Piped Systems: Diagram piping as installed and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals:
1. Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information:
a. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
b. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project manual and Drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation:
   1. Include the following information for each component part or piece of equipment:
      a. Standard maintenance instructions and bulletins:
         1) Include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one (1) item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable:
            a) Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
      b. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
      c. Identification and nomenclature of parts and components.
      d. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures:
   1. Include the following information and items that detail essential maintenance procedures:
      a. Test and inspection instructions.
      b. Troubleshooting guide.
      c. Precautions against improper maintenance.
      d. Disassembly; component removal, repair, and replacement; and reassembly instructions.
      e. Aligning, adjusting, and checking instructions.
      f. Demonstration and training video recording, if available.

F. Maintenance and Service Schedules:
   1. Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment:
      a. Scheduled maintenance and service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
      b. Maintenance and service record: Include manufacturers' forms for recording maintenance.

G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

I. Warranties and Bonds:
   1. Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds:
      a. Include procedures to follow and required notifications for warranty claims.

J. Drawings:
   1. Prepare Drawings supplementing manufacturers' printed data to illustrate the

relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these Drawings with information contained in record Drawings to ensure correct illustration of completed installation:
a. Do not use original Project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project manual and Drawing or schedule designation or identifier where applicable.

D. Product Information:
1. Include the following, as applicable:
   a. Product name and model number.
   b. Manufacturer's name.
   c. Color, pattern, and texture.
   d. Material and chemical composition.
   e. Reordering information for specially manufactured products.

E. Maintenance Procedures:
1. Include manufacturer's written recommendations and the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Schedule for routine cleaning and maintenance.
   e. Schedule for annual inspection and reports.
   f. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds:
1. Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds:
   a. Include procedures to follow and required notifications for warranty claims.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION - 01 78 23

SECTION 01 78 39 | PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Project record documents, including but not limited to:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product data.
   4. Miscellaneous record submittals.

1.3 SUBMITTALS

A. Record Drawings:
   1. Number of copies - Submit one (1) set of marked up record prints.
   2. Number of Copies - Submit copies of record Drawings:
      a. Initial submittal:
         1) Submit PDF electronic files of scanned record prints and one (1) of file prints.
         2) Submit record digital data files and one (1) set of plots.
         3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
      b. Final submittal:
         1) Submit PDF electronic files of scanned record prints and three (3) sets of prints.
         2) Submit record digital data files and three (3) sets of record digital data file plots.
         3) Plot each Drawing file, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one (1) paper copy and one (1) annotated PDF electronic files of the Project Specifications, including addenda and Contract modifications.

C. Record Product Data:
   1. Submit one (1) paper copy and one (1) annotated PDF electronic file and directories of each submittal:
      a. Where record product data are required as part of operation and maintenance manuals, submit duplicate marked up product data as a component of manual.

D. Miscellaneous Record Submittals: Refer to the individual Specification Sections for miscellaneous record keeping requirements and submittals in connection with various construction activities. Submit one (1) paper copy and annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report monthly indicating items incorporated into Project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 PROJECT RECORD DOCUMENT PROCEDURES

A. Do not use Project record documents for construction purposes. Protect Project record documents from deterioration and loss. Provide access to Project record documents for Architect's reference:
   1. **Do not use** as-built Drawings and Specifications for record Drawings and Specifications.

B. Recording Procedures: Update Drawings and Specifications on daily bases to record actual conditions. Record information concurrently with construction progress. Do not conceal work until required information is accurately recorded.

C. Store record documents and samples apart from as-built documents used for construction:
   1. Label and file record documents and samples in accordance with Section number listings in table of contents. Label each document ***PROJECT RECORD*** in neat, large, printed letters.
   2. Maintain record documents in clean, dry, and legible condition.
   3. Make record documents and samples available for inspection upon request of Architect.

PART 2 PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints:
   1. Maintain one (1) set of marked up paper copies of the Contract Drawings and shop drawings:
      a. Preparation:
         1) Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is installer, Subcontractor, or similar entity, to provide information for preparation of corresponding marked up record prints. Show actual installation conditions where installation varies from that shown originally:
            a) Give attention to information on concealed elements difficult to identify or measure and record later.
            b) Accurately record information in an acceptable drawing technique.
            c) Record data as soon as possible after obtaining it.
            d) Record and check the markup before enclosing concealed installations.
            e) Cross reference record prints to corresponding shop drawings or archive photographic documentation.
   2. Content:
      a. Types of items requiring marking include, but are not limited to, the following:
         1) Dimensional changes to Drawings.
         2) Revisions to details shown on Drawings.
         3) Depths of foundations below first floor.
         4) Locations and depths of underground utilities.
         5) Revisions to routing of piping and conduits.
         6) Revisions to electrical circuitry.
         7) Actual equipment locations.
         8) Duct size and routing.
         9) Locations of concealed internal utilities.
         10) Changes made by Change Order or Construction Change Directive.
         11) Changes made following Architect's written orders.
         12) Details not on the original Contract Drawings.

13) Field records for variable and concealed conditions.
14) Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and shop drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked up record prints.
4. Mark record sets with erasable, red colored pencil. Use colors to distinguish between changes for different categories of the work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files:
1. Immediately before inspection for Certificate of Substantial Completion, review marked up record prints with Architect. When authorized, prepare full set of corrected digital data files of the Contract Drawings:
   a. Format: Same digital data software program, version, and operating system as the original Contract Drawings and annotated PDF electronic file with comment function enabled.
   b. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
   c. Refer instances of uncertainty to Architect for resolution.
   d. Architect will furnish Contractor one (1) set of digital data files of the Contract Drawings for use in recording information:
      1) Refer to Section 01 33 00: Submittal Procedures for requirements related to use of Architect's digital data files.
      2) Architect will provide data file layer information. Record markups in separate layers.

C. Newly Prepared Record Drawings:
1. Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor shop drawings are suitable to show actual installation:
   a. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or modification. Including ALL documents used for Construction Change Directive to DSA.
   b. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format:
1. Identify and date each record Drawing; include the designation *PROJECT RECORD DRAWING* in a prominent location:
   a. Record prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
   b. Format: Annotated PDF electronic file with comment function enabled.
   c. Record digital data files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
   d. Identification:
      1) As follows:
         a) Project name.
         b) Date.
         c) Designation PROJECT RECORD DRAWINGS.

d) Name of Architect.
e) Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation:
1. Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and Contract modifications:
   a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   b. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
   c. Record the name of manufacturer, supplier, installer, and other information necessary to provide a record of selections made.
   d. For each principal product, indicate whether record product data has been submitted in operation and maintenance manuals instead of submitted as record product data.
   e. Note related Change Orders, record product fata, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file and marked up paper copy of Specifications. ALL documents to match PBK format.

2.3 RECORD PRODUCT DATA

A. Preparation:
1. Mark product data to indicate the actual product installation where installation varies substantially from that indicated in product data submittal:
   a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   b. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
   c. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record product data as annotated PDF electronic file. Include record product data directory organized by Specification Section number and title, electronically linked to each item of record product data.

2.4 RECORD SAMPLES

A. Record Samples: Determine with Architect and Owner which submitted samples are to be maintained as record samples. Maintain and mark one (1) set to indicate date of review and approval by Architect; note any deviations or variations between reviewed sample and installed product or material.

2.5 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by the individual Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference. Include the following:
1. Reviewed shop drawings, product data, and samples.
2. Field test reports.
3. Inspection certificates and manufacturer's certificates.

4. Inspections by authorities having jurisdiction (AHJ [DSA]).
5. Documentation of foundation depths.
6. Special measurements or adjustments.
7. Tests and inspections.
8. Surveys.
9. Design mixes.
10. DSA submitted CCDs.

B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked up miscellaneous record submittals. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one (1) copy of each submittal during the construction period for Project record document purposes. Post changes and revisions to Project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and samples in the field office apart from the Contract Documents used for construction. Do not use Project record documents for construction. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project record documents for Architect's reference during normal working hours.

END OF SECTION - 01 78 39

SECTION 01 79 00 | DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Demonstration and training video recordings.
   4. Operation and maintenance manuals should be uploaded into Owner’s designated software (Prolog).

1.3 SUBMITTALS

A. Instruction Program:
   1. Submit outline of instructional program for demonstration and training including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module:
      a. Indicate proposed training modules utilizing manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For instructor.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Demonstration and Training Video Recordings:
   1. Submit two (2) copies within seven (7) days of end of each training module:
      a. Identification:
         1) On each copy, provide an applied label with the following information:
            a) Name of Project.
            b) Name and address of videographer.
            c) Name of Architect.
            d) Name of Contractor.
            e) Date of video recording.
      b. At completion of training, submit complete training manual(s) for Owner's use.

1.4 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00: Quality Requirements, experienced in operation and maintenance procedures and training.

PART 2 PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules:
1. Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
   a. Basis of system design, operational requirements, and criteria - include the following:
      1) System, subsystem, and equipment descriptions.
      2) Performance and design criteria if Contractor is delegated design responsibility.
      3) Operating standards.
      4) Regulatory requirements.
      5) Equipment function.
      6) Operating characteristics.
      7) Limiting conditions.
      8) Performance curves.
2. Documentation:
   a. Review the following items in detail:
      1) Emergency manuals.
      2) Operations manuals.
      3) Maintenance manuals.
      4) Project record documents.
      5) Identification systems.
      6) Warranties and bonds.
      7) Maintenance service agreements and similar continuing commitments.
3. Emergencies:
   a. Include the following, as applicable:
      1) Instructions on meaning of warnings, trouble indications, and error messages.
      2) Instructions on stopping.
      3) Shutdown instructions for each type of emergency.
      4) Operating instructions for conditions outside of normal operating limits.
      5) Sequences for electric or electronic systems.
      6) Special operating instructions and procedures.
4. Operations:
   a. Include the following, as applicable:
      1) Startup procedures.
      2) Equipment or system break-in procedures.
      3) Routine and normal operating instructions.
      4) Regulation and control procedures.
      5) Control sequences.
      6) Safety procedures.
      7) Instructions on stopping.
      8) Normal shutdown instructions.
      9) Operating procedures for emergencies.
      10) Operating procedures for system, subsystem, or equipment failure.
      11) Seasonal and weekend operating instructions.
      12) Required sequences for electric or electronic systems.

13) Special operating instructions and procedures.

5. Adjustments:
   a. Include the following:
      1) Alignments.
      2) Checking adjustments.
      3) Noise and vibration adjustments.
      4) Economy and efficiency adjustments.
6. Troubleshooting:
   a. Include the following:
      1) Diagnostic instructions.
      2) Test and inspection procedures.
7. Maintenance:
   a. Include the following:
      1) Inspection procedures.
      2) Types of cleaning agents to be used and methods of cleaning.
      3) List of cleaning agents and methods of cleaning detrimental to product.
      4) Procedures for routine cleaning
      5) Procedures for preventive maintenance.
      6) Procedures for routine maintenance.
      7) Instruction on use of special tools.
8. Repairs:
   a. Include the following:
      1) Diagnosis instructions.
      2) Repair instructions.
      3) Disassembly: Component removal, repair, and replacement, and reassembly instructions.
      4) Instructions for identifying parts and components.
      5) Review of spare parts needed for operation and maintenance.

PART 3 EXECUTION

3.1 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

3.2 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23: Operation and Maintenance Data.

B. Set up instructional equipment at instruction location.

3.3 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system:

1. Owner will furnish an instructor to describe Owner's operational philosophy.
2. Owner will furnish Contractor with names and positions of participants.

B. Scheduling:
   1. Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season:
      a. Schedule training with Owner through program manager with at least ten (10) days advance notice.

C. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.4 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

END OF SECTION - 01 79 00

SECTION 01 91 13 | GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section establishes general and administrative requirements pertaining to commissioning (Cx) of equipment, devices, and building systems on the Project. Technical requirements for Cx of particular systems and components are established in the respective technical sections of this Project manual.

B. It is of primary concern that all operable systems installed in the Project perform in accordance with the Contract Documents, Owner's Project requirements and the basis of design. During Cx, Contractor systematically demonstrates to Owner or Owner's representative that the operable systems have been installed and perform in strict accordance with the Contract Documents.

C. Commissioning requires cooperation and involvement of all parties throughout the construction process. Contractor shall deliver a successful Cx process. Successful Cx requires that installation of all building systems complies with Contract Document requirements and that full operational check-out and necessary adjustments are performed prior to Substantial Completion with the exception of deferred tests approved in advance by Owner.

D. Commissioning will encompass and coordinate traditionally separate functions of:
   1. System documentation.
   2. Installation checkout.
   3. System verification checklists and start-up.
   4. Control system calibration and point-to-point checkout.
   5. Testing, adjusting, and balancing (TAB).
   6. Functional performance tests.
   7. Integrated system tests.
   8. Contractor demonstration to Owner and training of Owner's personnel:
      a. This requires assembling all related documentation into one (1) cohesive collection. Commissioning is intended to achieve the following specific objectives of the Contract Documents:
         1) Verify and document proper installation and intended performance of equipment, systems, and integrated systems.
         2) Ensure that operating and maintenance and Cx documentation requirements are complete.

E. Provide Owner with functional buildings and systems that meet the Contract Document requirements and Owner's Project requirements at Substantial Completion.

1.3 DEFINITIONS

A. Basis of Design: A document that records the concepts, calculations, decisions, and product selections used to meet Owner's Project requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions

and lists of individual items that support the design process.

B. Commissioning (Cx): A systematic process confirming that building systems have been installed, properly started, and consistently operated in strict accordance with the Project documents, that all systems are complete and functioning in accordance with the Contract Documents at Substantial Completion, and that Contractor has provided Owner adequate system documentation and training.

C. Commissioning Authority (CxA): Party having a contractual agreement with Owner to provide third party Cx services as defined herein under CxA's Role and Responsibilities. Commissioning Authority may represent Owner and is authorized to act on behalf of Owner. The CxA does not have authority to alter design or installation procedures without the written approval of Owner or the design team.

D. Contract Documents: The General Conditions, Drawings, Specifications, addenda, and other documents developed by the Architect/Engineer (A/E) Team and approved by Owner that constitute the contractual obligations of the Project scope.

E. Control Point and Sensor Calibration Verification: Process of verifying the point integrity and/or sensor calibration from the physical point of monitoring (sensor, contact, actuator, etc.) to the digital point location at the Operator's interface within the respective control system (building automation, lighting controls, power status and monitoring, etc.).

F. Deferred Testing: Functional performance or integrated system tests performed after Substantial Completion due to partial occupancy, partial equipment acceptance, seasonal requirements, design, or other site conditions that prohibit the test from being performed prior to Substantial Completion.

G. Deficiency: Condition of a component, piece of equipment, or system that is not in compliance with the Project documents.

H. Functional Performance Test: Test of dynamic function and operation of equipment and systems executed by Contractor and witnessed by the CxA. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, life safety conditions, power failure, etc. Systems are operated through all specified sequences of operation. Components are verified to be responding in accordance with requirements in the Project documents.

I. Functional Performance Testing Procedures: Commissioning protocols, detailed test procedures and instructions in tabular and script-type format that fully describe system configuration and steps required to determine if the system is performing and functioning properly.

J. Integrated Systems Test: Test of dynamic function and operation of multiple systems. Integrated systems tests are tested under various modes, such as fire alarm and emergency situations, life safety conditions, power failure, etc. Systems are integrally operated through all specified sequences of operation. Systems and interconnections are verified to be responding in accordance with the requirements in the Project documents.

K. Integrated Systems Testing Procedures: Commissioning protocols and detailed test procedures and instructions in tabular and script-type format that fully describe system configurations and steps required to determine if the interacting systems are performing and functioning properly.

L. Operational Testing: Activities and testing occurring after initial energizing and/or start-up of

equipment that determine whether equipment is operating within the manufacturer's recommendations and the design requirements. These activities are intended to ensure that equipment and systems meet all warranty requirements and are ready for functional performance testing. Common examples are TAB of HVAC systems and initial load testing of electrical equipment.

M. Owner's Project Requirements: A written document that details the functional requirements of a Project and the expectations of how the facility will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

N. Project Documents: Consists of the Contract Documents, approved submittals, Requests for Information (RFI), vendor documentation, operations and maintenance information, and other documentation that determines the requirements for acceptable installation and operation of the specific equipment and systems on the Project.

O. Start-up: The activities where equipment is initially energized, tested, and operated. Start-up is completed prior to operational testing and functional performance testing, and is an integral item documented in the system verification checklist.

P. System Verification Checklist: A list of static inspections and material or component tests that verify proper installation of equipment (e.g., belt tension, oil levels, labels affixed, gages in place, sensors calibrated, etc.), start-up activities and documentation, as well as operational testing results. The checklists are meant to document all activities for an individual piece of equipment from procurement on the Project through operational testing are performed in accordance with the requirements in the Project documents.

Q. Training Plan: A detailed plan prepared by Contractor and reviewed by Owner and CxA that outlines the training activities, instructors, time durations, and system requirements in accordance with the Contract Documents and Cx plan.

R. Trending: Data collection of monitored points using the building automation system, lighting controls system, power status and monitoring system, or independent data acquisition instrumentation.

1.4 COMMISSIONING TEAM

A. Owner shall appoint the following Members:
1. Owner's project manager and any other designated representatives of Owner's staff.
2. CxA.
3. A/E.
4. TAB Firm – may be subcontracted to the CxA.

B. Contractor shall appoint the following Members:
1. Individuals, each having authority to act on behalf of the entity they represent, explicitly organized to implement the Cx process through coordinated actions. At a minimum, Contractor shall designate a Cx coordinator and each major subcontractor (MEP, building automation, etc.) shall have a dedicated representative.
2. Vendor representatives (as needed) required for start-up, operational testing, functional performance testing, integrated systems testing, and Owner training activities.
3. Representatives of independent testing agencies (TAB, Electrical Testing Agency, etc.).

1.5 ROLES AND RESPONSIBILITIES

A. Roles and responsibilities of Cx team members related to the Cx process are provided in this Section. The respective entities defined below shall fulfill the listed roles and responsibilities as contained herein. Specific technical roles and responsibilities are defined in other Sections of the Project Specifications.

B. Owner's Roles and Responsibilities:
   1. Provide guidance in development of Owner's Project requirements.
   2. Review technical Specifications containing Cx requirements.
   3. Approve the Cx scope of Work and schedule of Cx activities.
   4. Assign Owner's representatives and schedule them to participate in Cx activities, including the following:
      a. Commissioning team meetings.
      b. Review and approval of the Cx plan, training plan, system verification checklist templates, functional performance test procedures, integrated systems test procedures, deferred testing plans, final Cx process report, systems manual, measurement and verification plan, and other Cx documents.
      c. Attend Owner training sessions in operation and maintenance of systems and equipment.
      d. Observation of Contractor's demonstration of systems and equipment operation.

C. Commissioning Authority's Roles and Responsibilities:
   1. Prepare the Cx plan with Owner's and Contractor's review and input.
   2. Periodically attend and/or review the proceedings of the regular construction meetings hosted by Contractor to understand the progress of construction activities on the Project.
   3. Conduct and document Cx team meetings including the Cx kickoff meeting.
   4. Perform site visits as necessary to observe component and system installations prior to energizing or start-up of equipment and systems.
   5. Review and comment on product data and shop drawing submittals and coordination drawings applicable to systems being commissioned.
   6. Following submittal review and approvals by the A/E team, review the sequences of operation and coordinate with Contractor and A/E team in order to prepare the functional performance test procedures and integrated systems test procedures. Submit to Owner and Contractor for review and comment prior to facilitating functional performance tests and integrated systems tests on the Project.
   7. Upon written notice that equipment or systems are ready for initial energizing or start-up, review the progress of the systems verification checklists for the respective systems and components and ensure that all requirements have been completed by Contractor to permit energizing or start-up in accordance with the Project documents; CxA shall issue written notice to Owner and Contractor that equipment is ready to energize or start-up. Commissioning Authority will witness and ensure proper documentation is provided by Contractor for major equipment energizing and start-ups as executed by Contractor with appropriate notice as indicated herein.
   8. Witness, verify, and document results of functional performance tests and integrated systems tests.
   9. Coordinate resolution of deficiencies identified during site observations, equipment energizing or start-up, functional performance testing, integrated systems testing, deferred testing, and during the warranty period.
   10. Review the operations and maintenance documents to ensure that as-built information and correct data is included prior to Owner training sessions; review final operations and maintenance submittal to ensure compliance with the requirements in the Project documents and provide written comments to Owner.
   11. Review Contractor's training plan and individual training agendas for compliance with the requirements in the Project documents. Recommend acceptance to Owner prior to Contractor scheduling training sessions with Owner. Review the attendance and content of the training sessions to ensure the requirements of the Project documents

are completed. Conduct a survey of Owner's personnel to evaluate the effectiveness of Owner training.

12. Compile the final Cx process report and submit to Owner for review and approval.

D. A/E's Roles and Responsibilities:
   1. Specify control sequences of operation within the Contract Documents that comply with Owner's Project requirements and basis of design.
   2. Incorporate Cx requirements into the Contract Documents if requested by Owner.
   3. Attend Cx team meetings.
   4. Review the Cx plan, system verification checklists templates, functional performance test procedures, integrated systems test procedures, deferred testing plans, and other Cx documents as required by Owner or the Contract Documents.
   5. Review Contractor's training plan and provide comments to Owner.
   6. Approve technical requirements for correction of deficiencies identified during Cx, deferred tests, and during the warranty period.
   7. Review operation and maintenance manuals and provide comments to Owner.

E. Contractor's Roles and Responsibilities:
   1. Contractor shall review and provide comments on documents produced by the CxA, and shall accept the Cx plan, system verification checklists, functional performance test procedures, and integrated system test procedures as approved by Owner.
   2. Provide an individual, subject to Owner's approval, experienced in construction and Cx of building systems to organize, schedule, conduct, and document Contractor's responsibilities in the Cx process. Contractor shall assign this individual to act as Contractor's Cx coordinator. Contractor's Cx coordinator may have additional duties such as MEP coordinator, but not as project manager or superintendent. Submit qualifications demonstrating the Cx coordinator's technical expertise and experience to Owner for approval. If Contractor chooses to subcontract its Cx obligations, then Contractor must submit the subcontractor's qualifications and personnel to Owner for Owner's approval.
   3. Furnish and install systems that meet all requirements of the Contract Documents.
   4. Ensure that Cx process activities are incorporated into the master Project schedule. Contractor shall coordinate with the CxA and Owner to determine the required activities, durations, and predecessors.
   5. Submit inspection requests, start-up requests, and all supporting documentation in accordance with the Contract Documents, General Conditions, and Cx plan.
   6. Cooperate with Owner's representative(s), provide access to work, and provide adequate labor, resources, and time for Cx.
   7. Furnish copies of all shop drawings and submittals, manufacturers' literature, maintenance information, and any other information required for the Cx process. Contractor must submit to Owner installation and checkout materials shipped inside equipment and actual field checkout sheet forms used by the factory or field technicians. This requirement does not supersede any additional requirements contained in the Contract Documents.
   8. Schedule and conduct pre-installation meetings and pre-commissioning meetings with subcontractors and equipment suppliers related to Cx. Contractor must invite A/E, Owner, and CxA to attend the pre-installation meetings and pre-commissioning meetings.
   9. Provide qualified personnel, including subcontractors as required, to fully perform the testing and operational demonstrations required by the Contract Documents and the Cx plan, including any deferred testing or re-testing related to warranty work.
   10. Correct deficiencies identified during any stage of the Cx process.
   11. Coordinate with the CxA to develop the training plan and submit to Owner for approval. Provide training to Owner's personnel in accordance with the Contract Documents and the approved training plan. Coordinate with Owner to schedule training sessions and coordinate subcontractor/vendor participation in all training sessions.

12. Perform deferred testing and make necessary amendments to operating and maintenance manuals and as-built drawings for applicable issues identified during the deferred testing.
13. Perform system maintenance during construction as specified and recommended by Owner and send the maintenance records to Owner for record.
14. Document the equipment as it arrives onsite to ensure that the submitted and received equipment is correct as it arrives onsite, including the completion of the system verification sections pertaining to the procurement process.

1.6 SYSTEMS TO BE COMMISSIONED

A. The following systems shall be commissioned according to the process defined in this Section:
   1. Major HVAC Systems (including but not limited to the list below):
      a. Air handling units.
      b. Fan coil units.
      c. Exhaust fans.
      d. Supply fans.
      e. Pumps.
      f. Chillers.
      g. Boilers.
   2. Terminal units (ten percent [10%] sampling).
   3. Building automation system.
   4. Lighting controls - occupancy sensors (25 percent greater than 25 sensors installed, 100 percent less than 25 sensors installed).
   5. Lighting - daylight controls.
   6. Lighting - time switch controls.
   7. Normal and emergency power systems.

PART 2 PRODUCTS

2.1 COMMISSIONING PLAN

A. Document developed by the CxA that provides the structure, schedule, and coordination plan for the Cx process from the pre-construction phase through the occupancy phase. The Cx plan shall describe the Project and systems to be commissioned, Cx process activities and deliverables, procedures to follow throughout the process, specific roles and responsibilities for each participant, and general description of testing and verification methods.

B. The Cx plan shall comply with Owner Project requirements.

C. The Cx team shall review the Cx plan prior to the pre-commissioning meeting and submit written comments or questions to the CxA to be addressed in the meeting.

D. Following the pre-commissioning meeting, the CxA shall incorporate all changes discussed and agreed upon in the pre-commissioning meeting and submit the final Cx plan to the Cx team for approval and acceptance.

E. If changes to the Cx plan are needed during the Cx process, the CxA shall edit the plan and distribute to the Cx team for approval and acceptance.

F. Contractor’s acceptance shall constitute acceptance of all parties subcontracted to Contractor. Contractor shall ensure that all subcontractors and vendors agree and accept the Cx plan.

2.2 SYSTEM VERIFICATION CHECKLISTS

A. System verification checklists are important to ensure that the equipment and systems are connected and operational and that functional performance testing proceeds without unnecessary delays. These checklists document the inspections and procedures necessary to take a piece of equipment from a static state into an operating state. These checklists augment the manufacturer's start-up checklists to provide a complete document from procurement to the start of functional performance testing when combined.

B. The CxA shall develop the system verification checklist templates for review by the Cx team. Contractor, appropriate subcontractors, and vendors shall support the CxA in development of system verification checklists for each system and components by providing any necessary supporting documentation as requested by the CxA and reviewing and commenting on the checklist templates in accordance with the Project Specifications and the Cx plan.

C. Once the checklist templates are reviewed and accepted, the CxA will produce checklists for all equipment and components to be commissioned on the Project utilizing an electronic Cx database that is accessible via web portal or local field tool (i.e., iPad, tablet, laptop, etc.).

D. The CxA shall provide login access and training to Contractor and other members of the Cx team in the use of the electronic Cx database.

E. Contractor shall be responsible for completing the required sections of the system verification checklists utilizing the electronic Cx database and providing all supporting documentation via electronic transmittal to the CxA. Additional requirements for completion of the checklists are included in this Section and other technical Sections of the Specifications.

F. Once equipment arrives on the Project site, Contractor or subcontractors shall begin completing the individual checklists and continue throughout the installation process. The checklists are meant to be progressive and a tool for tracking progress.

G. Once the system verification checklists are electronically completed, the CxA will review and approve the checklists and supporting documentation and compile the information to include in the final Cx process report.

2.3 FUNCTIONAL PERFORMANCE TESTING PROCEDURES

A. The purpose of the functional performance testing procedures is to verify and document that the equipment and systems on the project individually perform in accordance with the requirements in the Contract Documents and meet Owner's Project requirements.

B. The CxA shall develop specific script-type test procedures to verify and document proper operation of each piece of equipment and system. Contractor shall provide any supporting information to the CxA that may be needed including, but not limited to, product submittals, operations and maintenance information, and sequences of operation. Once developed, the CxA will issue to the Cx team for review and comment.

C. The Cx team shall review the functional performance testing procedures and submit written comments or questions to the CxA. Contractor shall ensure that the subcontractors and any vendors that would be involved with functional performance testing review the procedures and provide comments.

D. The CxA will coordinate with the Cx team to address any comments and produce the final

functional performance testing procedures for acceptance by the Cx team. Contractor's acceptance shall constitute acceptance of all parties subcontracted to Contractor.

E. Contractor shall utilize the functional performance testing procedures for any pre-testing activities prior to functional performance testing.

2.4 INTEGRATED SYSTEMS TESTING PROCEDURES

A. The purpose of the integrated systems testing procedures is to verify and document that all the integrated equipment and systems on the Project perform together in accordance with the requirements in the Contract Documents and meet Owner's Project requirements.

B. The CxA shall develop specific script-type test procedures to verify and document proper operation of the integrated systems throughout the facility. Contractor shall provide any supporting information to the CxA that may be needed including but not limited to product submittals, operation and maintenance information, and sequences of operation. Once developed, the CxA will issue to the Cx team for review and comment.

C. The Cx team shall review the integrated systems testing procedures and submit written comments or questions to the CxA. Contractor shall ensure that the subcontractors and any vendors that would be involved with integrated systems testing review the procedures and provide comments.

D. The CxA shall coordinate with the Cx team to address any comments and produce the final integrated systems testing procedures for acceptance by the Cx team. Contractor's acceptance shall constitute acceptance of all parties subcontracted to Contractor.

E. The CxA shall also develop the integrated system test personnel matrix that will be utilized to track the individual testing teams involved with the integrated system test. The CxA will distribute the matrix to the Cx team so that Contractor and Owner can assign the appropriate personnel to the appropriate teams.

F. The CxA shall also host a coordination meeting prior to the integrated system test to review the integrated system test procedures, complete any final coordination, review safety procedures, and answer any questions.

G. The CxA estimates there will be two integrated system tests on the Project. The first will test the data center systems separately and the second will test the entire facility. Requirements of the testing are included in the respective technical Sections of the Project Specifications.

H. The integrated systems testing procedures shall be utilized by Contractor for any pre-testing activities prior to official integrated systems testing.

2.5 TRAINING PLAN

A. Contractor, in coordination with Owner and CxA, shall develop the training plan with Project specific requirements for Owner training, after reviewing the different systems to be installed and commissioned. The purpose of the training plan is to specifically communicate the required content and training durations required by Owner based upon the type of equipment and Owner's experience.

B. Contractor shall review all of the individual technical sections of this Specification for specific training requirements.

C. Contractor shall coordinate with Owner to ensure that the proposed training requirements

meet Owner's needs and expectations.

D. Contractor shall coordinate with the subcontractors and vendors to ensure Owner training requirements can be achieved and gather any additional information or recommendations.

E. Any changes to the training requirements in this specification must follow contractual protocols.

F. The training plan shall include a list of systems and equipment for which training will be provided according to the three-tiered training approach outlined in the Project Specifications.

G. All training sessions shall have a syllabus indicating the following as a minimum in addition to any other specification requirements:
1. Session objectives.
2. Proposed instructor(s).
3. Instructor qualifications.
4. Training materials that will be provided.
5. Location and durations of the various parts of the training session (i.e., classroom, onsite, etc.).
6. Applicable Specification Sections and operation and maintenance manual sections.
7. Detailed outline of training session content.

H. Contractor shall coordinate with the CxA to organize the systemic training sessions comparable to the organization of the systems manual.

I. Owner training must be completed prior to Contractor obtaining Substantial Completion by Owner.

2.6 FINAL COMMISSIONING PROCESS REPORT

A. The CxA shall prepare the final Cx process report that will include the following:
1. Executive summary.
2. Participants and roles.
3. Brief building description.
4. Overview of Cx and testing scope.
5. General description of testing and verification methods.
6. Appendices with supporting information, issues log, and communications.

B. Contractor shall coordinate with the CxA to provide any additional information that may be needed to complete the final Cx process report.

C. Contractor shall resolve any outstanding Cx items prior to the CxA preparing the final Cx report.

D. The CxA shall issue the final Cx process report to the Cx team for review. Owner shall approve the final Cx process report after any comments or discrepancies are resolved by the CxA.

PART 3 EXECUTION

3.1 PROJECT SCHEDULE

A. Contractor shall integrate all Cx activities into the detailed Project schedule. All parties will address scheduling problems and make necessary notifications in a timely manner to

expedite the Cx process.

3.2 COMMISSIONING TEAM MEETINGS

A. Upon obtaining Owner's approval of the Cx plan, the CxA shall coordinate with the Cx team to schedule, plan, and conduct a pre-commissioning meeting with all parties involved in the Cx process. This meeting should include the major subcontractors, specialty manufacturers/suppliers, A/E, TAB Firm, Electrical Testing Agency, and Owner's representatives as participants.

B. Contractor shall prepare for the pre-commissioning meeting by supplying the following documents created by the CxA to all applicable subcontractors and vendors: Cx plan, example system verification checklists, example functional performance test procedures, and example integrated systems test procedures.

C. The CxA shall conduct the pre-commissioning meeting and review all aspects of the Cx plan and applicable Specifications.

D. The Cx plan shall be reviewed with all attendees and the scope of work discussed. Contractor should be prepared to distribute copies of the pertinent sections to the various subcontractors involved in the Cx process.

E. The outcome of the meeting shall be an understanding of the Cx process, roles and responsibilities, and consensus acceptance of the Cx plan by the Cx team.

F. Contractor may request additional meetings with the CxA and individual subcontractors to clarify roles, responsibilities, and procedures as needed.

3.3 TEST EQUIPMENT

A. Contractor shall provide all specialized tools, test equipment, and instruments required to execute start-up, checkout, and testing of equipment.

B. All specialized tools, test equipment and instruments required to execute start-up, checkout, and testing of equipment shall be of sufficient quality and accuracy to test and/or measure system performance within specified tolerances. A testing laboratory must have calibrated test equipment within the previous 12 months. Calibration shall be NIST traceable. Contractor must calibrate test equipment and instruments according to manufacturer's recommended intervals and whenever the test equipment is dropped or damaged. Calibration tags must be affixed to the test equipment or certificates readily available.

3.4 REPORTING

A. Beginning at the procurement stage for the equipment included in the Cx scope, Contractor shall communicate at least monthly with all members of the Cx team, keeping them apprised of construction progress and scheduling changes.

B. Contractor shall submit deficiency reports to Owner within five (5) days of the deficiency occurrence. This includes responses to items noted by the CxA.

3.5 DEFICIENCY RESOLUTION

A. The CxA shall document any issues noted during observation or testing activities in the CxIL. The CxIL shall be distributed electronically to the Cx team at regular intervals.

B. Contractor shall respond in writing to the CxA within ten [10] days to all new CxIL items regardless of the disposition. This response does not constitute a request for re-verification, only an acknowledgement of the outstanding item. Contractor should utilize CxIL responses to update the Cx team on the progress of deficiency resolution.

C. Contractor shall respond to the CxA and Owner indicating CxIL items that are completed and ready for the CxA to verify completion.

D. If any item indicated complete by Contractor is found to be incomplete by the CxA upon re-verification, Contractor is responsible for all costs and additional compensation resulting from incomplete CxIL items.

3.6 REQUEST FOR ENERGIZING / START-UP OF EQUIPMENT

A. Owner and/or Owner's representative may install lockout devices on equipment in addition to Contractor's lockout/tagout devices once permanent power is connected to the facility. This lock would be removed once the proper start-up notification is received by Owner and/or the CxA, and the CxA has reviewed the appropriate system verification checklists and supporting documentation to verify the equipment is ready for energizing and/or start-up.

B. These requirements do not supersede any additional requirements noted elsewhere in the Contract Documents or as required by applicable code authorities.

C. Contractor shall notify Owner and the CxA in writing to request initial energizing and/or start-up of equipment and systems at least 72 hours (not including weekends or holidays) prior to the scheduled start-up.

D. Contractor shall complete the applicable sections of the system verification checklists evidencing Contractor's thorough inspection of the system and readiness for start-up activities as required by the Project documents and the Cx plan. Contractor shall submit required supporting documentation to Owner and/or the CxA including, but not limited to, factory testing reports, alignment reports, electrical testing reports and any other documentation required by the Project documents prior to energizing and/or start-up.

E. The CxA shall review the system verification checklists and supporting documentation within the 72-hour notice period and confirm in writing that the systems and equipment are approved to proceed with energizing and start-up.

F. The CxA and/or owner may witness equipment energizing and/or start-up at the scheduled time, but witness is not required, unless noted elsewhere in the Specifications, as long as written approval is received as noted herein.

G. Contractor shall perform start-up under supervision of the responsible manufacturer's representative in accordance with manufacturer's instructions and Project document requirements.

H. Contractor shall complete all required factory start-up documentation and applicable items in the system verification checklist, prior to startup, to ensure compliance with the requirements in the Project documents.

3.7 OPERATIONAL TESTING

A. Once the appropriate start-up activities are completed, Contractor shall complete all necessary operational testing requirements included in the Project documents prior to

functional performance testing. Specific requirements for systems and equipment are included in other technical Sections of the Specifications.

B. Contractor shall complete all operational testing items in the system verification checklist and submit all supporting documentation to Owner and/or CxA for review.

C. Contractor and manufacturer's representatives shall supervise and coordinate adjustments and balancing of all devices and systems for proper operation prior to requesting a functional performance test.

D. Contractor shall clearly list outstanding items or system verification checklist items not completed successfully. Contractor shall obtain from subcontractor or vendor completed forms documenting any outstanding deficiencies within five (5) days of completion of energizing and/or start-up activities.

E. Contractor shall review completed deficiencies to determine if outstanding items prevent execution of the functional performance tests and shall issue any necessary responses to Owner and/or the CxA.

F. Contractor shall notify Owner and CxA in writing to request functional performance testing of equipment and systems at least 72 hours (not including weekends or holidays) prior to the scheduled activities. Owner may require Contractor to reschedule functional performance testing to ensure availability of Owner’s representative(s) as needed.

G. The CxA shall review the system verification checklists and supporting documentation within the 72-hour notice period and confirm in writing that the systems and equipment are approved to proceed with functional performance testing.

H. If any item indicated complete by Contractor is found to be incomplete by the CxA upon re-verification Contractor is responsible for all costs and additional compensation resulting from incomplete system verification checklist items.

3.8 CONTROL POINT AND SENSOR CALIBRATION VERIFICATION

A. Automation systems installed on the Project must be fully verified for point integrity and sensor calibration prior to functional performance testing. Additional requirements for this verification are listed in other technical Sections of the Specifications.

B. Contractor shall verify these points according to the requirements in the Project documents as part of start-up and operational testing of systems.

C. The TAB contractor shall independently verify each sensor and point and document the results to be included in the final TAB report.

D. The CxA will witness, at their discretion, this verification and/or independently verify and document the results to be included in the final Cx process report.

E. These activities must be completed prior to Contractor requesting functional performance testing as indicated herein.

3.9 FUNCTIONAL PERFORMANCE TESTING

A. The objective of functional performance testing is to demonstrate that each system operates according to the requirements in the Project documents and meets Owner’s Project requirements and basis of design.

B. Contractor shall operate, or cause to be operated, each system, device, or equipment item, both intermittently and continuously, for a duration period as indicated in the Specification Section(s) for each item and/or in accordance with the Project documents, the Cx plan and applicable functional performance testing procedures.

C. Contractor shall operate each component device and each building system to the full extent of its capability, from minimum to maximum, and under automatic control and manual control.

D. The CxA and members of the Cx team, including Owner's personnel, may observe functional performance testing of equipment components and systems. The CxA shall facilitate the functional performance testing activities according to the accepted functional performance testing procedures and record the results of all testing activities.

E. The CxA shall record any deficiencies noted during the testing in the CxIL. If significant deficiencies exist, Owner and/or CxA may request that the testing activities be terminated and re-scheduled after proper verification by Contractor. Contractor is responsible for all costs and additional compensation resulting from deficiencies and incomplete systems noted during scheduled functional performance testing.

F. All functional performance testing of integrated dystems must be completed in accordance with the Project documents and the Cx plan prior to Contractor scheduling the integrated systems testing activities.

3.10 INTEGRATED SYSTEMS TESTING

A. The objective of integrated systems testing is to demonstrate that each integrated system operates jointly and/or independently of other systems according to the requirements in the Contract Documents.

B. Contractor shall operate each system, jointly and independently of other systems, through selected modes of operation (fire alarm integration with HVAC, emergency power modes, equipment failures among related systems, etc.) according to the accepted integrated systems testing procedures developed by the CxA. The CxA shall facilitate and document the testing, organizing the appropriate testing teams and providing sufficient instruction to all participants to conduct efficient and effective testing activities.

C. Integrated systems testing typically involves multiple teams with representation from the CxA, Owner, and Contractor. Contractor shall provide any needed communication equipment (i.e., radios) or make available any centralized intercom or paging system for communication with all testing groups.

D. Contractor shall provide no less than seven (7) days (not including weekends or holidays) notice when requesting to conduct the integrated systems testing. All personnel must be assigned to the personnel matrix by the CxA and a coordination meeting held within the seven (7) day period as prescribed elsewhere in this Section.

E. Contractor conducts integrated systems testing after all applicable functional performance testing is satisfactorily completed and approved by Owner and/or CxA.

F. The CxA shall record any deficiencies noted during the testing in the CxIL. If significant deficiencies exist, Owner and/or CxA may request that the testing activities be terminated and re-scheduled after proper verification by Contractor. Contractor is responsible for all costs and additional compensation resulting from deficiencies and incomplete systems noted during scheduled integrated systems testing.

3.11 DEMONSTRATION AND OWNER TRAINING

A. Contractor, in coordination with Owner and CxA, shall develop the training plan with Project-specific requirements for Owner training as required throughout various Sections of the Project Specifications.

B. The specific requirements for scheduling and conducting Owner training are included in other sections of this Specification.

C. Owner training activities shall not occur until the training plan is approved by Owner and Contractor has submitted all operation and maintenance information for review and use during the training sessions.

D. Contractor shall notify the CxA of all training sessions. Contractor shall record attendance of the training sessions and Owner shall ensure the appropriate personnel are in attendance.

E. The CxA shall ensure the content of Owner training sessions meets the requirements in the Project documents.

F. The CxA may conduct surveys of Owner's personnel to gauge the effectiveness of Owner training sessions. If unfavorable surveys are received by Owner's personnel indicating unsatisfactory training, Owner reserves the right to require Contractor to re-train in those specific areas of nonconformance until the requirements in the Project documents are satisfactorily completed.

G. Owner training must be completed prior to Contractor obtaining substantial completion by Owner.

3.12 DEFERRED / SEASONAL TESTING

A. All construction phase requirements of the Cx process must be completed prior to Substantial Completion or as indicated elsewhere in this Specification.

B. If any testing or other requirements cannot be completed prior to Substantial Completion due to the building structure, required occupancy condition, or other condition, performance of such test may be delayed to later in the warranty period, upon approval of Owner. Contractor shall reschedule testing according to the protocols described in this Section and any other operational protocols prescribed by Owner.

C. Contractor shall complete all outstanding Cx requirements as part of this Contract during the warranty period. Contractor shall schedule all activities with Owner and/or CxA.

D. The CxA shall document any deferred testing activities and ensure the appropriate Cx documents are updated. Contractor shall provide any additional documentation needed by the CxA to complete these requirements.

END OF SECTION - 01 91 13

SECTION 02 21 00 | SURVEYS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section relates to execution of survey construction staking and addresses the following:
   1. Personnel and applicable responsibilities for surveying and staking.
   2. Procedures and time limitations.
   3. Consideration of monuments and damage.

B. Contractor shall furnish and set construction stakes and marks to establish the lines and grades required for completion of the Work as shown on the Plans and specified in the Project Specifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

A. Construction staking shall be performed under the direction of a licensed land surveyor or registered professional Engineer familiar with construction surveying and staking.

B. Construction staking shall be performed as necessary to control the Work. Construction stakes and marks shall be furnished and set with accuracy adequate to assure that the completed Work conforms to the lines, grades, and sections shown on the Plans.

C. Contractor shall provide a construction staking request in writing to Owner and the Engineer no less than 72 hours prior to the desired time for construction staking to be performed.

D. Construction stakes shall be removed from the site by Contractor when no longer needed. Removal and disposal of construction staking materials is the sole responsibility of Contractor.

E. In the event Contractor’s operations destroy any of the survey control points, Contractor shall replace such control points at his expense, subject to verification by the Engineer. The cost of any such verification or replacement of the control surveys will be the sole responsibility of Contractor with no additional cost to Owner. Contractor will not be allowed any adjustment in Contract Time for such verification or replacement of survey control points.

F. Contractor must preserve all Geographic Reference Stations, section corners, and all other legal property monuments of any kind during all construction and related activities. It is Contractor's responsibility to become familiar with the survey control and documentation of the site and surrounding property prior to conducting activities on the site that may potentially jeopardize such facilities.

G. Contractor shall give written notice to Owner and the Engineer at least five (5) working days in advance of any need to disturb or destroy any of the monuments of the site. Contractor

must receive approval for such destruction or disturbance from Owner and Engineer prior to conducting the work.

H. Only a professional land surveyor registered in the State of California will be permitted to perform surveying to reset or replace destroyed monuments. The professional land surveyor shall follow all rules, regulations, provisions, and laws of the State of California, as applicable for such work.

I. The cost of replacement of monuments destroyed or disturbed by Contractor will be the sole responsibility of Contractor and be at no additional cost to Owner.

END OF SECTION - 02 21 00

SECTION 02 41 00 | DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Furnishing all labor, materials, and equipment necessary for demolition, dismantling, cutting, and alterations as indicated, specified, and required for completion of the Contract, as applicable. Includes items such as the following:
      a. Protecting existing work to remain.
      b. Hazardous material identification and removal.
      c. Utility service and termination.
      d. Removing debris and equipment.
      e. Removal of items indicated on Drawings.
      f. Landscape and sprinkler demolition and reinstall.
      g. Disposal of material.

B. Related Sections:
   1. Section 01 50 00: Temporary Facilities and Controls.
   2. Section 31 00 00: Earthwork.
   3. Section 33 00 00: Utilities.

C. Regulatory Requirements:
   1. Conform to applicable jurisdictional authority regulations and codes for disposal of debris.
   2. Coordinate clearing work with utility companies.
   3. Maintain emergency access ways at all times.
   4. Contractor shall comply with all applicable laws and ordinances regarding hazardous materials, including contaminated soils, hazardous material transformers, and similar materials or components.

1.3 SUBMITTALS

A. Schedule: Submit a detailed sequence of demolition and removal work, including dates for shutoff, capping, and continuance of utility services.

B. Procedures: Submit written procedures documenting the proposed methods to be used to control dust and noise.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during Work, notify Architect promptly for instructions. Failure to notify will

make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

B. Conduct demolition to minimize interference with adjacent structures or items to remain. Maintain protected egress and access at all times.

3.2 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, Contractor shall be solely and completely responsible for working conditions at the jobsite, including safety of all persons and property during performance of the Work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Safety precautions prevent damage to existing elements identified to remain or to be salvaged and prevent injury to the public and workmen engaged onsite. Demolish roofs, walls, and other building elements in such a manner that demolished materials fall within foundation lines of building. Do not allow demolition debris to accumulate onsite. Pull down hazardous work at end of each day; do not leave standing or hanging overnight, or over weekends:
   1. Protect existing items that are not indicated to be altered. Protect utilities designated to remain from damage.
   2. Protect trees, plant growth, and features designated to remain as final landscaping as shown on Drawings.
   3. Protect bench marks from damage or displacement.

D. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.

E. Fire Safety: Contractor shall conform to Chapter 33 of the California Fire Code (CFC), "Fire Safety During Construction and Demolition," at all times during the construction process. A copy of this chapter can be provided.

F. Any construction review of Contractor's performance conducted by the geotechnical Engineer is not intended to include review of the adequacy of Contractor's safety measures in, on, or near the construction site.

G. Surface Drainage: Provide for surface drainage during period of construction in a manner to avoid creating nuisance to adjacent areas. Contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of Work, regardless of cause, source, or nature of water.

H. Adjacent streets and sidewalks shall be kept free of mud, dirt, or similar nuisances resulting from earthwork operations.

I. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

3.3 EXAMINATION

A. Examine conditions of work in place before beginning Work; report defects.

B. Report existence of hazardous materials or unsafe structural conditions.

3.4 PREPARATION

A. Scheduling:
   1. General: Coordinate and schedule demolition work as required by Owner and as necessary to facilitate construction progress.

B. Hazardous Materials:
   1. General: Identify chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations, and notify such jurisdictional agencies as may be required. Collect and legally dispose of such materials at official disposal locations away from the site.
   2. Asbestos: If asbestos or materials containing asbestos are encountered, stop work immediately and contact Owner. Do not proceed with demolition until directed by Owner.

C. Utility and Service Termination:
   1. Locate and identify existing utility, service, and irrigation system components affected by Work of this Contract. Review existing record Drawings, conduct site investigations, contact Underground Service Alert and other qualified cable/pipe/line locator services, and implement all other means necessary to define the location of underground systems.
   2. Prior to beginning any demolition, properly disconnect all water, gas, and electrical power supply at appropriate disconnect locations. Obtain all necessary releases and approvals from serving utility companies.
   3. Prior to demolition or disconnect, obtain Owner's approval that such system does not impact facilities or systems beyond the extent of this Contract.
   4. Mark location of disconnected systems. Identify and indicate stub-out locations on Project record documents.

D. Verify that existing plant life and features designated to remain are tagged or identified.
   1. Architect will mark the features, trees, and shrubs to remain within the construction area. Contractor shall not commence clearing and grubbing operations until authorized by Owner and all protective measures are in place.

E. Coordinate the time and duration of all system disconnects with Owner.

3.5 DEMOLITION

A. General Requirements:
   1. Clear areas required for access to site and execution of Work, including pavement, structures, foundations, vegetation, trash, and debris.
   2. Coordinate with Owner the time of day and route to remove demolished materials from premises.
   3. Remove demolished materials from site as work progresses. Upon completion of work, leave areas of work in clean condition.
   4. Remove all buried debris, rubble, trash, or other material not deemed suitable by the geotechnical Engineer.
   5. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with specified fill material.

B. Fixture and Equipment Removal:

1. Remove existing fixtures and equipment as identified and shown on Drawings and required by Architect.
2. Verify all service connections to fixtures and equipment designated for removal have been properly disconnected.
3. Remove all conductors from conduit at all abandoned circuits.

3.6 UTILITY AND BUILDING SERVICES REMOVAL AND RE-INSTALLATION

A. Where crossing paths and potential points of interference with existing utility services are shown or can be reasonably inferred from surface conditions or evidence of subsurface systems, such as meter boxes, vaults, relief vents, cleanouts, and similar components:
   1. Review all Contract Documents showing crossing paths and potential points of interference.
   2. Pot-hole or determine by other means the accurate depth and location of such utilities.
   3. Incorporate all costs required to complete work under this Contract, including additional trenching, re-routing of existing and new utilities, and all means necessary to construct work under this Contract.
   4. No additional cost to Owner will be allowed for work necessary to accommodate utility conflicts where such crossing paths are shown on Contract Drawings or can be reasonably inferred from surface conditions or components.

B. Remove all conductors from conduit at all abandoned electrical circuits.

C. Seal off ends of all piping, drains, and other components as directed by Architect and serving utility.

D. Where necessary to maintain service to existing utility and building systems, relocate or redirect all conduit and conductors, piping, drains, and associated system components:
   1. Re-circuit all electrical as required.
   2. Re-circuit all landscape irrigation valving and control systems as required.
   3. Temporarily terminate landscape system components in approved boxes or with approved caps, suitable for re-connection or extension.
   4. Extend or otherwise modify all site drainage systems, including catch basins, drain inlets, and piping. Fine grade to maintain proper drainage flow pattern to drains.

E. Demolish structure in an orderly and careful manner:
   1. Use of explosives prohibited.

3.7 SITE PAVEMENT REMOVAL

A. Remove sidewalk and curb where required for new construction as specified and as indicated on the Drawings:
   1. Remove all paving by saw-cutting.
   2. Remove concrete paving and curbing at locations shown on Drawings. Locate closest adjacent expansion or weakened plane joint to define start of removal or saw-cutting.

B. Remove asphalt concrete paving areas where required for new construction as specified and as indicated on the Drawings:
   1. Remove all paving by saw-cutting.
   2. Remove paving assembly as required to expose subgrade.

3.8 LANDSCAPE AND IRRIGATION SYSTEMS DEMOLITION AND RENOVATION

A. Clearing, Grubbing, and Planting Demolition:
   1. Remove grass and grass roots to a minimum depth of two inches (2”) below existing

grade.

2. Remove all shrubs, plants, and other vegetation within the area of the work unless designated to remain. Grub and remove all roots of all vegetation to a depth of 24 inches below existing grade.
3. Remove only those trees that are specifically designated for removal, or as shown on the Drawings, within the construction area. Remove all stumps. Remove root ball and root systems larger than one inch (1") in diameter to a depth of two feet (2') below existing or finished grades, whichever is lower, and a minimum of five feet (5') beyond the edge of paving, structure, wall, or walkway.
4. Hand cut existing tree roots over one inch (1") in diameter as necessary for trenching or other new construction. Apply multiple coats of emulsified asphalt sealant especially made for horticultural use on cut or damaged plant tissues to cut faces and adjacent surfaces. Cover exposed roots with wet burlap to prevent roots from dying out until backfilling is complete.
5. Disking and mixing of vegetation, trash, debris, and other deleterious materials with surface soils prior to grading is not permitted.
6. Remove all buried debris, organic material, rubble, trash, or other material not deemed suitable by the geotechnical Engineer.
7. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with fill material in compliance with Section 31 00 00: Earthwork.
8. Selected equipment of such sizes and capacities that the existing environment is disturbed as little as possible, and to afford ease of mobility within limited and relatively confined work areas. Make every effort to preserve the topography in its natural state.
9. Keep drains, catch basins, surface drainage courses, and related drainage system components clear of debris and construction materials.
10. Remove irrigation piping and appurtenances as necessary within area of work, unless noted otherwise to remain. Replace irrigation piping and appurtenances to irrigate new and/or existing landscaping. Contractor shall be responsible for temporary landscape irrigation until such time that irrigation system is restored and operational.

3.9 DISPOSAL

A. Demolished materials become property of the Contractor and shall be removed from premises, except those items specifically listed to be retained by Owner.

B. Dispose of all demolished material, trash, debris, and other materials not used in the work in accordance with the regulations of jurisdictional authority.

C. It is required that all materials that are of a recyclable nature, be transported to a suitable legal recycling facility instead of a dump or refuse facility (unless they are one-in-the same).

D. Burning and Burying of Materials: **Not allowed**.

E. Haul Routes:
   1. Obtain permits as required by jurisdictional agencies. Establish haul routes in advance; post flagmen for the safety of the public and workmen.
   2. Keep streets free of mud, rubbish, etc. Assume responsibility for damage resulting from hauling operations; hold Owner free of liability in connection therewith.

F. Remove demolished materials and debris from site on a daily basis.

3.10 CLEANING

A. Upon completion of work of this Section, promptly remove from the working area all scraps and debris.

B. Clean excess material from the surface of all remaining paved surfaces and utility structures.

C. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION - 02 41 00

SECTION 02 41 13 | SELECTIVE SITE DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Furnishing all labor, materials, and equipment necessary for demolition, dismantling, cutting, and alterations as indicated, specified, and required for completion of the Project, as applicable. Includes items such as the following:
      a. Protecting existing work to remain.
      b. Cleaning soiled materials that are to remain.
      c. Disconnecting and capping utilities.
      d. Removing debris and equipment.
      e. Removal of items indicated on Drawings.
      f. Salvageable items to be retained by Owner as indicated on Drawings and during the pre-construction job walk.

B. Related Sections:
   1. Section 31 22 00: Grading.

1.3 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain Owner's property.

B. Remove and Salvage: Items indicated to be removed and salvaged remain Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to location as directed by Owner's representative.

C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse. Store and protect against damage. Reinstall items in locations indicated.

D. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by Owner's representative, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

E. Replace: Remove and legally dispose of existing item(s) indicated and install new like item(s) that conform to Project Specifications.

1.4 QUALITY ASSURANCE

A. Comply with the following:
   1. Applicable codes, ordinances, and regulations of local, municipal, state, and federal authorities having jurisdiction.
   2. Comply strictly to Rule 403 Fugitive Dust, Sacramento Air Quality Management District.
   3. Obtain necessary permits and notices; post where required.

4. Comply with safety requirements of the local fire department.
5. Comply with ANSI A10.6.

B. Notify affected utility companies before starting Work and comply with their requirements.

C. Carefully perform demolition work by skilled workers experienced in building demolition procedures, using appropriate tools and equipment. Perform work, at all times, under the direct supervision of a supervisor approved by Owner's inspector.

D. Coordinate demolition with other trades to ensure correct sequence, limits, and methods of proposed demolition. Schedule work to create least possible inconvenience to the public and to facility operations.

E. Pre-Demolition:
1. Conduct conference at Project site seven (7) days prior to scheduled installation:
   a. Conference agenda shall include review and discussion of requirements of authorities having jurisdiction, instructions and requirements of serving utilities, sequencing and interface considerations, and Project conditions.
   b. Conference shall be attended by supervisory and quality control personnel of Contractor and all subcontractors performing this and directly related work. Submit minutes of meeting to design builder's representative for Project record purposes.

F. Ownership of Materials:
1. Except for items or materials indicated to be reused, salvaged, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from the site with further disposition at Contractor's option.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Items scheduled for salvage by Owner shall be delivered to a location designated by Owner's authorized representative. Items shall be cleaned, packaged, and labeled for storage.

B. Items scheduled for reuse shall be stored onsite and protected from damage, soiling, and theft.

C. Follow legal requirement to hand expose to the point of no conflict 24 inches on either side of the underground facility, so its exact location is known before using power equipment.

D. Note: If caught digging without a Dig Alert ticket, a fine of up to fifty thousand dollars ($50,000.00) may be assessed per California government code 4216.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: The onsite shallow sands encountered in the borings are considered non-expansive and following proper processing should be suitable for backfilling purposes provided they are free of deleterious materials and oversize particles. Import materials may also be used for backfilling. The onsite or imported materials being used for backfilling should be non-expansive (EI less than 20), and should be in compliance with the specifications of the Project's soils report.

B. Backfill and Native Fill Materials: The onsite soils may be reused as compacted engineered fill provided they comply with the requirements of satisfactory soil materials as described

above.

C. Borrow/Imported Fill Material: Soil excavated from site or imported conforming to requirements for fill material shall conform to Section 31 22 00: Grading.

D. Engineered Fill: Satisfactory soil materials/borrow fill material, as described above, placed in lifts no greater than eight inches (8") thick (loose measurements) and each lift moisture conditioned. All engineered fill should be densified to a minimum relative compaction of 90 percent per ASTM D1557.

E. Backfill Material for Trenches: The onsite soils have been determined to be suitable for being used for backfilling purposes in trenches. Utility trenches should be backfilled with granular materials and mechanically compacted to at least 90 percent of the maximum dry density of the soils.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Drawings may not indicate in detail all demolition work to be carried out. Carefully examine existing conditions to determine full extent of demolition required. All utilities, whether shown on Drawings or not, to be capped at the property line U.N.O.

B. Repair damage due to demolition activities to existing improvements to remain at no additional cost to Owner. Repair or replace as directed by Owner's inspector.

C. Take measures to avoid excessive damage from inadequate or improper means and methods, or improper shoring, bracing, or support. Repair or replace any resulting damage at no additional cost to Owner as directed by Owner's inspector.

D. If conditions are encountered that vary from those indicated, notify Owner's inspector for instructions prior to proceeding. Owner assumes no responsibility for actual condition of structures to be demolished.

E. Inform Owner immediately upon discovery of asbestos products, radioactive materials, toxic wastes, or other hazardous materials. Do not remove hazardous materials without Owner authorization.

F. Adjacent roadways/passageways:
   1. Maintain fire department access through all phases of the Project.
   2. Obstruction of streets, walks, or other adjacent facilities will not be allowed.

3.2 DIG ALERT NOTIFICATION

A. Before any excavation in or near the public right-of-way, Contractor must contact the Underground Service Alert or USA-North (Dig Alert) at 811 or 800-642-2444 for information on buried utilities and pipelines.

B. Delineation of the proposed excavation site is mandatory. Mark the area to be excavated with water soluble or chalk based white paint on paved surfaces or with other suitable markings such as flags or stakes on unpaved areas.

C. Call at least two (2) full working days prior to digging.

D. If the members (utility companies) have facilities within the work area, they will mark them

prior to the start of excavation; if not, they will provide notice of no conflict. A different color is used for each utility type (electricity is marked in red, gas in yellow, water in blue, sewer in green, telephone and cable TV in orange).

3.3 GENERAL

A. Protection:
1. Do not begin demolition until safety partitions, barricades, warning signs, and other forms of protection are installed.
2. Provide safeguards, including warning signs, lights and barricades, for protection of occupants and the general public during demolition.
3. Provide and maintain fire extinguishers. Comply with requirements of governing authorities.
4. Maintain existing utilities that are to remain in service and protect from damage during operations.

B. Safety: If at any time safety of existing construction appears to be endangered, take immediate measures to correct such conditions; cease operations and immediately notify Owner's inspector. Do not resume demolition until directed by Owner's inspector.

C. Noise and Dust Abatement: Exercise all reasonable and necessary means to abate dust, dirt rising, and undue noise. Perform necessary sprinkling and wetting of construction site to allay dust as required by applicable codes and ordinances.

D. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations. Do not create hazardous or objectionable conditions, such as flooding and pollution, when using water.

E. Water for Dust Control: Contractor shall obtain and pay for all water required for dust control operations. This may include, but is not limited to, payment of deposits to utility for construction meter, and payment of all monthly service and water charges. Construction meter shall be in place throughout construction period unless alternative arrangements are made with the City of Parlier to provide construction water for all purposes. Contractor shall be aware of water moratoriums and restrictions, and shall immediately advise Owner of effects on construction schedules.

F. An eight-foot-high (8') chain link fence and gates shall be erected prior to any demolition operations at the construction limits perimeter. Coordinate the exact location with Owner.

G. Debris Removal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

H. Progress Cleaning: Clean adjacent buildings and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before start of demolition.

I. Where performing contracted scope of work requires coring of existing concrete, brick masonry, or CMU structures (including walls, floors, and sitework), Contractor shall obtain and document means of verifying existence and location of embedded steel reinforcing materials within said concrete, brick, and CMU assemblies. Contractor shall locate reinforcement by means of noninvasive technology, such as X-ray photography, for the purposes of protecting said reinforcement in place and shall not damage any reinforcement materials (rebar, etc.) unless specifically detailed as such and approved by the authority

having jurisdiction.

J. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

K. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

L. Contractor shall provide temporary weather protection during interval between demolition and removal of existing construction, on exterior surfaces, and new construction to ensure that no water leakage or damage occurs to structure or interior areas.

M. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished.

N. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

O. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials if exposed; repaired surfaces shall match existing adjacent surface color finish and texture:
   1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.

P. Disposal: Promptly dispose of demolished materials; do not allow demolished materials to accumulate onsite.

3.4 PREPARATION

A. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as necessary.

B. Utilities:
   1. The Drawings do not purport to show all below-grade conditions and objects on the site. Contractor shall perform field investigations as necessary to establish location of underground utility services and other features affecting earthwork.
   2. Mark location of underground utilities on asphalt pavement with paint.
   3. Disconnect and cap utility services; comply with requirement of governing authorities.
   4. Contractor shall arrange and notify utility company in advance of date and time when service needs to bedisconnected.
   5. Do not commence demolition operations until associated disconnections have been completed.
   6. Should utilities and other below-grade conditions be encountered that adversely affect the Work, discontinue affected Work and notify Owner's representative and Architect and request direction. Unforeseen conditions will be resolved in accordance with provisions of the General Conditions of the Contract.
   7. Should a utility line or structure be damaged, immediately notify the responsible utility company or agency and notify Owner’s representative and Architect:
      a. Repair or replace all damaged utility lines and structures as directed by the responsible utility company oragency.
      b. Repair or replacement of damaged utility lines and structures whose location or existence has been made known to Contractor shall be at no change in the

Contract Time and Contract price.

C. Structures to be demolished shall be inspected for hazardous materials; such materials shall be removed and disposed of before general demolition begins.

D. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner's representative and authority having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner's representative and authority having jurisdiction.

3.5 EXPLOSIVES

A. Explosives: Use of explosives will not be permitted.

3.6 DEMOLITION

A. Demolition, General:
1. With certain exceptions, Contractor shall raze, remove, and dispose of all buildings and foundations, structures, paving, fences, and other obstructions that lie wholly or partially within the construction limits identified on Drawings. The exceptions are utility-owned equipment and any other items the Owner/Documents may direct Contractor to leave intact or re-use onsite. Cease demolition immediately if adjacent structures appear to be in danger.
2. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
3. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner's representative and authority having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
4. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area:
   a. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
   b. Protect existing site improvements, appurtenances, and landscaping to remain.
   c. Completely remove below-grade construction, including foundation walls and footings.
5. Filling below-grade areas: Completely fill below-grade areas and voids resulting from demolition of buildings and pavement with soil materials according to requirements specified in Section 31 22 00: Grading.
6. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.
7. Unless otherwise indicated on the Plans, remove all demolished material from the site and dispose of at approved disposal sites. Comply with all requirements for recycling of demolished material as called for in Division 01 of this Specification. Contractor shall obtain necessary permits for the transportation of material from the site.

3.7 REMOVAL OF EXISTING PLUMBING AND ELECTRICAL EQUIPMENT AND SERVICES

A. Remove existing plumbing and electrical equipment fixtures and services not indicated for reuse and not necessary for completion of Work. Remove abandoned lines and cap unused portions of existing lines. Contractor is responsible for completely surveying the site and locating all existing utilities, above and below ground, before contracting to perform the work.

B. Asbestos – Cement (A-C) Pipe Removal and Disposal: The Plans for the Project may

indicate that existing asbestos-cement pipe is to be removed from the ground. Where so indicated, Contractor shall excavate with care, expose the pipeline, and remove the A-C pipe to the nearest joint. Should the Plans not call out the removal of the A-C pipe and A-C pipe is encountered, Contractor shall obtain approval from Owner as to whether or not the A-C pipe is to be removed or can be left in place. Cutting of the pipe shall only be done if there is no other way to expose the length of pipe to the nearest joint that be separated and Owner approves the cutting of the pipe. Cutting of the pipe shall be done with a mechanical saw with a pressure water source to dampen the pipe and the dust from the cutting. To remove a coupling, the coupling may have to be broken in the trench. The pipe once removed from the trench may be broken for handling. The breaking shall be done within a plastic bagging or sheeting material to minimize the release of asbestos fibers into the atmosphere. Once removed and broken, if necessary, the A-C material shall be bagged and disposed of legally with Owner being given a copy of all Contractor paperwork as to the legal disposal of the material. If the A-C pipe section(s) are removed intact, the pipe can be removed by Contractor from the Project site and become the property and responsibility of Contractor.

3.8 CLEANING

A. Clean existing materials to remain, using appropriate tools and materials.

B. Protect adjacent materials and equipment during cleaning operations.

3.9 RESTORATION

A. Restoration of Site Finishes:
   1. Concrete paving: Where it is necessary to excavate a trench across, make a cut in concrete paved areas, cut concrete with cutting saw, full depth of paving.
   2. Bituminous paving: Where it is necessary to excavate a trench across, make a cut in bituminous paved areas, either first score paving with a concrete cutting saw, in neat straight lines, prior to removing paving, or make straight cuts with pneumatic spade.
   3. Restoration of paving: Restore all paved areas to their original condition using material of like type and quality as the removed paving. Paving in public ways shall conform to applicable requirements of authorities having jurisdiction. Repaired surfaces shall match existing adjacent paving except minimum depth shall be 3-1/2 inches where existing paving is less than 3-1/2 inches.
   4. Restoration of landscape planting: Restore soil and plant materials to match original condition, including additional topsoil, topsoil grading and preparation, new plant materials, and plant maintenance during establishment period.

3.10 MAINTENANCE

A. Install and maintain all erosion control devices, including sandbag and gravel bag dikes, silt fences, de-silting basins, inlet barricades, vehicle wash traps, and other features called for in the Storm Water Pollution Prevention Plan and Temporary Erosion Control Plans.

3.11 CLEAN-UP/DISPOSAL

A. Coordinate building access with the Owner’s inspector. Review and schedule waste storage and removal, include truck access to site.

B. Debris shall be dampened by fog water spray prior to transporting by truck.

C. Debris pick-up area shall be kept broom-clean and shall be washed daily with clean water.

D. Remove waste and debris other than items to be salvaged. Turn over salvaged items to

Owner, or store and protect for reuse where scheduled. Continuously clean-up and remove items as demolition work progresses. Do not allow waste and debris to accumulate in building or onsite.

END OF SECTION - 02 41 13

SECTION 03 00 00 | CONCRETE WORK - GENERAL

PART 1 GENERAL

1.1 APPLICABLE SECTION

A. Submit Shop Drawings, Product Data, Mill Certificates and Samples required by other portions of Contract Documents. The requirements/provisions of the General and Supplementary Conditions and Division 1 Specification Section shall apply to this section.

1.2 DESCRIPTION OF WORK

A. The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary for, required in connection with or properly incidental to furnishing, and installing concrete work as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom, except as hereinafter specifically excluded.

B. Work Included:

1. All formwork, including any special forms necessary to produce architectural details and/or to accommodate the work of others and removal of forms.
2. All concrete reinforcement, placement, bending and forming thereof.
3. All concrete and cement finishing; all surface treatment and curing, including non-slip finishes and color work.
4. Installation of all reglets, bolts, anchors, cans, sleeves, column anchor bolts, etc., whether furnished under this section or by others (except cans and sleeves required under the Electrical and Mechanical Divisions).
5. The furnishing of all items required to be or shown on the drawings as embedded in concrete, which are not specifically required under other sections.
6. Setting headers and screeds. Curing and protecting concrete.
7. Grouting of column bases.
8. Inserts, sleeves, cans, etc. required under the Plumbing, Mechanical, and Electrical Divisions 22, 23, and 26 respectively.
9. Routing out cracks and sawcutting control joints as required by waterproofing.

PART 2 PRODUCTS - SEE OTHER PORTIONS OF SPECIFICATIONS.

PART 3 EXECUTION

3.1 DEFECTIVE WORK

A. General: Work considered to be defective may be ordered by the Architect to be replaced in which case the Contractor shall remove the defective work at his expense. Work considered to be defective shall include, but not be limited to, the following:

Reinforcing:

1. Kinks and bends therein which are not scheduled or indicated on the drawings; reinforcing improperly placed, or previously heated, or excessively cold worked reinforcing.

Concrete:

2. Concrete in which defective or inadequate reinforcing steel has been placed.
3. Concrete incorrectly formed or not conforming to details and dimensions on the drawings or with the intent of these documents, or concrete the surfaces of which are out of plumb or level.

4. Concrete below specified strength.
5. Concrete not meeting the maximum allowable drying shrinkage requirements.
6. Concrete containing wood, cloth, or other foreign matter, rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the drawings.

3.2 CORRECTION OF DEFECTIVE WORK

A. The Contractor shall, at his expense, make all such corrections and alleviation measures as directed by the Engineer.
B. Concrete work containing rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the drawings, shall be chipped out until all unconsolidated material is removed.
C. Secure approval of chipped-out areas before patching. Patch per ACI 301.

END OF SECTION 03 00 00

SECTION 03 10 00 | CONCRETE FORMWORK

PART 1 GENERAL

1.1 APPLICABLE SECTION

A. The requirements/provisions of the General and Supplementary Conditions and Division 1 Specification Section shall apply to this section.

1.2 DESCRIPTION OF WORK

A. The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary for, required in connection with or properly incidental to furnishing, installing, and removing form work as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom, except as hereinafter specifically excluded.

B. Work Included:
1. Design of Formwork, Shoring and Falsework
2. Construction and removal of all forms.
3. Installation of items furnished under other sections but indicated therein to be installed under this section.
4. Accuracy of installation is responsibility of section furnishing item.

C. Related Work Specified Elsewhere:
1. Concrete Reinforcement; Section 03 20 00
2. Cast-in-Place concrete; Section 03 30 00

1.3 REFERENCE STANDARDS

A. The following is a list of Reference Standards referred to in this portion of the Specification:
1. W.C.L.I.B.; "Standard Grading and Dressing Rules No. 17"
2. American Concrete Institute Standard ACI 347 "Guide to Formwork for Concrete" and ACI 318 "Building Code Requirements for Reinforced Concrete", Latest edition.
3. California Building Code, current governing edition.
4. American Plywood Association, "U.S. Product Standard PS1-19"

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with all Federal, State and Local Codes and Safety Regulations. In addition, comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.
1. California Building Code, current governing edition.
2. ACI-347 "Guide to Formwork for Concrete", current edition.
3. State of California Department of Transportation Standard Specifications, current governing edition.

B. Qualifications: Design and detailing of formwork shall be by a person experienced in the design of formwork and familiar with the principles of engineering mechanics. Design and detailing of formwork over 12' in height, shoring, and falsework shall be prepared by a

registered Civil/Structural Engineer of the State of California.

1.5 SUBMITTALS

A. General Requirements
   1. Submittals shall be made to Architect in accordance with the requirements of Division 1, General Requirements of these specifications.
   2. Construction, and fabrication or ordering of materials for formwork shall not begin until Contractor has received submittals reviewed by Architect governing all aspects of the intended work as required in these specifications.

B. Shop Drawings:
   1. Formwork: Submit shop drawings for fabrication and erection of forms for portions of the concrete surfaces, as indicated below:
      a. Formwork over 12' in height
      b. Show general construction of forms including size of members, bracing, jointing, special form joint or reveals, location and pattern of form tie placement, and other items that affect the structural integrity of formwork or exposed concrete visually. Formwork over 12' in height shall be designed, detailed, and stamped by a registered Civil/Structural Engineer of the State of California.
   2. Falsework and Shoring Shop Drawings: The Contractor shall submit shop drawings and calculations of any required falsework or shoring. Shop drawings and calculations shall be prepared, stamped, and signed by a registered Civil/Structural Engineer of the State of California. Shop drawings and calculations shall be prepared in accordance with the requirements of the State of California Department of Transportation Standard Specifications, Section 51-1.06A, “Falsework Design and Drawings.”

1.6 SEQUENCING AND SCHEDULING

A. The Contractor shall obtain information and instructions from other trades and suppliers in ample time to schedule and coordinate the installation of items furnished by them to be embedded in concrete.

PART 2 PRODUCTS

2.1 FORMS

A. Plywood shall be 5/8" Exterior "B.B." Plyform Class I. Each sheet shall be grade stamped with an APA stamp.

B. Sheathing shall be Douglas Fir "Standard" grade per Grading Rules #17, W.C.L.I.B., Paragraph 118-c. 1x6 shiplap S4S.

C. Hardboard shall be 1/8" tempered.

2.2 SPREADERS

A. Spreaders shall be of metal type that will give positive tying and accurate spreading.

2.3 STUDS, WALES AND SHORING

A. Studs, wales, and shoring shall be Douglas Fir "Construction" grade per Grading Rules #17, W.C.L.I.B. Paragraph 122-b or "No. 2" grade, Paragraph 123-c.

2.4 MANUFACTURED ASSEMBLIES

A. Manufactured assemblies may be used as forms provided that maximum loadings and deflections used on jacks, brackets, columns, joists and other manufacturer devices does not exceed the manufacturer's recommendations.

PART 3 EXECUTION

3.1 GENERAL

A. Furnish and install all forms, clamps, accessories, etc., required for all poured-in-place concrete below grade and unexposed portions above grade. Where sides of excavations have been cut neat and accurate to size for pouring of concrete directly against the excavation, forms for footings will not be required. Where the face of excavation is more than 3 inches wider than the specified width formwork shall be used.

B. Furnish and install all forms, clamps, sealer, accessories, etc., required for all poured-in-place concrete above grade that will be exposed.

C. Provide crack control and keyed cold joint forms.

3.2 DESIGN AND CONSTRUCTION OF FORMWORK

A. Forms shall be constructed of sound material, of the correct shape and dimension, mortar tight, and of sufficient strength, and so braced and tied together that the movement of equipment, men, materials, or placing and vibrating the concrete will not throw them out of line or position. Construct so that they may be easily removed without damage to the concrete. Any movement or bellying of forms during construction shall be considered just cause for their removal and, in addition, the concrete work so affected. All formed joints on concrete surfaces to be exposed shall be taped and shall align so joints will not be apparent on the concrete surfaces. All dirt, chips, sawdust and other foreign matter shall be completely removed before concrete is placed.

B. Before concrete is placed in forms, all inside surfaces of the forms shall be thoroughly coated with an approved form sealer. The form sealer shall be of high penetrating quality leaving no film on the surface of the forms that can be absorbed by the concrete.

C. Form supports shall be placed on adequate foundations and have sufficient strength and bracing to prevent settlement or distortion from the weight of the concrete or other cause. Support shall rest on double wedged shim, or other approved means, so that the forms will be maintained at the proper grade.

D. Form Ties: Bolts, rods, or other approved devices shall be used for internal form ties and shall be of sufficient quantities to prevent spreading of the forms. The ties shall be placed at least 1 inch away from the finished surface of the concrete. The use of ties consisting of twisted wire loop will not be permitted. Bolts and rods that are to be completely withdrawn shall be coated with grease.

E. Form Stakes: Where used, form stakes shall be smooth metal, coated as required to allow for removal from hardened concrete. Wood form stakes are not permitted. Fill voids left by

form stake removal with non-shrink grout.

3.3 PLUMBING, LEVELING, REPAIRING AND MAINTAINING FORMS

A. Before concrete is placed in any form, the horizontal and vertical position of the form shall be carefully verified and all inaccuracies corrected. All wedging and bracing shall be completed in advance of placing of concrete.

B. Boards or other form materials that have been damaged or checked or warped prior to placing of concrete shall be removed from the forms and replaced with approved materials or otherwise corrected to the satisfaction of the engineer.

C. Assign a sufficient number of men to keep watch on and maintain the forms during placing of concrete. Satisfactorily remedy any displacement or looseness of forms or reinforcement before placing of concrete. No form shall be moved or altered except as may be specifically directed.

D. Wallforms shall be set to account for movement of post-tensioned slabs that will occur due to long term shortening of slabs. The Engineer will establish the offsets at each level after the Contractor has submitted a detailed pour schedule.

3.4 FIELD QUALITY CONTROL

A. The Contractor shall hire the Engineer responsible for the design of formwork over 12' in height, falsework or shoring to inspect the work as detailed on the reviewed shop drawings.

B. The Engineer responsible for design of formwork over 12' in height, falsework or shoring shall write a letter to the Architect certifying construction is in accordance with the reviewed shop drawings and meets his/her approval prior to the Contractor placing any concrete.

C. The Contractor shall verify accuracy of items, furnished under other sections of these specifications and installed under this section.

3.5 REMOVAL OF FORMWORK, FALSEWORK AND SHORING

A. Formwork, falsework, and shoring shall not be removed until the concrete members have acquired sufficient strength to support their weight and the loads to be superimposed thereon safely.

B. The contractor is solely responsible for the design, installation, and removal of temporary bracing and construction supports required to complete the project. No portion of the structure shall be considered to be self supporting until the entire vertical and lateral load resisting system is in place.

C. Vertical forms shall remain on columns, walls, pilasters, etc., for at least seven (7) days, and formwork over 12' in height shall not be removed until the Engineer responsible for design of the formwork has approved removal.

D. Shoring and falsework under beams, girders, slabs, etc. shall remain in place for at least 14 days and until the Engineer responsible for design of shoring and falsework has approved removal.

E. The Contractor shall request to have field cured compression test specimens taken for any

concrete where it is planned to remove formwork, falsework, or shoring sooner than indicated above.

F. In removing plywood forms, no metal pinch bars shall be used and special care to be taken in stripping. Start at top edge or vertical corner where it is possible to insert wooden wedges. Wedging shall be done gradually and shall be accompanied by light tapping of the plywood panels to crack them loose. Do not remove forms with a single jerk after it has been started at one end.

G. Forms shall be left in place as long as possible to permit shrinkage away from concrete and plywood forms shall be left in place until all other forms around are stripped and until there is no danger of damaging the architectural concrete due to other work in the vicinity.

H. Nothing herein shall be construed as relieving the contractor of any responsibility of the safety of the structure.

I. After stripping, properly protect all concrete to be exposed in the finish work from damage with boards and building paper to prevent staining, spoiled edges, chips, etc.

J. Whenever the formwork is removed during the curing period, the exposed concrete shall be cured by one of the methods specified in Section 03300.

3.6 CLEAN UP

A. Clean up shall be per special conditions. Failure to perform clean up within 24 hours notice by the Architect shall be considered adequate grounds for having the work done by others at the contractor's expense.

END OF SECTION - 03 10 00

SECTION 03 20 00 REINFORCING STEEL

PART 1 GENERAL

1.1 APPLICABLE SECTION

A. The requirements/provisions of the General and Supplementary Conditions and Division 1 Specification Section shall apply to this section.

1.2 DESCRIPTION OF WORK

A. The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary for, required in connection with or properly incidental to furnishing and installing all reinforcing bars, ties, spacing devices, inserts, and all other material required to complete installation, as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom.

B. Work Included:
1. Fabricating and installing all reinforcing steel for cast in place concrete and unit masonry.
2. Fabrication and installing all reinforcing steel for shotcrete.
3. Fabrication of reinforcing steel dowels to be embedded in existing concrete and existing masonry.
4. Fabrication and installing all reinforcing steel for tilt-up precast concrete.

C. Related Work Specified Elsewhere:
1. Concrete Formwork; Section 03 10 00
2. Cast-in-Place Concrete; Section 03 30 00
3. Post Installed Anchors; Section 03 70 10

1.3 REFERENCE STANDARDS

A. The following is a list of Reference Standards referred to in this portion of the specifications:
1. ASTM A184/A184M, Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
2. ASTM A615, "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement".
3. ASTM A706, "Specification for Deformed and Low-Alloy Steel Bars for Concrete Reinforcement".
4. ASTM A970, “Specification for Headed Steel Bars for Concrete Reinforcement”.
5. ASTM A1064, "Specification for Carbon Steel Wire and Welded Wire Reinforcement, Plan and Deformed, for Concrete".

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with all applicable Federal, State and Local Code and Safety Regulations. In addition, comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
1. ACI 315R, "Guide to Presenting Reinforcing Steel Design Details", latest edition.
2. ACI 318, "Building Code Requirements for Structural Concrete", latest edition.
3. AWS D1.4, "Structural Welding Code- Steel Reinforcing Bars", latest edition.

B. Mill Certificates: The Contractor shall provide Mill Certificates for reinforcing steel in accordance with the requirements of Part 1.5,, "Submittals" of this specification section. When Mill Certificates cannot be provided, laboratory test reports shall be provided in accordance with the requirements of Part 1.5,, "Submittals" of this specification section.

C. Sampling, Testing, and Inspection:
   1. General
      a. All materials and work shall be subject to inspection at the mill, the fabrication shop, and at the building site. Material or workmanship not complying fully with the drawings, and/or specifications will be rejected.
      b. If the Owner's agent, through oversight or otherwise, has accepted material or work which is defective or contrary to specifications, this material or work, regardless of state of completion, may be rejected.
   2. Owner: The Owner shall employ an independent testing laboratory as the Owner's agent to perform the sampling, testing and inspections shown on the contract drawings, and submit certified test results.
   3. Contractor:
      a. The Contractor shall cooperate with and notify Owner's agent at least 24 hours in advance of inspections required and shall provide samples, test pieces, and facilities for inspection without extra charge.
      b. The Contractor shall identify each lot of fabricated reinforcing steel to be shipped to the site by assigning an individual lot number that identifies steel by heat number and shall be tagged in such a manner that each such lot can be accurately identified at the job site.
      c. The Contractor shall remove all unidentified reinforcing steel, anchorage assemblies and bar couplers received at the site.

1.5 SUBMITTALS

A. General Requirements:
   1. Submittals shall be made to Architect in accordance with the requirements of Division 1, General Requirements of these specifications.
   2. Construction, fabrication, or ordering of materials shall not begin until Contractor has received submittals reviewed by Architect governing all aspects of the intended work.

B. Shop Drawings:
   1. Shop Drawings shall be submitted that show diagrammatic elevations of all walls, footings, columns, beams, slabs, etc., at a scale sufficiently large to show clearly the positions and erection marks of reinforcing bars, their dowels, and splices.
   2. Use same bar marks on diagrammatic elevations as used on the bar schedule.
   3. Shop drawings shall also show details for congested areas and connections.
   4. Shop Drawings used in field must be reviewed copies.
   5. Contract drawings shall not be reproduced in whole or in part. Contract drawings modified into shop drawings will be returned without review.
   6. Revised submittals shall have clear indications of revised or new information. Clouding is an acceptable form of identification.

C. Product Data: Manufacturer's catalog sheets including instructions for use and description of application shall be provided on each of the following items intended for use on project:
   1. Mechanical anchorage devices for butt splices.

D. Mill Certificates:
   1. The Contractor shall provide Mill Certificates for each size of bar for each heat to be used on project.
   2. Mill Certificates shall include name of mill, date of rolling, date of shipping to fabricator and shall be signed by fabricator certifying that each material complies with or exceeds the specified requirements. A Mill Certificate shall be furnished with each lot of material delivered to the project and the lot shall be clearly identified in the Certificate.
   3. When Mill Certificates cannot be provided, the Contractor shall hire a professional testing laboratory to verify compliance and provide laboratory test reports. The Contractor shall pay for the cost of testing.

E. Laboratory Test Reports:
   1. Laboratory test reports shall show the name of testing agency; date of testing, types of tests performed and shall be signed by a principal of the testing agency who is a registered Civil Engineer in the State of California.
   2. When required by other portions of these specifications, laboratory test reports shall be submitted for each size of bar tested for each heat to show compliance with appropriate ASTM Standards and these specifications.

1.6 STORAGE OF MATERIALS

A. Store reinforcement during fabrication and at site to avoid excessive rusting or coating with grease, oil, dirt, or other objectionable materials.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate work with all trades so as not to interfere with the work of other trades. Bring interferences between trades to Architect's attention and resolve before any concrete is placed.

PART 2 PRODUCTS

2.1 REINFORCING BARS

A. Bars for reinforcement not noted above shall conform to the requirements of ASTM A615, Grade 60. ASTM A615 Grade 60 requires 80,0000 psi minimum tensile strength with 1.10 minimum ratio of actual tensile strength to actual yield strength based on mill testing.

2.2 WIRE

A. All wire for concrete reinforcement shall conform to ASTM A1064.

B. Holding wire for fusion welding shall conform to ASTM A1064.

2.3 OTHER MATERIALS

A. All other materials, not specifically described by these specifications but required for complete and proper placement of reinforcement shall be new, first quality of their respective kinds, and subject to the approval of the Architect.

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

A. Prior to all work of the section, carefully inspect the installed work of other trades and verify that all work is sufficiently complete to permit the start of work under this section and that the completed work of this section will be in complete accordance with the original design and the reviewed shop drawings. In the event of discrepancy, immediately notify the Architect/Engineer in writing.

B. In the event conduits, pipes, inserts, sleeves, or any other items interfere with placing the reinforcement as indicated on the drawings or approved shop drawings, or as otherwise required, immediately notify the Architect/Engineer and obtain approval on procedure before placement of reinforcement is started.

3.2 FABRICATION

A. Bends for reinforcing steel shall be made in accordance with ACI 318 latest edition. Bend all bars cold. Do not field bend reinforcing steel in a manner that will injure material, cause the bars to be bent on too tight a radius, or that is not indicated as allowed on drawings or permitted by Engineer. Do not straighten bent or kinked bars for use on project without permission of Engineer. Replace bars with kinks or bends not shown on the drawings.

B. The use of fusion welding for attaching carrying wires to the foundation rebar work is acceptable with the following provisions:
   1. Fusion welding shall be to the stirrups and is not allowed to longitudinal reinforcing steel.
   2. Fusion welding of holding wires shall not occur on a bent portion of a reinforcing bar. After holding wire has been fusion welded to a reinforcing bar, that bar may not be bent where the fusion weld occurs.
   3. All reinforcing steel to be welded shall comply with ASTM A706.
   4. The welding process shall be as outlined in ASTM A1064.
   5. The contractor shall submit a complete shop welding program outlining the type of the specific fusion welding machine.
   6. Fusion welding shall have periodic special inspection of the in-plant welding, including review of the setup of the machine prior to the start of welding and testing of samples.

3.3 PLACING

A. All reinforcement shall be placed in strict conformity with the requirements of the engineering drawings, both as to location, position and spacing of members. It shall be supported and secured against displacement by the use of adequate and proper wire supporting and spacing devices, tie wires, etc. so that it will remain in its proper position in the finished structure.

B. Preserve clear space between parallel bars of not less than 1 1/2 times the nominal diameter of round bars and in no case let the clear distance be less than 1 1/2 inches nor less than 1-1/3 times the maximum size of aggregate for concrete. Bars placed in shotcrete shall have a minimum clearance between bars of 2 1/2" for No. 5 and smaller and 6 bar diameters for bars larger than No. 5.

C. Lap splices shall be contact lap splices in accordance with ACI 318 unless noted otherwise on the Contract Drawings. Bars shall be wired together at laps. Wherever possible, stagger splices in adjacent bars. Make all splices in wire fabric at least 1 1/2 meshes wide or 12", which ever is greater. When splicing in areas to receive shotcrete, lap splices shall be non-contact with at least 2" clearance between bars.

D. Butt splices shall be accomplished by mechanical anchorage devices.

3.4 CLEANING REINFORCEMENT

A. Take all means necessary to ensure that steel reinforcement, at the time concrete is placed around it, is completely free from rust, dirt, loose mill scale, oil, paint and all coatings which will destroy or reduce the bond between steel and concrete.

3.5 FIELD QUALITY CONTROL

A. Inspection: The Owner’s agent will perform the inspections shown on the contract drawings.

END OF SECTION 03 20 00

SECTION 03 30 00 | CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 APPLICABLE SECTION

A. The requirements/provisions of the General and Supplementary Conditions and Division 1 Specification Section shall apply to this section.

1.2 DESCRIPTION OF WORK

A. The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary for, required in connection with or properly incidental to furnishing, and installing cast-in-place concrete work as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom, except as hereinafter specifically excluded.

B. Work Included:
1. Design of Concrete Mixes.
2. All concrete and cement finishing; all surface treatment and curing, including non-slip finishes and color work.
3. Installation of all reglets, bolts, anchors, cans, sleeves, column anchor bolts, etc., whether furnished under this section or by others (except cans and sleeves required under the Electrical and Mechanical Divisions).
4. The furnishing of all items required to be or shown on the drawings as embedded in concrete, which are not specifically required under other sections.
5. Setting headers and screeds. Curing and protecting concrete.
6. Grouting of column bases.
7. Routing out cracks and sawcutting control joints as required by waterproofing.
8. Grouting between bearing plates, channels, etc. and bearing surfaces.
9. Drilling of existing concrete and masonry for placement of bars, dowels, and rods.
10. Grouting of bars, dowels, and rods in existing concrete and existing masonry.

C. Related Work Specified Elsewhere:
1. Concrete Formwork; Section 03 10 00
2. Reinforcing Steel; Section 03 20 00
3. Structural Steel and Miscellaneous Iron; Section 05 12 00
4. Inserts, sleeves, cans etc. required under Plumbing, Mechanical, and Electrical Divisions 22, 23, and 26 respectively.

1.3 REFERENCE STANDARDS

A. The following is a list of Reference Standards referred to in this portion of the Specification:
1. ASTM C31 " Standard Practice for Making and Curing Concrete Test Specimens in the Field"
2. ASTM C33 "Standard Specification for Concrete Aggregates "
3. ASTM C39 " Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens"
4. ASTM C42 " Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete"
5. ASTM C94 "Standard Specification for Ready Mixed Concrete"
6. ASTM C143 "Standard Test Method for Slump of Hydraulic-Cement Concrete"
7. ASTM C150 "Standard Specification for Portland Cement"
8. ASTM C157 " Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete"
9. ASTM C171 " Standard Specification for Sheet Materials for Curing Concrete"
10. ASTM C172 " Standard Practice for Sampling Freshly Mixed Concrete"

11. ASTM C173 " Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method"
12. ASTM C231 " Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method"
13. ASTM C260 " Standard Specification for Air-Entraining Admixtures for Concrete"
14. ASTM C309 " Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete"
15. ASTM C330 " Standard Specification for Lightweight Aggregates for Structural Concrete"
16. ASTM C494 " Standard Specification for Chemical Admixtures for Concrete"
17. ASTM C618 " Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete"
18. ASTM C881 " Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete"

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with all Federal, State and Local Codes and Safety Regulations. In addition, comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
   1. ASTM C94, "Specifications for Ready Mixed Concrete".
   2. ACI 117, Standard Specifications for Tolerances for Concrete Construction and Materials.
   3. ACI 121R, Quality Management System for Concrete Construction.
   4. ACI 201.2R, Guide to Durable Concrete.
   5. ACI 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
   6. ACI 214R, Recommended Practice for Evaluation of Strength Test Results in Concrete.
   7. ACI 301, Specifications for Structural Concrete.
   8. ACI 302.1R, Guide for Concrete Floor and Slab Construction.
   9. ACI 304.2R, Placing Concrete by Pumping Methods.
   10. ACI 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
   11. ACI 305R, Guide to Hot Weather Concreting.
   12. ACI 306.1, Standard Specification for Cold Weather Concreting.
   13. ACI 308R, Guide to Curing Concrete.
   14. ACI 309R, Guide for Consolidation of Concrete.
   15. ACI 311.4R, Guide for Concrete Inspection.
   16. ACI 318, Building Code Requirements for Structural Concrete.
   17. ACI SP-15, Field Reference Manual: Standard Specifications for Structural Concrete with Selected ACI and ASTM References.
   18. ACI SP-2, ACI Manual of Concrete Inspection.
   19. ACI SP-66, ACI Detailing Manual.
   20. California Building Code, current edition.

B. Certificates of Compliance: The Contractor shall provide Certificates of Compliance for concrete materials in accordance with the requirements of Part 1.5, "Submittals", of these specifications. When Certificates of Compliance cannot be provided, laboratory test reports shall be provided in accordance with the requirements of Part 1.5, "Submittal" of these specifications.

C. Engineer’s Review: The Engineer will review the mix designs prepared by the testing laboratory hired by the Contractor.

D. Sampling, Testing and Inspection:
   1. General:

a. All materials and work shall be subject to inspection at the batch plant, and at the building site. Material or workmanship not complying fully with the drawings, and/or specifications will be rejected.
b. If the Owner's agent, through oversight or otherwise, has accepted material or work which is defective or contrary to specifications, this material or work, regardless of state of completion, may be rejected.

2. Owner: The Owner shall employ an independent testing laboratory as the Owner's agent to perform the sampling, testing, and inspections shown on the contract drawings, and submit certified test results.
3. Contractor:
   a. The Contractor shall cooperate with and notify Owner's agent at least 24 hours in advance of inspection required and shall provide samples and facilities for inspection without extra charge.
   b. The Contractor shall hire a professional testing laboratory to provide concrete mix designs for each type of concrete on the job. Each mix design shall be verified by trial batch tests or laboratory test reports and certified to by a principal of the laboratory who is a registered Civil Engineer in the State of California and submitted to the Architect for review. Laboratory test reports, in order to be acceptable, must indicate that not less that 90 percent of at least 20 consecutive 28-day tests exceed the specified strength, and none of said tests are less than 95 percent of specified strength.

1.5 SUBMITTAL

A. General Requirements:
   1. Submittals shall be made to Architect in accordance with the requirements of Division 1, General Requirements of these specifications.
   2. Construction and fabrications or mixing of materials shall not begin until Contractor has received submittals reviewed by Architect governing all aspects of the intended work.

B. Mix Designs:
   1. Mix designs shall be submitted for each class of concrete on the job and shall show names and brands of all materials, proportions, slump, strength, gradation of coarse and fine aggregates, and location to be used on job.
   2. Mix designs for concrete designated by compressive strength shall be proportioned on the basis of field experience or trial mixtures, as described in ACI 301.
   3. Drying shrinkage data should be provided in the test histories or trial mixtures for suspended slabs and slabs on grade.
   4. When continuous batch plant inspection is waived, provide current certificate from the National Ready Mixed Concrete Association indicating that the plant has automatic batching and recording capabilities. See section 3.16 below for additional criteria.

C. Concrete Placement Schedule: The Contractor shall submit a concrete placement schedule which shall show all proposed construction joint locations, limits of each placement sequence, order of placement and type of joint proposed at each joint location.

D. Product Data: Manufacturer's catalog sheets including instructions for use and description of application shall be provided on each of the following materials:
   1. Epoxies
   2. Grout
   3. Admixtures
   4. Curing Compounds
   5. Chemical Hardener
   6. Moisture Barriers
   7. Waterstops

E. Samples: Submit samples of materials as specified and as otherwise required by Architect, including names, sources and descriptions.

F. Certificates of Compliance:
1. The Contractor shall provide Certificate of Compliance for each type of aggregate, cement and admixture to be used in each class of concrete or a Certificate of Compliance for each class of concrete.
2. Certificates of Compliance shall include the name, source, and description of all materials used in each class of concrete and shall be signed by the concrete supplier certifying that each material item complies with, or exceeds the specified requirements. Certificates of Compliance shall be furnished 60 days in advance of any concrete pours.
3. When Certificates of Compliance cannot be provided, the Contractor shall hire a professional testing laboratory to verify compliance of each type of material to be used in each Class of Concrete. The cost of testing shall be paid for by the Contractor.

G. Laboratory Test Reports:
1. Laboratory test reports shall show the name of testing agency, date of testing, types of tests performed and shall be signed by a principal of the testing agency who is a registered Civil Engineer in the State of California. Laboratory tests shall not be older than eight (8) months and shall certify that the tested materials meet the specified standards.
2. Laboratory test reports for concrete mix designs shall clearly identify each material or mix number of each mix tested to verify the correlation between the tested mix designs and the proposed mix designs.
3. When required by other portions of these specifications, laboratory test reports shall be submitted for each material to be used in each class of concrete, or for each mix design and shall show compliance with appropriate ASTM Standards and these specifications.

H. Weight and Batch Tags:
1. Weight and batch tags will be supplied to the engineer upon request.

1.6 SEQUENCING AND SCHEDULING

A. Obtain information and instructions from other trades and suppliers in ample time to schedule and coordinate the installation of items furnished by them to be embedded in concrete so provision for their work can be made without delaying the project.

B. Do any cutting and patching made necessary by failure or delay in complying with these requirements, at no cost to Owner.

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS

A. Portland Cement
1. Portland cement shall conform to ASTM C150 for Type II cement. Use a single, approved standard brand throughout work.

B. Fly Ash
1. Fly ash shall conform to ASTM C618 for Class F fly ash.

C. Ground Granulated Blast Furnace Slag
1. Slag shall conform to ASTM C989, Grade 100 or 120.

2.2 CONCRETE AGGREGATES

A. Aggregates for hardrock concrete shall conform to ASTM C33.

B. Aggregates for light-weight concrete shall conform to ASTM C330.

C. Fine Aggregate: Use washed natural sand of hard, strong particles and not more than 1% of deleterious materials. Not more than 2.5% shall pass the No. 200 sieve. Fineness modulus - 2.65 to 3.05.

D. Coarse Aggregate: Use clean, sound-washed gravel or crushed rock. Not more than 1% deleterious material or 5% flat, thin, elongated or laminated material allowed. Cleanness value shall not be less than 75 when tested in accordance with California Test 227.

2.3 WATER

A. Mixing Water for concrete shall be clean and free from deleterious amounts of acids, alkalis or organic materials.

2.4 NONSHRINK GROUT

A. Nonshrink grout shall be pre-mixed, high strength, flowable grout which does not shrink as it cures. Nonshrink grout shall attain a minimum compressive strength of 5000 psi at 7 days. Subject to compliance with requirements provide one of the following:
   1. Metallic
      a. Embeco 636; BASF.
      b. Sikagrout 212; Sika Chemical Company.
      c. Burke Metallic Spec Grout; Dayton Superior Corporation.
   2. Non-Metallic
      a. Masterflow 928; BASF.
      b. Sonogrout 10K; BASF.
      c. Sure-Grip Grout; Dayton Superior Corporation.

2.5 CURING PRODUCTS

A. Liquid membrane curing compounds: Liquid membrane curing compounds shall conform to the requirements of ASTM C309.

B. Waterproofing Paper: Waterproofing paper for curing concrete shall conform to the requirements of ASTM C171.

2.6 AIR-ENTRAINING ADMIXTURE

A. Air-entraining admixtures shall conform to the requirements of ASTM C260. Subject to that compliance, provide one of the following:
   1. Sika Aer; Sika Corporation.
   2. MB-VR or MB-AE; BASF.
   3. Dorex AEA; W.R. Grace.

2.7 WATER-REDUCING ADMIXTURE

A. Water-reducing admixtures shall conform to the requirements of ASTM C494, Type A, and contain not more than 0.1% chloride ions. Subject to compliance with requirements, provide one of the following:
   1. Eucon WR-75; Euclid Chemical Company.
   2. MasterPozzolith 322; BASF.
   3. Plastocrete 160; Sika Chemical Corporation.

2.8 HIGH-RANGE WATER-REDUCING ADMIXTURE (SUPER PLASTICIZER)

A. Super Plasticizer shall conform to the requirements of ASTM C494, Type F or Type G and contain not more than 0.1% chloride ions. Subject to compliance with requirements, provide one of the following:
   1. ADVA 190; W.R. Grace.
   2. Sikament; Sika Chemical Corporation.
   3. Pozzolith 400; BASF.

2.9 WATER-REDUCING, RETARDING ADMIXTURE

A. Water-reducing, retarding admixtures shall conform to the requirements of ASTM C494, Type D, and contain not more than 0.1% chloride ions. Subject to compliance with requirements, provide one of the following:
   1. Pozzolith 300-R; BASF.
   2. Daratard; W.R. Grace.
   3. Plastiment; Sika Chemical Corporation.

2.10 WATERSTOPS

A. General: Provide flat, dumbbell type or centerbulb type waterstops at construction joints and other joints as indicated. Size to suit joints.

B. Rubber Waterstops: Rubber Waterstops shall conform to the requirements of Corps of Engineers CRD-C513. Subject to compliance with requirements, provide one of the following:
   1. Dayton Superior Corporation
   2. Progress Unlimited
   3. Williams Products

2.11 CONCRETE

A. Concrete Mix Requirements: See plans for concrete mix design requirements and specifications.

B. Slumps noted on the plans are for concrete without admixtures to be consolidated using vibration. Formwork constraints, congestion of rebar, and pumping of concrete may require increased slump beyond the slump listed on the plans. The contractor shall adjust the slump up to 8” max using admixtures as necessary to provide workability and consistency to permit concrete to be worked readily into forms and around reinforcement under conditions of placement to be employed without segregation or excessive bleeding. All admixtures shall be noted in the submitted mix design and are subject to the Engineer’s review. Slump shall not exceed 3" for any concrete placement where top of surface slopes more than 2%.

C. At Contractor's option, an air entraining agent conforming to the latest revision of ASTM Specification C260 may be added to the concrete to provide entrained air. Air-entraining shall not exceed 3% ± 1.5% without the approval of the engineer.

D. Drying Shrinkage: The average “Drying Shrinkage” of the concrete after 21 days of drying shall not exceed 0.048 percent for slabs on grade.

2.12 CONTROL JOINTS

A. Sawcut Control joints shall use SOFF-CUT International or equal.

2.13 UNDERSLAB VAPOR BARRIER/RETARDER

A. Vapor barrier/retarder membrane including installation accessories, for installation under concrete slabs-on-grade for floors of interior spaces as follows:
   1. Minimum 15-mil-thick polyolefin geomembrane for superior barrier performance and for tear strength and puncture resistance, manufactured from ISO certified virgin resins.
   2. Acceptable Manufacturers:
      a. Stego Wrap (15-mil) Vapor Barrier as manufactured by Stego Industries LLC, San Juan Capistrano, CA, 949-493-5460, website: www.stegoindustries.com.
      b. Ecosheild-E15 (15-mil) Vapor Barrier as manufactured by Epro, Derby, KS.
      c. Griffolyn Vaporguard as manufactured by Reef Industries, Houston, TX.
   3. Physical Properties:
      a. Tensile Strength: ASTM E-175, minimum 45.0-lbf/in.
      b. Water Vapor Barrier: ASTM E-1745, meets or exceeds Class B.
      c. Water transmission Rate: ASTM E-96, 0.006-gr/ft^2/hr or lower.
      d. Permeance Rating: ASTM E-96, 0.01-gr/ft^2/hr or lower.
      e. Puncture Resistance: ASTM E-1745, minimum 1970 grams.
   4. Installation Accessories:
      a. Seam Tape and Vapor Proofing Mastic: Water Vapor Transmission Rate shall be 0.3-perms or lower per ASTM E 96.
      b. Pipe Boots: Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.
      c. Vapor Stakes: Provide Density of 0.0289-lb/in^3 per ASTM D 1505: and Specific Gravity of 0.0477 per ASTM D 792.

B. Vapor barrier/retarder membrane shall be installed in accordance with manufacturer's printed instructions and ASTM E 1643-04. The following shall serve as a general outline for preparation and installation:
   1. Preparation: Ensure that subsoil is approved by architect or geotechnical firm. Level and tamp or roll aggregate, sand or tamped earth base as applicable.
   2. Schedule preconstruction meeting/conference at the site with field representative of the vapor barrier/retarder membrane prior to installation. Provide minimum one week notice to manufacturer's representative and the Architect.
   3. Unroll vapor barrier/retarder with the longest dimension parallel with the direction of the pour. Lap vapor barrier/retarder over footings and seal to foundation walls. Seal to interior/perimeter footings using specified mastic. Overlap joints 6 inches and seal with manufacturer's seam tape.
   4. Seal all penetrations (including pipes) per manufacturer's instructions, and as follows:
      a. Seal single pipe penetrations using pipe boot constructed from the product:
         1) Cut a piece of vapor barrier membrane; minimum 12-inches wide and length of 1-1/2 times the circumference of the pipe.
         2) Cut slits half the width of the film using scissors.
         3) Wrap boot around pipe; tape onto pipe and completely tape the base to the vapor barrier/retarder membrane.
   5. Multiple pipe penetrations in close proximity and very small pipes may be sealed using specified vapor proofing mastic.
      a. Cut out a small area around pipes.
      b. Cut a patch of vapor barrier/retarder membrane extending at least 6 inches past the cut-out portion in all directions.
      c. Cut X's or small circles in the patch and install over pipes.
      d. Overlap at least 6 inches and tape.
      e. Build up 40-60 mils of mastic, or as needed to completely fill all voids between the pipe and the vapor barrier/retarder membrane.
   6. No penetration of the vapor barrier/retarder membrane is allowed except for reinforcing steel and permanent utilities.
   7. In the case that forms must be used vapor stakes should be used to hold forms in place:
      a. Penetrate plastic with stake.
      b. Treat stake as pipe penetrations(See above, 3.a. - 3.e.).
      c. Leave stakes permanently in concrete.

d. Using a power saw, cut the stake off above the seal, but below the surface of the finished concrete.
e. The lower portion of the vapor stake remains in place, permanently plugging the penetration.

8. Repair damaged areas by cutting patches of vapor barrier/retarder membrane, overlapping damaged area 6-inches and taping all four sides with tape.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. Produce concrete of required consistency and strength to present appearance satisfactory to Architect.

B. Use only one brand of cement unless otherwise authorized by Architect.

C. Embedded Items: Place all pipe sleeves, inserts, anchors bolts, angle frames, ties and other embedded items required for adjoining work or for its support prior to concreting. Embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts and anchor bolt slots shall be filled temporarily with a readily removable material to prevent entry of concrete into the voids.

D. Store materials delivered to the job and protect from foreign matter and exposure to any elements which would reduce the properties of the material.

E. When concrete is cast against existing concrete the surface shall be cleaned and roughened by sandblasting, grinding, bush hammering or other suitable means. Wet the surface until it is damp, but without visible free water.

3.2 EXISTING CONCRETE SURFACE PREPARATION

A. Where concrete is to be cast against existing concrete, prepare the surface of existing concrete as follows, unless noted otherwise:
1. Chip or scarify surface as required to remove all spalled, severely cracked, deteriorated, loose or unsound material.
2. Chip or scarify any area as required to remove offsets which would cause an abrupt change in thickness of the new concrete. Taper edges to leave no square shoulders at the perimeter of a cavity.
3. Sand-blast or water-blast all surfaces to receive new concrete to remove all dirt, paint, grease, fractured concrete, oil, or other substances that could interfere with the bond of the newly placed concrete. Clean forms and reinforcing of drippings. Clear away debris by compressed air.
4. Wet the surface until it is damp, but without visible free water.

B. Where noted on the drawings to ‘intentionally roughen’ surface, prepare the surface of existing concrete as follows:
1. Chip or scarify surface as required to remove all spalled, severely cracked, deteriorated, loose or unsound material.
2. Chip or scarify any area as required to remove offsets which would cause an abrupt change in thickness of the new concrete. Taper edges to leave no square shoulders at the perimeter of a cavity.
3. Sand-blast using coarse sand or water-blast to clean and roughen to 1/4" amplitude all surfaces to receive new concrete, exposing coarse aggregate solidly embedded in mortar matrix. Clean forms and reinforcing of drippings. Clear away debris by compressed air.
4. Wet the surface until it is damp, but without visible free water.

3.3 MIXING

A. Use ready-mixing concrete complying with ASTM C94 and with the requirements of Contract Documents. Mix for a period of not less than ten (10) minutes; at least three (3) minutes of mixing period shall be immediately prior to discharging at the job.

B. Introduction of additional water after initial mixing not permitted.

3.4 WEATHER REQUIREMENTS

A. Do not mix or place when atmospheric temperature is below 40 degrees F. or when conditions indicate temperature will fall below 40 degrees within 72 hours. Reinforcement, forms, and ground which concrete will contact shall be completely free of frost. Keep concrete and formwork at a temperature not less than 50 degrees F. for not less than 72 hours after pouring.

B. When temperature is above 80 degrees F. Contractor shall take precautions to insure that rebar temperature does not exceed ambient temperature.

C. Temperature of concrete at time of placing shall not be less than 50 degrees F. and not more than 85 degrees F.

3.5 CONVEYING AND PLACING

A. All concrete shall be mixed and delivered in accordance with the requirements of ASTM C94. All concrete shall be placed, finished and cured and all other pertinent construction practices shall be in accordance with the requirements of ACI 301.

B. It is the contractor’s responsibility to provide a concrete mix suitable for the job site conditions. Workability and pumpability may be increased by methods noted in Section 2.11.

C. Notify Architect at least 48 hours before placing any concrete.

D. Before placing, clean mixing and conveying equipment, clean forms and space to be occupied by concrete and wet forms. Remove ground water until completion of work.

E. Place no concrete in any unit of work until all formwork has been completely constructed, all reinforcements secured in place, all items to be built into concrete are in place, and form ties at constructions joints tightened.

F. Concrete shall be placed so that a uniform appearance of surfaces will be obtained. The concrete will be free of all rock pockets, honeycombs and voids. Deposit as nearly as practical in its final position.

G. The subgrade must be moist when the concrete is placed for floor slab to prevent excessive loss of water from the concrete mix.

H. Carry on concreting, once started, as a continuous operation until the section of approved size and shape is completed. Make pour cut-offs of approved detail and location.

I. Handle concrete as rapidly as practicable from mixer to place of deposit by methods which prevent separation or loss of ingredients. Deposit as nearly as practicable in final position to avoid rehandling or flowing. Do not drop concrete freely where reinforcing bars will cause segregation, nor drop freely more than four feet. Deposit to maintain a plastic surface approximately horizontal. In walls, deposit in horizontal layers not over eighteen inches deep. In pouring columns, walls or thin sections of considerable heights, use openings in forms, elephant trunks, tremies or other approved devices which permit concrete to be

placed without segregation or accumulation of hardened concrete on forms or metal reinforcement above the level of the concrete. Install so concrete will be dropped vertically.

J. Concrete that has partially hardened shall not be deposited in the work.

K. All concrete floors except sloping to drains shall be brought to a level not exceeding one-eighth inch (1/8") in a 10'-0" measured with a straight edge.

L. Vibrating: Employ as many vibrators and tampers as necessary to secure the desired results. Minimum: one per each 20 cubic yards of concrete placed per hour. Eliminate the following practices: Pushing of concrete with vibrator; external vibration of forms; allowing vibrator to vibrate against reinforcing steel where steel projects into green concrete; allowing vibrator to vibrate contact faces of forms. Vibrators shall function at a minimum frequency of 3600 cycles per minute when submerged in concrete. Supplement vibration by forking and spading along the surfaces of the forms and between reinforcing whenever flow is restricted.

M. Tremie Concrete: Tremie concrete is a special procedure for placing concrete underwater. Tremie concrete shall be placed by pump or a gravity feed pipe. If a gravity feed pipe is used it shall be 8" minimum diameter and shall be affixed with a shutoff device at the bottom that will allow filling of the pipe with concrete without allowing water to enter. The trunk of the pump or gravity pipe shall be placed at the bottom of caisson prior to placing any concrete. The pump trunk or gravity pipe shall be removed slowly as the caisson is filled insuring that the end of pump trunk or gravity pipe is embedded in concrete a minimum of 1 foot.

3.6 CURING

A. General: Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures and shall be maintained with minimum moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

B. Initial Curing:
   1. Initial curing shall immediately follow the finishing operation. Concrete shall be kept continuously moist at least overnight. One of the following material or methods shall be used: Ponding or continuous sprinkling; absorptive mat or fabric kept continuously wet.
   2. Curing compounds conforming to ASTM C309. Such compounds shall be applied in accordance with the recommendations of the manufacturer and shall not be used on any surface against which additional concrete or other cementitious finishing materials are to be bonded, where epoxy flooring is called for, where concrete topping is to receive waterproofing membrane, nor on surfaces where such curing is prohibited by the project specifications.

C. Final Curing:
   1. Immediately following the initial curing and before the concrete has dried, additional curing shall be accomplished by one of the following materials or methods:
      a. Continuing the method used in initial curing.
      b. Waterproofing paper conforming to the requirements of ASTM C171.
      c. Other moisture-retaining coverings as approved.

D. Duration of Curing: The final curing shall continue until the cumulative number of days or fractions thereof, not necessarily consecutive, during which temperature of the air in contact with the concrete is above 50 degrees F. has totaled seven days. If high-early-strength concrete has been used, the final curing shall continue for a total of three days. Rapid drying at the end of the curing period shall be prevented.

E. Formed Surfaces: Steel forms heated by the sun and all wood forms in contact with the concrete during the final curing period shall be kept wet. If forms are to be removed during the final curing period, one of the above curing materials or methods shall be employed immediately. Such curing shall be continued for the remainder to the curing period.

F. Architecturally Exposed Slabs: Architecturally exposed slabs shall be cured by moisture-retaining cover curing. Thoroughly wet the surface of the concrete and then cover with moisture-retaining cover, placed in widest practical width, with edges lapped at least 12 inches and extended 18 inches beyond the area of concrete to be cured, and seal with waterproofing tape. Maintain a film of water under the cover through the curing period by rolling back and rewetting. Immediately repair any holes or tears that occur using cover material and waterproof tape. Start moisture-retaining cover curing as soon as free water has disappeared from concrete surface following finishing. Curing shall be maintained for 7 days.

3.7 CONCRETE FINISHES

A. Finishes:

Element:	Finish
Exposed foundation surfaces	Rough troweled finish
Permanently exposed formed surfaces	Grout cleaned and sacked
Slabs	Smooth troweled finish

B. Grout Cleaned Finish: After the concrete still freshly hardened has been pre-dampened, a slurry consisting of one part cement and one and one-haft parts sand passing the No. 16 sieve, by damp loose volume, shall be spread over the surface with clean burlap pads or sponge rubber floats. Any surplus shall be removed by scraping and then rubbing with clean burlap. The finish shall be cured in an approved manner. Sample to be approved by Architect.

C. Troweled Finish: Where a troweled finish is specified, the surface shall be finished first with power floats, then with power trowels, and finally with hand trowels. The first troweling after power floating shall be done by a power trowel and shall produce a smooth surface which is relatively free of defects but which may still contain some trowel marks. Additional trowelings shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be free of any trowel marks, uniform in texture and appearance.

D. Broom or Belt Finish: Slabs shall be given a coarse traverse scored texture by drawing a broom or burlap belt across the surface. Slabs with less than 6% slope shall receive a medium broom finish. Slabs with greater than 6% slope shall receive a heavy broom finish. This operation shall follow immediately after troweling.

3.8 PROTECTION

A. Protect from injurious action of elements and defacement of any nature during operations.

3.9 CONSTRUCTION JOINTS

A. Location and details of construction joints shall be as indicated on drawings, specified, or as approved by the Architect. Locate so as not to impair the strength of the structure. Submit drawings with construction joints clearly defined, and schedule of pouring operations for

approval in accordance with Part 1.5 "Submittals" of this specification section, prior to starting concreting.

B. Sandblast all construction joints using coarse sand or waterblast to clean and roughen entire surface of joint, exposing coarse aggregate solidly embedded in mortar matrix. Clean forms and reinforcing of drippings. Clear away debris by compressed air.

3.10 CONTROL JOINTS

A. Location: as indicated on the drawings or as approved by Architect
B. Spacing:
   1. Exterior Slab on grade: 8 feet o.c. maximum, unless otherwise noted
   2. Interior Slab on grade: 15 feet o.c. maximum
C. Installation:
   1. Exterior Slab on grade: Tooled joints with rounded edges,1/8 inch wide by 1/4 of slab depth.
   2. Interior Slab on grade: Use saw cuts 1/8 inch wide by 1/4 of slab depth, or tooled joints with rounded edges 1/8 inch wide by 1/4 of slab depth.

3.11 PATCHING AND CLEANING

A. After forms are removed, remove projecting fins, bottles, form ties, nails, etc. not necessary for the work or cut back one inch from the surface. Joint marks and fins in exposed work shall be smoothed off and cleaned as directed by the Architect.

B. Repair defects in concrete work as directed by the Engineer. Chip voids and stone pockets to a depth of one inch or more as required to remove all loose material. Voids, surface irregularities, chipped areas, etc., shall be filled by patching, gunite or rubbing, as directed by the Architect. Repaired surfaces shall duplicate appearance of unpatched work.

C. Clean exposed concrete surfaces and adjoining work stained by leakage of concrete to approval of Architect.

3.12 CLEANUP

A. In addition to the requirements of Supplementary General Conditions, clean up all concrete and cement work on completion of this portion of the work, except protective coatings or building papers shall remain until floors have completely cured or until interior partitions are to be installed.

3.13 GROUTING

A. Column base plates: The grout shall be mixed and placed in strict accordance with manufacturer's instructions. Care shall be taken in the grouting to ensure that there are no voids or air pockets, and that there is full bearing between the base plates and the grout.

3.14 DEFECTIVE WORK

A. General: Work considered to be defective may be ordered by the Architect to be replaced in which case the Contractor shall remove the defective work at his expense. Work considered to be defective shall include, but not be limited to, the following:
   1. Concrete in which defective or inadequate reinforcing steel has been placed.
   2. Concrete in incorrectly formed, or not conforming to details and dimensions on the drawings or with the intent of these documents, or concrete the surfaces of which are out of plumb or level.
   3. Concrete below specified strength.
   4. Concrete not meeting the maximum allowable drying shrinkage requirements.
   5. Concrete containing wood, cloth, or other foreign matter, rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the drawings.

3.15 CORRECTION OF DEFECTIVE WORK

A. The Contractor shall, at his expense, make all such corrections and alleviation measures as directed by the Architect.

B. Concrete work containing rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the drawings, shall be chipped out until all unconsolidated material is removed.

C. Secure approval of chipped-out areas before patching. Patch per ACI 301, or as ordered by the Architect.

3.16 FIELD QUALITY CONTROL

A. Inspections: The Owner's agent will perform inspections shown on the contract drawings.

B. Engineer Review: The Engineer shall inspect the surfaces between plates and channels, bearing on masonry and concrete to determine if grouting of space is necessary. If grouting of space is necessary, the Owner's agent shall inspect the grouting procedure.

C. Sampling and Testing: The Owner's agent will perform sampling and testing shown on the contract drawings.

D. Test Results: Test results shall be reported in writing to Engineer and Contractor within 7 days after tests are made. Test results of less than .6 fc' at 7 days and less than fc' at 28 days shall be reported in writing to the Engineer and Contractor within 48 hours after tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing services, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests. Strength level of concrete will be considered satisfactory if the averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below the specified compressive strength by more than 500 psi. Concrete batch plant weight tags shall be collected at the site and submitted to the Engineer.

When the strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.

E. Additional Tests: The Owner's agent will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Engineer. Owner's agent may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed. Contractor shall pay for such tests conducted, other additional testing as may be required, and cost of repairing areas of structure tested when unacceptable concrete is verified.

F. Continuous Batch Plant Waiver: It is acceptable to waive the continuous batch plant inspection for concrete per CBC Section 1705A.3.3 provided the following requirements are met:

1. The concrete plant shall be fully compliant with the requirements of ASTM C 94, sections 8 & 9 and shall provide a current certificate from the National Ready Mixed Concrete Association indicating that the plant has automatic batching and recording capabilities.
2. A qualified technician of the testing laboratory shall check the first batch at the start of the day.
3. A licensed weighmaster shall positively identify materials as to quantity and certify each load by a batch ticket.

4. Batch tickets, including actual material quantities and weights, shall accompany the load and shall be transmitted to the inspector of record by a truck driver with the load identified thereon. The load shall not be placed without a batch ticket identifying the mix. The inspector shall keep a daily record of placements, identifying each truck, its load, time of receipt, and approximate location of deposit in the structure and shall transmit a copy of the daily record to DSA.

END OF SECTION - 03 30 00

SECTION 03 35 00 | CONCRETE FINISHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Deep penetrating concrete floor sealer.
   2. Accessories necessary for a complete installation

B. Related Sections:
   1. Section 03 20 00: Concrete Reinforcing.
   2. Section 03 30 00: Cast-In-Place Concrete.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, application instructions, and recommendations. Include data substantiating product complies with requirements of the Contract Documents.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code: Comply with applicable requirements for interior finishes in CBC 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA).

B. Accessibility Requirements:
   1. Comply with applicable requirements:
      a. Americans with Disabilities Act of 1990, as amended:
         1) ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.
      b. CBC 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA).
      c. CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.

C. Manufacturer Qualifications: Provide products produced by a company specializing in production of concrete sealers for minimum of five (5) years.

PART 2 PRODUCTS

2.1 MATERIAL

A. Concrete Sealer: Deep penetrating sealer, water based, clear, non-yellowing, nontoxic, VOC compliant concrete sealer, integral with concrete through chemical reaction forming nonsoluble seal within pores and capillaries of concrete and sealing it against ingress of moisture while allowing concrete to breathe.

B. Basis of Design:
   1. Product: Subject to compliance with requirements, provide **Moxie International Inc.;**

Moxie Shield 1600 Concrete Sealer, P.O. Box 838 Loomis, CA 95650; Contact Manufacturer's representative: P:916-251-0825, F: 877-330-1930 Email: info@moxieshield.com.
a. PROSOCO, Inc.
b. W.R. Meadows.

C. Physical Properties:
1. Permeability: Maximum 0.093 ml/m^2/s.
2. Specific gravity: 1.094.
3. PH: 11.50.
4. Flash point: Nonflammable.
5. Chemical identity: Mixture containing silicates, bonding catalysts, and inert materials.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Requirements: Do not proceed with installation until areas to receive work are enclosed and temperature and relative humidity are stabilized and maintained for optimum quality control.

B. Environmental Limitations:
1. Comply with coating manufacturer's written instructions for substrate temperature, ambient temperature, humidity, ventilation, and conditions affecting floor treatment application. Do not apply coating until wet work in spaces is complete and dry; and overhead work, including installing mechanical systems, lighting, and athletic equipment, is complete:
a. Apply floor coatings when substrate temperature and surrounding air temperatures are between 50 degrees F and 95 degrees F (10 degrees C and 35 degrees C).
b. Do not apply floor coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F (3 degrees C) above the dew point; or to damp or wet surfaces.

3.2 EXAMINATION

A. Examine substrates for conditions affecting performance and conditions of floor treatment:
1. Verify compatibility with and suitability of substrates, including existing finishes or primers.
2. Verify plasticizers in existing concrete substrate will not impair bond.
3. Proceed with installation after correcting unsatisfactory conditions

3.3 PREPARATION

A. Clean substrate, removing projections and substances detrimental to the work; comply with recommendations of manufacturer of products to be installed for proper preparation procedures. Mask off or protect adjacent surfaces not scheduled to receive sealer.

3.4 APPLICATION

A. Spray apply sealer to comply with manufacturer's instructions except where Project conditions require extra precautions or provisions to ensure satisfactory performance of the Work:
1. Apply sealer to produce surface without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or surface imperfections. Produce sharp glass lines and color breaks.

3.5 CLEANING

A. After completing application, clean spattered surfaces. Remove spattered sealer by washing or other appropriate methods for coating. Do not scratch or damage adjacent finished surfaces.

B. Clean Up: Remove rubbish, empty cans, rags, and discarded materials from site daily. Rinse and recycle or legally dispose of sealer and coating containers.

3.6 PROTECTION

A. Institute protective procedures and install protective materials as required to ensure that work of this Section will be without damage or deterioration at substantial completion.

END OF SECTION - 03 35 00

SECTION 03 35 19 | INTEGRALLY COLORED CONCRETE FINISHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Integrally colored finishes for site-cast concrete.
   2. If this Section conflicts with Related Sections:
      a. This Section takes precedence for matters that affect concrete appearance.
      b. Related Sections take precedence for matters that do not affect concrete appearance.
      c. In case of conflicts, notify Architect for clarification.

B. Related Section:
   1. DIVISION 03: Cast-In-Place Concrete

C. Reference Standards:
   1. American Concrete Institute:
      a. ACI 301 – Structural Concrete.
      b. ACI 303.1 – Cast-in-Place Architectural Concrete.
      c. ACI 305.1 – Hot Weather Concreting.
      d. ACI 306.1 – Cold Weather Concreting.
      e. ACI 308R – Curing Concrete.
      f. ACI 318 – Building Code Requirements for Structural Concrete.
   2. ASTM:
      a. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete.
      b. ASTM C979 – Pigments for Integrally Colored Concrete.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference:
   1. Conduct conference at Project site.
   2. Comply with Section 01 31 00: Project Management and Coordination.
      a. Review procedures required to produce specified results.

1.3 SUBMITTALS

A. Product Data:
   1. Color additives.
   2. Curing products.
   3. Form release agents.
   4. Proprietary cleaning agents.
   5. Surface retarders.

B. Shop Drawings: Indicate extent of each color of integrally colored concrete.

C. Samples for Initial Selection: Submit color additive manufacturer's [color chart][sample chip set].

D. Samples for Verification: Submit sample chip of specified concrete colors indicating Davis color name.

1.4 QUALITY ASSURANCE

A. Codes and Standards:
   1. Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
      a. CBC 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA).
      b. American Concrete Institute (ACI) Publications:
         1) Comply with the following unless modified by requirements in the Contract Documents:
            a) ACI 301, "Specifications for Structural Concrete."
            b) ACI 117, "Specification for Tolerances for Concrete Construction and Materials and Commentary."
            c) ACI 302.1R, “Guide to Concrete Floor and Slab Construction.”
            d) ACI 302.2R, “Guide for Concrete Slabs that receive Moisture-Sensitive Flooring Materials.”
            e) ACI 305R, “Guide to Hot Weather Concreting.”
            f) ACI 306R, “Guide to Cold Weather Concreting.”
            g) ACI 318, “Building Code Requirements for Structural Concrete and Commentary.”

B. Manufacturer Qualifications:
   1. A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment:
      a. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Installer Qualifications: Concrete work shall be by firm with [five]<Other number> years experience with work of similar scope and quality.

D. Perform work in accordance with: ACI 303.1, ACI 305.1, ACI 306.1, ACI 318.

E. Obtain each material from same source and maintain high degree of consistency in workmanship throughout Project.

F. Field Samples: Submit three samples 24 by 24 inches indicating concrete color range and texture.

G. Integrally Colored Concrete Mock-Up:
   1. Provide full-scale mock-up under Division 01 Section "Quality Requirements" Construct at least one month before start of other concrete work to allow concrete to cure before observation.
   2. At location acceptable to Architect, demonstrate methods used for construction, including forming and finishing conditions required for Project using materials, workmanship, joint treatments, form ties, patching techniques, and curing methods to be used throughout Project.
   3. Accepted mock-up provides visual standard for work of Section.
   4. Remove mock-up when no longer required for comparison with finished work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Color Additive: Deliver, store, and handle in accordance with manufacturer's instructions.

B. Concrete: Schedule delivery to provide consistent mix times from time color additive is placed in mixture until placement of integrally colored concrete.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A. Cements:
1. Types: As specified in Related Sections.
2. Colors: As required to match Reference Sample.

B. Supplementary Cementitious Materials:
1. Types: As specified in Related Sections.
2. Colors: As required to match Reference Sample.

C. Fine Aggregate:
1. Types: As specified in Related Sections.
2. Color: As required to match Reference Sample.

D. Coarse Aggregate:
1. Types: As specified in Related Sections.
2. Color: As required to match approved concrete sample.

E. Water: Clean and potable.

F. Admixtures: Do not use calcium chloride admixtures.

2.2 COLOR ADDITIVES

A. MANUFACTURER: Davis Colors
1. Contact Information:
Phone: 800-356-4848 or 323-269-7311.
E-mail: info@daviscolors.com.
Web Site: www.daviscolors.com.
2. Substitutions: Comply with Division 01 Section "Substitution Procedures"].

B. TYPE:
1. Concentrated pigments specially processed for mixing into concrete and complying with ASTM C979.
2. Color additives containing carbon black are not acceptable.
3. On most projects, selection of color additive delivery system should be left to concrete producer. Retain both automated and manual options below unless project has special requirements.

C. COLOR ADDITIVE DELIVERY:
1. Automated Dispensing:
b. Meter and dispense colors using computer-controlled automated color weighing and dispensing system. Use Davis Colors Chameleon liquid metering system and Hydrotint liquid color additives.
2. Manual Dispensing: Use Davis Colors Mix-Ready powdered color additives in pre-measured disintegrating bags.

2.3 FORMED CONCRETE

A. FORMS AND FORM FACING MATERIALS:

1. TYPE: High density and non-vapor transmitting form face, free of rust or other defects deleterious to required finish, and with watertight joints.

B. FORM TIES: Corrosion-resistant ties, removable cones, and plugs.

C. FORM RELEASE: Use type that is non-staining and minimizes formation of bug-holes.

D. CURING COMPOUND FOR FORMED SURFACES: Complying with ASTM C309 and approved by color additive manufacturer for use on integrally colored concrete. Do not use white-pigmented curing compounds.

2.4 ACCESSORIES

A. REINFORCING BAR SUPPORTS: Use corrosion-resistant types at locations contacting exposed surfaces.

B. JOINT SEALANTS:
1. Provide type specified in Division 07 Section "Joint Sealants"
2. Color: Color selected by Architect from manufacturer's full range to match integrally colored concrete.

C. CLEANING AGENTS: Use products known to be compatible with integrally colored concrete.

2.5 MIXES

A. SLUMP: If greater slump is required, use water-reducing or super-plasticizing admixture; do not add water.

B. COLOR ADDITIVES: Mix in accordance with manufacturer's instructions. Mix until color additives are uniformly dispersed throughout mixture and disintegrating bags, if used, have disintegrated.

C. Do not retemper mix or add water in field.

2.6 CONCRETE COLORS

A. CONCRETE COLORS: Provide color additives that, along with specified concrete materials, result in concrete to match.

B. CONCRETE COLORS:
Provide colors to be selected by Architect from manufacturer’s full range of colors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not place integrally colored concrete where standing water is present.

3.2 INSTALLATON

A. Comply with color admixture manufacturer’s recommendations unless otherwise specified in this Section.

3.3 FORMED SURFACES

A. STRUCTURAL CONCRETE: Where applicable on Drawings.
   1. Provide ACI 301 Surface Finish SF-3.0:
      a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
      b. Remove projections larger than 1/8 inch.
      c. Patch tie holes.
   2. Match sample finish. Contractor must reproduce a mockup of the sample finish on an area at least 100 square feet.
   3. SURFACE TOLERANCE: ACI 117:
      a. Class B (+1/4 inch maximum irregularities).

B. ARCHITECTURAL CONCRETE:
   1. As-Cast Finish: Form or form facing material shall be:
      a. Smooth.
   2. Exposed Aggregate Finish: Comply with ACI 303.1.
      a. Type: Heavy Broom.
      b. Reveal: Projection of the aggregate from mortar after completion of exposure operations:
         1) Brush: Sufficient to dull surface sheen but not reveal aggregate.
         2) Light: Maximum 1/16 inch reveal.
         3) Medium: Maximum 1/4 inch reveal.
         4) Heavy: Maximum reveal of 1/3 of large aggregate diameter.
   3. Surface Tolerance: ACI 347:
      a. Class A (+1/8 inch maximum irregularities).
      b. Class B (+1/4 inch maximum irregularities).

C. ACI 308R, Table 2.1 – Recommended Minimum Duration of Curing (Summarized)
   1. Curing and Stripping:
      a. Curing: Cure for [duration recommended in ACI 308R][28 days]<Other Duration>. Maintain concrete between [65° and 85°F]<Other Temperature Range> during curing.
      b. Leave forms in place for as long as practical, and do not strip until concrete has reached a consistent age.
      c. Stripping: If forms are removed before required curing duration, apply curing compound for formed surfaces. To extent practical, integrally colored concrete throughout project should be cured using the same methods and for the same durations.

D. REPAIR:
   1. Fill holes and defects in concrete surface within 48 hours of form removal.
   2. Use patching materials and techniques approved in mock-up.
   3. Make patches with stiff mortar made with materials from same sources as concrete. Adjust mortar mix proportions so dry patch matches dry adjacent concrete.
      a. Add white cement to mortar mix if necessary to lighten it. With exposed aggregate finishes, add aggregate to mortar mix so patches will have same texture and appearance as adjacent concrete.

3.4 APPEARANCE TOLERANCES

A. APPEARANCE: Minor variations in appearance of integrally colored concrete that are similar to natural variations in color and appearance of uncolored concrete are acceptable.

3.5 CLEANING

A. Efflorescence: Remove efflorescence as soon as practical after it appears and as part of final cleaning.

B. Use least aggressive cleaning techniques possible

C. If proprietary cleaning agents are used, pre-wet surface, test cleaning agent on small, inconspicuous area, and check effects prior to proceeding. At walls, begin cleaning at top and work down. Thoroughly rinse surface afterwards with clean water. Follow cleaner manufacturer's instructions.

D. Do not use muriatic or hydrochloric acid on integrally colored concrete.

END OF SECTION - 03 35 33

SECTION 03 35 43 | POLISHED CONCRETE FINISHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Polished concrete finishing.
   2. Staining.
   3. Scoring.
   4. Accessories necessary for a complete installation,

1.3 SUBMITTALS

A. Product Data: Technical data for each type of product including special concrete finishes, data sheets, and manufacturer’s installation instructions.

B. Polishing Schedule: Submit plan showing polished concrete surfaces and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints.

C. Samples: Submit samples of each type of exposed color showing anticipated variegation of color.

D. Test Reports: Submit test reports or certification from NFSI confirming that polished concrete floor finish has been tested and has passed phase 2 level of certification.

E. Qualification Data: Submit one (1) copy of installer’s qualifications.

F. Material Certificates:
   1. Submit materials certificates signed by manufacturer for the following products:
      a. Repair materials.
      b. Stain materials.
      c. Liquid floor treatments.

G. Maintenance Data: Submit manufacturer's recommended cleaning and maintenance instructions for polished concrete floor finish.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code: Comply with applicable requirements for interior finishes in 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA).
   2. Americans with Disabilities Act of 1990, as amended:
      a. ADA Title II Regulations & the 2010 ADA Standards for Accessible Design.
      b. 2025 California Building Code Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.

B. Manufacturer Qualifications: Provide products produced by a company specializing in

production of special concrete finishes concrete for minimum of five (5) years.

C. Installer Qualifications: Installer having minimum five (5) years' documented experience, who specializes in the finishing of concrete substrates, and who is certified by manufacturer as an installer of special concrete finishes.

D. Field Sample Panels:
1. After approval of verification sample and before casting concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three (3) sets of full-scale panels, approximately 48 inches by 48 inches (1,200 mm x 1,200 mm) minimum, to demonstrate the expected range of finish, color, and appearance variations:
   a. Locate panels as indicated, or if not indicated, as directed by Architect.
   b. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
   c. Demolish and remove field sample panels when directed.

E. Mockups:
1. Before casting concrete, build mockups to verify selections made under sample submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
   a. Build mockups in the location and of the size indicated, or if not indicated, as directed by Architect.
   b. Demonstrate curing, finishing, and protecting of polished concrete.
   c. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Pre-Installation Conference:
1. Conduct conference at site. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with polished concrete to attend, including the following:
   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready mix concrete manufacturer.
   d. Cast-in-place concrete Subcontractor.
   e. Polished concrete finishing Subcontractor.

G. Review cold and hot weather concreting procedures, curing procedures, construction joints, concrete repair procedures, concrete finishing, and protection of polished concrete.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original containers, with seals unbroken, bearing manufacturer labels indicating brand name and directions for storage.

B. Dispense special concrete finish material from factory numbered and sealed containers. Maintain record of container numbers.

PART 2 PRODUCTS

2.1 MATERIALS

A. Densifying and Sealing Treatment:

1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Dayton Superior.
   b. Laticrete: FGS Permashine.
   c. W.R. Meadows: Liqui-Hard.
   d. Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

B. Reactive Stain:
   1. Acidic based stain with wetting agents and high grade, UV stable metallic salts that react with calcium hydroxide in cured concrete to produce permanent, variegated, or translucent color effects:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) Bomanite Co.
         2) Increte Systems Inc.
         3) Scofield, L. M. Company.
         4) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

C. Penetrating Stain:
   1. Water based, acrylic latex, penetrating stain with colorfast pigments:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) Bomanite Co.
         2) Scofield, L. M. Company.
         3) SuperStone, Inc.
         4) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

D. Penetrating Liquid Floor Treatments for Polished Concrete Finish:
   1. Clear, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; and that penetrates, hardens, and is suitable for polished concrete surfaces:
      a. Manufacturers are subject to compliance with requirements. Provide products by one of the following:
         1) Euclid Chemical Company (The); a RPM company.
         2) L&M Construction Chemicals, Inc.
         3) Vexcon Chemicals Inc.
         4) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic necessary for other construction activities.

B. Environmental Limitations:
   1. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and conditions affecting topping performance.
   2. Concrete Flatness:
      a. Floor Flatness Rating: Minimum FF 40.

b. Floor Levelness Rating: Minimum FL 40.
3. Curing: Minimum of 28 days or as directed by the manufacturer before application.
4. Apply stain minimum ten (10) days prior to installation of equipment and Substantial Completion, ensuring uninhibited concrete slab.
5. Close areas to traffic during floor application and after application, for time period recommended in writing by manufacturer.

3.2 EXAMINATION

A. Examine substrate for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work:
1. Verify that slab complies with finish and surface profile requirements.
2. Prior to application, verify concrete floor surfaces are free of laitance and construction materials.
3. Verify concrete has been in place a minimum of 28 days prior to the commencement of application.
4. Do not proceed until unsatisfactory conditions are corrected.

3.3 PREPARATION

A. Deliver materials to site in original, factory sealed, unopened, new containers bearing manufacturer’s name and label intact and legible, with the following information:
1. Name or title of material.
2. Manufacturer’s standard container drum numbers.
3. Thinning instructions.
4. Application instructions.

B. Storage:
1. Store materials in protected and well-ventilated area at temperatures between 40 degrees F and 90 degrees F unless otherwise required by manufacturer:
a. Keep containers sealed until ready for use.
b. Do not use materials beyond manufacturer’s shelf life limits.

C. Existing Concrete:
1. On existing concrete substrates, remove mastics, adhesives, paint, and foreign matter:
a. Clean concrete surfaces free of dirt, debris, paint/oil splatters and other residue.
b. Remove curing compounds and sealers from concrete surfaces.
c. Leave concrete surfaces clean and dry, ready for polishing process.
d. Protect adjacent surfaces and finishes from damage by concrete polishing procedures.
e. Fill control joints and shave prior to grinding and polishing.

D. New Concrete: Verify new concrete has been in place for a minimum of 30 days.

3.4 STAINING

A. Prepare surfaces according to manufacturer's written instructions and as follows:
1. Clean concrete thoroughly by scraping, applying solvents or stripping agents, sweeping and pressure washing, or scrubbing with rotary floor machine and detergents recommended by stain manufacturer. Rinse until water is clear and allow surface to dry. Do not use acidic solutions to clean surfaces.
2. Test surfaces with droplets of water. If water beads and does not penetrate surface, or penetrates only in some areas, profile surfaces by grinding, sanding, or abrasive blasting. Retest and continue profiling surface until water droplets immediately darken and uniformly penetrate concrete surfaces.

3. Apply acidic solution to dampened concrete surfaces, scrubbing with uncolored, acid resistant nylon bristle brushes until bubbling stops and concrete surface has texture of 120 grit sandpaper. Do not allow solution to dry on concrete surfaces. Rinse until water is clear. Control, collect, and legally dispose of runoff.
4. Neutralize concrete surfaces and rinse until water is clear. Test surface for residue with clean white cloth. Test surface according to ASTM F710 to ensure pH is between seven and eight (7 - 8).

B. Score decorative jointing in concrete surfaces 1/16-inch (1.6 mm) deep with diamond blades to match pattern indicated. Rinse until water is clear. Score after staining:
1. Joint Width: 3/8 inch (10 mm).

C. Allow concrete surface to dry before applying stain. Verify readiness of concrete to receive stain according to ASTM D4263 by tightly taping 18-inch by 18-inch (450 mm x 450 mm), 4 mil (0.1 mm) thick polyethylene sheet to a representative area of concrete surface. Apply stain only if no evidence of moisture has accumulated under sheet after 16 hours.

D. Reactive Stain:
1. Apply reactive stain to concrete surfaces according to manufacturer's written instructions and as follows:
   a. Apply stain by uncolored bristle brush, roller, or high volume, low pressure sprayer and immediately scrub into concrete surface with uncolored, acid resistant nylon bristle brushes in continuous, circular motion. Do not spread stain after fizzing stops. Allow to dry four hours and repeat application of stain in sufficient quantity to obtain color consistent with approved mockup.
   b. Remove stain residue after four (4) hours by wet scrubbing with commercial-grade detergent recommended by stain manufacturer. Rinse until water is clear. Control, collect, and legally dispose of runoff.

E. Penetrating Stain:
1. Apply penetrating stain to concrete surfaces according to manufacturer's written instructions and as follows:
   a. Apply first coat of stain to dry, clean surfaces by airless sprayer or by high-volume, low-pressure sprayer.
   b. Allow to dry four (4) hours and repeat application of stain in sufficient quantity to obtain color consistent with approved mockup.
   c. Rinse until water is clear. Control, collect, and legally dispose of runoff.

3.5 PREPARATION

A. Cover and protect merchandise and racking to prevent damage or contamination of stored products. Provide dust drapes as required to protect merchandise from dust or debris.

B. Close areas to traffic during and after floor finish application for time period recommended by hardener/densifier manufacturer.

C. Cleaning Substrate:
1. Remove curing, sealing and coating agents, oil, breaking compound residue, wax, and grease by scraping off heavy deposits mechanically or chemically to assure penetration of product into surface:
   a. Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water.
   b. Remove dust and loose material by brushing, sweeping, vacuuming, and blowing with high pressure air.
   c. Remove paint residue with solvent/stripper, provided the stripper does not have an

acidic pH.

d. Remove tire marks and residue with recommended non-acidic cleaning agents:
   1) Comply with manufacturer's detailed instructions prior to mixing and removal.
   2) Dilute cleaning agent in recommended proportions to avoid etching concrete and opening of concrete pores.
e. Power scrub and rinse floor surface to remove soap residue and contaminants.
f. Squeegee dry.
g. No hazardous, flammable, toxic, or solvent based cleaning materials are permitted.

D. Grind protrusions flush with surface. Patch voids, holes, and cracks with recommended cementitious patching compound compatible with floor finish.

E. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and contaminants.

F. Protect surrounding and adjacent surfaces in accordance with floor finish manufacturer's written recommendations. Do not apply tape to the floor.

3.6 POLISHING

A. Apply concrete polishing in accordance with manufacturer's instructions to the selected sheen level:
   1. Polish:
      a. Level 1: Matte finish, 100 grit
      b. Level 2: Low sheen, 400 grit
      c. Level 3: High sheen, 800 grit
      d. Level 4: Gloss shine, 3,000 grit.

B. Apply polished concrete finish system to cured and prepared slabs to match accepted mockup:
   1. Grind concrete floor to within five inches (5") of walls and partitions using SF-40 grit, removing construction debris and floor slab imperfections and imparting a uniform scratch pattern in concrete surfaces. Thoroughly vacuum floor using a squeegee vacuum attachment to completely remove dust and debris.
   2. Machine grind floor surfaces to receive polished finishes level and smooth and to depth required to reveal aggregate to match approved mockup.
   3. Apply liquid densifier and/or reactive stain for polished concrete in polishing sequence and according to manufacturer's written instructions.
   4. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time, approximately two (2) hours, between successive coats. Remove excess material from surfaces.
   5. Grind concrete floor to within five inches (5") of walls and partitions using metal bonded diamond grits in a finer grit for each polishing, grinding 90 degrees from each previous grind and removing scratches from each previous grind. After each grind, thoroughly vacuum floor using a squeegee vacuum attachment to completely remove dust and debris.
   6. Apply penetrating stain for polished concrete in polishing sequence and according to manufacturer's written instructions.
   7. Continue polishing with progressively finer grit diamond polishing pads to gloss level, to match approved mockup.
   8. Control and dispose of waste products produced by grinding and polishing operations.
   9. Neutralize and clean polished floor surfaces.

C. Completed polished concrete floor shall have uniform sheen level and shall match accepted mock-up.

END OF SECTION - 03 35 43

SECTION 03 70 10 POST INSTALLED ANCHORS

PART 1 GENERAL

1.1 APPLICABLE SECTIONS

A. The requirements/provisions of the general and supplementary conditions and division 1 specification section shall apply to this section.

1.2 DESCRIPTION OF WORK

A. The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary for, required in connection with or properly incidental to furnishing and installing dowels in existing concrete, and masonry as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom, except as hereinafter specifically excluded.

B. Work included:
   1. Installation of adhesive anchors in existing concrete and masonry.
   2. Installation of expansion anchors in existing concrete and masonry.
   3. Installation of threaded anchors in existing concrete and masonry.

C. Related work specified elsewhere:
   1. Reinforcing Steel; Section 03 2000
   2. Cast-In-Place Concrete; Section 03 3000
   3. ~~Shotcrete; Section 03 3600~~
   4. Concrete Unit Masonry; Section 04 2200

1.3 QUALITY ASSURANCE

A. Codes and standards: comply with all federal, state and local codes and safety regulations. In addition, comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
   1. ACI 318, "building code requirements of reinforced concrete", current edition.
   2. California building code, current edition.

B. Testing and inspection: the owner shall employ an independent testing laboratory or the engineer as the owner's agent to perform the inspections and tests, shown on the contract drawings and submit certified test results. The contractor will cooperate with and notify the owner's agent at least 24 hours in advance of inspections required.

1.4 SUBMITTALS

A. General requirements:
   1. Submittals shall be made to the architect in accordance with the requirements of division 1, general requirements of these specifications.
   2. Construction and fabrication shall not begin until contractor has received submittals reviewed by architect governing all aspects of the intended work.

B. Product data: manufacturer's catalog sheets including instruction for use and description of application shall be provided on each of the following materials:
   1. Adhesive anchors - in addition to manufacturer's catalog sheets the contractor shall provide a written description of where each adhesive material will be used for each different application and an explanation of why the particular material was selected.
   2. Threaded anchors - in addition to manufacturer's catalog sheets the contractor shall provide a written description of where each anchor will be used for each different application and an explanation of why the particular material was selected.

3. Threaded anchors - in addition to manufacturer's catalog sheets the contractor shall provide a written description of where each anchor will be used for each different application and an explanation of why the particular material was selected.

PART 2 PRODUCTS

2.1 ADHESIVE ANCHORING SYSTEMS FOR CONCRETE

A. Adhesive anchoring systems shall have current ICC or IAPMO reports for shear and tension in cracked concrete per the requirements of the California building code. Adhesive anchors shall be used in strict accordance with manufacturer's recommendations. Subject to compliance with requirements provide one of the following:
1. HIT-RE 500 v3; Hilti [ICC ESR 3814].
2. HIT HY 200; Hilti [ICC ESR 3187].
3. SET-XP; Simpson Strong Tie [ICC ESR 2508].
4. AT-XP; Simpson Strong Tie [IAPMO UES ER 263].
5. PURE 110+; Dewalt\powers fasteners [ICC ESR 3298].
6. AC100+ gold; Dewalt\powers fasteners [ICC ESR 2582].
7. Approved equal.

2.2 EXPANSION ANCHORING SYSTEMS FOR CONCRETE

A. Expansion anchoring systems shall have current ICC or IAPMO reports for shear and tension in cracked concrete per the requirements of the California building code. Expansion anchors shall be used in strict accordance with manufacturer's recommendations. Subject to compliance with requirements provide one of the following:
1. Kwik Bolt TZ2; Hilti [ICC ESR 4266].
2. Strong bolt 2 wedge anchors; Simpson Strong Tie [ICC ESR 3037].
3. Power-stud+ sd2; dewalt\powers fasteners [ICC ESR 2502].
4. Approved equal.

2.3 THREADED ANCHORING SYSTEMS FOR CONCRETE

A. Threaded anchoring systems shall have current ICC or IAPMO reports for shear and tension in cracked concrete and grouted concrete block per the requirements of the California building code. Threaded anchors shall be used in strict accordance with manufacturer's recommendations. Subject to compliance with requirements provide one of the following:
1. KWIK HUS-EZ; Hilti [ICC ESR 3027].
2. TITEN HD; Simpson Strong Tie [ICC ESR 2713].
3. TITEN CONCRETE & MASONRY SCREW; Simpson Strong Tie.
4. SCREWBOLT+; Dewalt\Powers Fasteners [ICC ESR 3889-CONCRETE].
5. Approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation of post installed anchors, including drilling and cleaning of holes, shall be in accordance with the current ICC or IAPMO report and the manufacturer’s recommendations.
B. Holes shall be drilled by methods that will not shatter or damage the concrete adjacent to the holes. Holes drilled through members or into thin elements such as walls or slabs shall utilize rotary drills to avoid impact damage to the opposite side of the member.
C. Holes in which longitudinal or transverse reinforcement is encountered during drilling before the specified depth is attained shall be rejected. A new hole, which does not strike reinforcement, shall be drilled adjacent to the rejected hole to the depth shown on the plans. Abandoned holes shall be patched with high strength grout or other material approved by the engineer.

D. The contractor shall use non-destructive methods to locate existing reinforcement prior to drilling where designated on the plans at no additional cost.
E. Any dowels which fail to bond or are damaged before new concrete is placed shall be removed and replaced at the contractor's expense.
F. Adhesive anchors shall be installed in concrete having a minimum age of 21 days at the time of anchor installation.
G. Installation of adhesive anchors that are to be under sustained tension loading in horizontal to vertically overhead orientation shall be done by a certified adhesive installer (AAI) as certified through ACI and in accordance with ACI 318 section D.9.2.2. Proof of current certification shall be submitted to the engineer for approval prior to the commencement of installation.

3.2 FIELD QUALITY CONTROL

A. Testing and inspections: the owner's agent will perform the inspections shown on the contract drawings for the placement of post installed anchors.
B. Test results: test results shall be reported in writing to the architect and contractor on a weekly basis, but no later than 5 working days after the end of the week in which the tests were performed.
C. Additional tests: additional testing required due to failure of post installed anchors to achieve the specified requirements shall be performed by the owner's agent at the contractor's expense.

END OF SECTION 03 70 10

SECTION 04 01 20 MAINTENANCE OF UNIT MASONRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes maintenance of unit masonry in the area where demolition work is adjacent to the existing masonry building, including:
   1. Repairing unit masonry, including replacing units.
   2. Re-anchoring veneers.
   3. Repointing joints.
   4. Cleaning exposed unit masonry surfaces.

1.3 DEFINITIONS

A. Very Low Pressure Spray: Under 100 psi (690 kPa).

B. Low Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

1.4 SUBMITTALS

A. Product Data: Technical data for each type of product, including material descriptions and application instructions and test data substantiating that products comply with requirements.

B. Shop Drawings for the Following:
   1. Provisions for expansion joints or other sealant joints.
   2. Replacement and repair anchors. Include details of anchors within individual masonry units, with locations of anchors and dimensions of holes and recesses in units required for anchors.
   3. Field investigation report outlining work required after existing construction is removed from masonry surface.

C. Samples for Initial Selection for the Following:
   1. Pointing mortar: Submit sets of mortar for pointing in the form of sample mortar strips, six inches (150 mm) long.

1.5 QUALITY ASSURANCE

A. Paint Remover Manufacturer Qualifications: Firm having minimum five (5) years' documented experience who regularly engages in producing masonry cleaners, and with factory authorized service representatives who are available for consultation and site inspection**,** preconstruction product testing, and onsite assistance.

B. Chemical Cleaner Manufacturer Qualifications: Firm having minimum five (5) years' documented experience who is regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory authorized service representatives who are available for consultation and site inspection, preconstruction product testing, and onsite assistance.

C. Cleaning Program:
   1. Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used; protection of surrounding materials; and control of runoff during operations. Include provisions for supervising worker performance and preventing damage:
      a. If materials and methods other than those indicated are proposed for any phase of cleaning work, add a written description of such materials and methods, including evidence of successful use on comparable projects and demonstrations to show their effectiveness.

D. Mockups:
   1. Prepare mockups of cleaning on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution:
      a. Clean an area approximately 25 square feet (2.3 sq. m) for each type of masonry and surface condition:
         1) Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not test cleaners and methods known to have deleterious effect.
         2) Allow a waiting period of not less than seven (7) days after completion of sample cleaning to permit a study of sample panels for negative reactions.
      b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

E. Preconstruction Testing Service:
   1. Engage one (1) or more chemical cleaner [**and paint remover**] manufacturer(s) to perform preconstruction testing on masonry surfaces:
      a. Use test areas as indicated and representative of proposed materials and existing construction.
      b. Propose changes to materials and methods to suit.

F. Pre-Installation Conference:
   1. Conduct conference at Project site:
      a. Review methods and procedures related to cleaning masonry including, but not limited to, the following:
         1) Verify masonry cleaning equipment and facilities needed to make progress and avoid delays.
         2) Materials, material application, and sequencing.
         3) Cleaning program.
         4) Coordination with building occupants.

PART 2 PRODUCTS

2.1 CLEANING MATERIALS (VERIFY WITH LOCAL ORDENANCE)

A. Water: Potable.

B. Hot Water: Water heated to a temperature of 140 degrees F to 160 degrees F (60 degrees C to 71 degrees C).

C. Detergent Solution - Job Mixed: Solution prepared by mixing two cups (0.5 L) of tetrasodium pyrophosphate (TSPP), 1/2 cup (125 mL) of laundry detergent, and 20 quarts (20 L) of hot water for every five gallons (20 L) of solution required.

D. Mold, Mildew, and Algae Remover - Job Mixed: Solution prepared by mixing two cups

(0.5 L) of tetrasodium pyrophosphate (TSPP), five quarts (5 L) of five percent (5%) sodium hypochlorite (bleach), and 15 quarts (15 L) of hot water for every five gallons (20 L) of solution required.

E. Nonacidic Gel Cleaner:
   1. Gel formulation, with pH between six (6) and nine (9) that contains detergents with chelating agents and is specifically formulated for cleaning masonry surfaces:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) PROSOCO, Inc.
         2) AHI Supply Co.
         3) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

F. Nonacidic Liquid Cleaner:
   1. Mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) PROSOCO, Inc.
         2) AHI Supply Co.
         3) Diedrich Technologies, Inc.
         4) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

G. Mild acid cleaner containing no muriatic (hydrochloric), hydrofluoric, or sulfuric acid; or ammonium bifluoride or chlorine bleaches:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. PROSOCO, Inc.
      b. AHI Supply Co.
      c. Diedrich Technologies, Inc.; a division of Sandell Construction Solutions.
      d. Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

H. Acidic masonry cleaner composed of hydrofluoric acid or ammonium bifluoride blended with other acids, detergents, wetting agents, and inhibitors:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. PROSOCO, Inc.
      b. AHI Supply Co.
      c. American Building Restoration Products, Inc.
      d. Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

I. One-Part Limestone Acidic Cleaner:
   1. Manufacturer's standard one-part acidic formulation for cleaning limestone:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) PROSOCO, Inc.
         2) AHI Supply Co.
         3) American Building Restoration Products, Inc.
         4) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

J. Two-part chemical cleaner system consisting of potassium - or sodium hydroxide based, alkaline prewash cleaner and acidic afterwash cleaner that does not contain hydrofluoric acid:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. PROSOCO, Inc.
      b. AHI Supply Co.
      c. Diedrich Technologies, Inc.
      d. Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

2.2 ACCESSORY MATERIALS

A. Liquid Strippable Masking Agent:
   1. Liquid, film forming, strippable masking material for protecting glass, metal, glazed masonry, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) PROSOCO, Inc.
         2) American Building Restoration Products, Inc.
         3) Price Research, Ltd.
         4) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

2.3 CHEMICAL CLEANING SOLUTIONS

A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended in writing by chemical cleaner manufacturer.

B. Acidic Cleaner Solution for Non-Glazed Masonry and Unpolished Stone:
   1. Dilute acidic cleaner with water to produce hydrofluoric acid content of three percent (3%) or less, but not greater than that recommended in writing by chemical-cleaner manufacturer:
      a. Stones: Use only on unpolished granite, unpolished dolomite marble, and siliceous sandstone.

C. Acidic Cleaner for Glazed Masonry and Polished Stone:
   1. Dilute acidic cleaner with water to concentration demonstrated by testing that does not etch, or otherwise damage glazed or polished surface, but not greater than that recommended in writing by chemical-cleaner manufacturer:
      a. Stones: Use only on polished granite and polished dolomite marble.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation when existing and forecasted weather conditions permit masonry cleaning work to be performed according to product manufacturers' written instructions and specified requirements.

B. Clean masonry surfaces only when air temperature is 40 degrees F (4 degrees C) and above and is predicted to remain so for at least seven (7) days after completion of cleaning.

3.2 SEQUENCING AND SCHEDULING

A. Perform masonry cleaning work in the following sequence:
   1. Remove plant growth.
   2. Inspect for open mortar joints. Where repairs are required, delay further cleaning work until after repairs are completed, cured, and dried to prevent the intrusion of water and other cleaning materials into the wall.
   3. Remove paint.
   4. Clean masonry surfaces.
   5. Where water repellents are to be used on or near masonry, delay application of chemicals until after cleaning.

3.3 PROTECTION

A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent paint removers and chemical cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by contact:
   1. Cover adjacent surfaces with materials that are proven to resist paint removers and chemical cleaners used unless products being used will not damage adjacent surfaces. Use protective materials that are waterproof and UV resistant. Apply masking agents according to manufacturer's written instructions. Do not apply liquid strippable masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
   2. Do not apply chemical solutions during winds of enough force to spread them to unprotected surfaces.
   3. Neutralize alkaline and acid wastes before disposal.
   4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

B. Remove gutters and/or downspouts and associated hardware adjacent to immediate work area and store during masonry cleaning. Reinstall when masonry cleaning is complete:
   1. Provide temporary rain drainage during work to direct water away from building.

3.4 CLEANING MASONRY

A. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from 20 feet (6 m) away by Architect.

B. Proceed with cleaning working from top to bottom of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water do not wash over dry, cleaned surfaces.

C. Use cleaning methods indicated for each masonry material and location:
   1. Brushes: Do not use wire brushes or brushes that are not resistant to chemical cleaner being used.
   2. Spray equipment:
      a. Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that cleaning methods do not damage surfaces, including joints:
         1) Equip units with pressure gages.
         2) For chemical cleaner spray application, use low pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with nozzle having a cone shaped spray.
         3) For water spray application, use fan shaped spray that disperses water at an angle of 25 to 50 degrees.
         4) For high pressure water spray application, use fan shaped spray that

disperses water at an angle of at least 40 degrees.

5) For heated water spray application, use equipment capable of maintaining temperature between 140 degrees F and 160 degrees F (60 degrees C and 71 degrees C) at flow rates indicated.
6) For steam application, use steam generator capable of delivering live steam at nozzle.

D. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and produces an even effect without streaking or damaging masonry surfaces. Keep wall wet below area being cleaned to prevent streaking from runoff.

E. Perform additional general cleaning, paint and stain removal, and spot cleaning of small areas that are noticeably different when viewed, so cleaned surfaces blend smoothly into surrounding areas.

F. Water Application Methods:
1. Water soak application: Soak masonry surfaces by applying water continuously and uniformly to limited area for time indicated. Apply water at low pressures and low volumes in multiple fine sprays using perforated hoses or multiple spray nozzles. Erect a protective enclosure constructed of polyethylene sheeting to cover area being sprayed.
2. Water spray applications: Unless otherwise indicated, hold spray nozzle at least six inches (150 mm) from masonry surface and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.

G. Steam Cleaning: Apply steam to masonry surfaces at the very low pressures indicated for each type of masonry. Hold nozzle at least six inches (150 mm) from masonry surface and apply steam in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.

H. Chemical Cleaner Application Methods: Apply chemical cleaners to masonry surfaces according to chemical cleaner manufacturer's written instructions; use brush or spray application. Do not spray apply at pressures exceeding 50 psi (345 kPa). Do not allow chemicals to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.

I. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed:
1. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.

J. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.5 PRELIMINARY CLEANING

A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing remaining growth to dry as long as possible before removal. Remove loose soil and plant debris from open joints to whatever depth they occur.

B. Preliminary Cleaning:
1. Before beginning general cleaning, remove extraneous substances that are resistant to

planned cleaning methods. Extraneous substances include paint, calking, asphalt, and tar:

a. Carefully remove heavy accumulations of rigid materials from masonry surface with sharp chisel. Do not scratch or chip masonry surface.
b. Remove paint and calking with alkaline paint remover:
    1) Comply with requirements.
    2) Repeat application up to two (2) times if needed.
c. Remove asphalt and tar with solvent type paste paint remover:
    1) Comply with requirements.
    2) Apply paint remover only to asphalt and tar by brush without prewetting.
    3) Allow paint remover to remain on surface for ten (10) to 30 minutes.
    4) Repeat application if needed.

3.6 CLEANING MASONRY

A. Cold Water Soak:
1. Apply cold water by intermittent spraying to keep surface moist.
2. Use perforated hoses or other means that apply a fine water mist to entire surface being cleaned.
3. Apply water in cycles of five (5) minutes on and 20 minutes off.
4. Continue spraying until surface encrustation has softened enough to permit its removal by water wash, as indicated by cleaning tests.

B. Cold Water Wash: Use cold water applied by low, medium, or high pressure spray.

C. Hot Water Wash: Use hot water applied by low, medium, or high pressure spray.

D. Steam Cleaning: Apply steam at very low pressures not exceeding 80 psi (550 kPa). Remove dirt softened by steam with wood scrapers, stiff nylon or fiber brushes, or cold-water wash, as indicated by cleaning tests.

E. Detergent Cleaning:
1. Wet surface with water applied by low pressure spray.
2. Scrub surface with detergent solution using medium soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used, and that surface remains wet.
3. Rinse with water applied by high pressure spray to remove detergent solution and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

F. Mold, Mildew, and Algae Removal:
1. Wet surface with water applied by low pressure spray.
2. Apply mold, mildew, and algae remover by brush.
3. Scrub surface with medium soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used, and that surface remains wet.
4. Rinse with cold water applied by medium pressure spray to remove mold, mildew, and algae remover and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

G. Nonacidic Gel Chemical Cleaning:
1. Wet surface with cold water applied by low pressure spray.
2. Apply gel cleaner in 1/8-inch (3 mm) thickness by brush, working into joints and

crevices. Apply quickly and do not brush out excessively, so area is uniformly covered with fresh cleaner and dwell time is uniform throughout area being cleaned.
3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer.
4. Remove bulk of gel cleaner.
5. Rinse with water applied by low pressure spray to remove chemicals and soil.
6. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

H. Nonacidic Liquid Chemical Cleaning:
1. Wet surface with water applied by low pressure spray.
2. Apply cleaner to surface in two (2) applications by brush or low pressure spray.
3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer.
4. Rinse with cold water applied by medium pressure spray to remove chemicals and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

I. Mild Acid Chemical Cleaning:
1. Wet surface with cold water applied by low pressure spray.
2. Apply cleaner to surface in two (2) applications by brush or low pressure spray.
3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer.
4. Rinse with cold water applied by medium pressure spray to remove chemicals and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

J. Acidic Chemical Cleaning:
1. Wet surface with cold water applied by low pressure spray.
2. Apply cleaner to surface in two (2) applications by brush or low pressure spray.
3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer.

K. One-Part Limestone Chemical Cleaning:
1. Wet surface with water applied by low pressure spray.
2. Apply cleaner to surface by brush or low pressure spray.
3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer.
4. Immediately repeat application of one-part limestone cleaner as indicated above over the same area.
5. Rinse with water applied by medium pressure spray to remove chemicals and soil.

L. Two-Part Chemical Cleaning:
1. Wet surface with hot water applied by low pressure spray.
2. Apply alkaline prewash cleaner to surface by brush or roller.
3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer unless otherwise indicated.
4. Rinse with cold water applied by medium pressure spray to remove chemicals and soil.
5. Apply acidic afterwash cleaner to surface in two (2) applications, while surface is still wet, using low pressure spray equipment, deep nap roller or soft fiber brush. Let neutralizer remain on surface for period recommended in writing by manufacturer unless otherwise indicated.
6. Rinse with cold water applied by medium pressure spray to remove chemicals and soil.

7. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once.

3.7 FIELD QUALITY CONTROL

A. Manufacturer Field Service: Engage paint remover manufacturer's and chemical cleaner manufacturer factory authorized service representatives for consultation and Project site inspection, to perform preconstruction product testing, and provide onsite assistance when requested by Architect. Have paint remover manufacturer and chemical cleaner manufacturer factory authorized service representatives visit site not less than once to observing progress and quality of the work.

3.8 FINAL CLEANING

A. Clean adjacent non-masonry surfaces of spillage and debris. Use detergent and soft brushes or cloths.

B. Remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

C. Remove masking materials, leaving no residues that could trap dirt.

END OF SECTION 04 01 20

SECTION 04 01 23 MASONRY CLEANING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for masonry cleaning including but not limited to:
   1. Unit masonry surfaces.
   2. Accessories necessary.

1.3 DEFINITIONS

A. Very Low Pressure Spray: Under 100 psi (690 kPa).

B. Low Pressure Spray: 100 to 400 psi (690 to 2,750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

C. Medium Pressure Spray: 400 to 800 psi (2,750 to 5,510 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

D. High Pressure Spray: 800 to 1,200 psi (5,510 to 8,250 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

1.4 SUBMITTALS

A. Product Data: Technical data for each type of product, including material descriptions and application instructions and test data substantiating that products comply with requirements.

B. Preconstruction Test Reports: Submit reports for cleaning materials and methods.

C. Cleaning program.

1.5 QUALITY ASSURANCE

A. Paint Remover Manufacturer Qualifications: Firm having minimum five (5) years' documented experience who regularly engages in producing masonry cleaners, and with factory authorized service representatives who are available for consultation and site inspection, preconstruction product testing, and onsite assistance.

B. Chemical Cleaner Manufacturer Qualifications: Firm having minimum five (5) years' documented experience who regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory authorized service representatives who are available for consultation and site inspection, preconstruction product testing, and onsite assistance.

C. Cleaning Program:
   1. Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used; protection of surrounding materials; and control of runoff during operations. Include provisions for supervising worker performance and preventing damage:
      a. If materials and methods other than those indicated are proposed for any phase of cleaning work, add a written description of such materials and methods, including

evidence of successful use on comparable projects and demonstrations to show their effectiveness.

D. Mockups:
1. Prepare mockups of cleaning on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution:
   a. Clean an area approximately 25 square feet (2.3 sq. m) for each type of masonry and surface condition:
      1) Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not test cleaners and methods known to have deleterious effect.
      2) Allow a waiting period of not less than seven (7) days after completion of sample cleaning to permit a study of sample panels for negative reactions.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

E. Preconstruction Testing Service:
1. Engage one (1) or more chemical cleaner and paint remover manufacturer(s) to perform preconstruction testing on masonry surfaces:
   a. Use test areas as indicated and representative of proposed materials and existing construction.
   b. Propose changes to materials and methods to suit.

F. Pre-Installation Conference:
1. Conduct conference at site:
   a. Review methods and procedures related to cleaning masonry including, but not limited to, the following:
      1) Verify masonry cleaning equipment and facilities needed to make progress and avoid delays.
      2) Materials, material application, and sequencing.
      3) Cleaning program.
      4) Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

A. Perform masonry cleaning work in the following sequence:
1. Remove plant growth.
2. Inspect for open mortar joints. Where repairs are required, delay further cleaning work until after repairs are completed, cured, and dried to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry surfaces.
5. Where water repellents are to be used on or near masonry, delay application of chemicals until after cleaning.

B. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units according to masonry repair Sections. Patch holes in mortar joints according to masonry repointing Sections.

PART 2 PRODUCTS

2.1 MATERIALS

A. Alkaline Paste Paint Remover:

1. Alkaline paste or gel formulation for removing paint from masonry; containing no methylene chloride:
   a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      1) PROSOCO, Inc.
      2) Diedrich Technologies, Inc.
      3) EaCo Chem, Inc.
      4) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

B. Cleaning Materials:
   1. Water: Potable.
   2. Hot water: Water heated to a temperature of 140 degrees F to 160 degrees F (60 degrees C to 71 degrees C).
   3. Detergent solution, job mixed: Solution prepared by mixing two cups (0.5 L) of tetrasodium pyrophosphate (TSPP), 1/2 cup (125 mL) of laundry detergent, and 20 quarts (20 L) of hot water for every five gallons (20 L) of solution required.
   4. Mold, mildew, and algae remover, job mixed: Solution prepared by mixing two cups (0.5 L) of tetrasodium pyrophosphate (TSPP), five quarts (5 L) of five percent (5%) sodium hypochlorite (bleach), and 15 quarts (15 L) of hot water for every five gallons (20 L) of solution required.
   5. Nonacidic Gel Cleaner:
      a. Gel formulation, with pH between six (6) and nine (9), that contains detergents with chelating agents, and is specifically formulated for cleaning masonry surfaces:
         1) Manufacturers are subject to compliance with requirements; provide products by one of the following:
            a) PROSOCO, Inc.
            b) Dumond Chemicals, Inc.
            c) Price Research, Ltd.
            d) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.
   6. Nonacidic Liquid Cleaner:
      a. Mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood:
         1) Manufacturers are subject to compliance with requirements; provide products by one of the following:
            a) PROSOCO, Inc.
            b) Diedrich Technologies, Inc.
            c) Dumond Chemicals, Inc.
            d) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.
   7. Mild acid cleaner containing no muriatic (hydrochloric), hydrofluoric, or sulfuric acid; or ammonium bifluoride or chlorine bleaches:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) PROSOCO, Inc.
         2) Diedrich Technologies, Inc.
         3) American Building Restoration Products, Inc.
         4) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.
   8. Liquid, film forming, strippable masking material for protecting glass, metal, glazed masonry, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:

1) PROSOCO, Inc.
2) Price Research, Ltd.
3) American Building Restoration Products, Inc.
4) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

2.2 CHEMICAL CLEANING SOLUTIONS

A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended in writing by chemical cleaner manufacturer.

B. Acidic Cleaner Solution for Non-Glazed Masonry and Unpolished Stone:
   1. Dilute acidic cleaner with water to produce hydrofluoric acid content of three percent (3%) or less, but not greater than that recommended in writing by chemical cleaner manufacturer:
      a. Stones: Use only on unpolished granite, unpolished dolomite marble, and siliceous sandstone.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation when existing and forecasted weather conditions permit masonry cleaning work to be performed according to product manufacturers' written instructions and specified requirements.

B. Clean masonry surfaces only when air temperature is 40 degrees F (4 degrees C) and above and is predicted to remain so for at least seven (7) days after completion of cleaning.

3.2 PROTECTION

A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent paint removers and chemical cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by contact:
   1. Cover adjacent surfaces with materials that are proven to resist paint removers and chemical cleaners used unless products being used will not damage adjacent surfaces. Use protective materials that are waterproof and UV resistant. Apply masking agents according to manufacturer's written instructions. Do not apply liquid strippable masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
   2. Do not apply chemical solutions during winds of enough force to spread them to unprotected surfaces.
   3. Neutralize alkaline and acid wastes before disposal.
   4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

B. Remove gutters and downspouts and associated hardware adjacent to immediate work area and store during masonry cleaning. Reinstall when masonry cleaning is complete:
   1. Provide temporary rain drainage during work to direct water away from building.

3.3 CLEANING MASONRY

A. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as

viewed from 20 feet (6 m) away by Architect.

B. Proceed with cleaning working from top to bottom of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water do not wash over dry, cleaned surfaces.

C. Use cleaning methods indicated for each masonry material and location:
   1. Brushes: Do not use wire brushes or brushes that are not resistant to chemical cleaner being used.
   2. Spray equipment:
      a. Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that cleaning methods do not damage surfaces, including joints:
         1) Equip units with pressure gages.
         2) For chemical cleaner spray application, use low pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with nozzle having a cone shaped spray.
         3) For water spray application, use fan shaped spray that disperses water at an angle of 25 to 50 degrees.
         4) For heated water spray application, use equipment capable of maintaining temperature between 140 degrees F and 160 degrees F (60 degrees C and 71 degrees C) at flow rates indicated.

D. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and produces an even effect without streaking or damaging masonry surfaces. Keep wall wet below area being cleaned to prevent streaking from runoff.

E. Perform additional general cleaning, paint and stain removal, and spot cleaning of small areas that are noticeably different when viewed, so cleaned surfaces blend smoothly into surrounding areas.

F. Water Application Methods:
   1. Water soak application: Soak masonry surfaces by applying water continuously and uniformly to limited area for time indicated. Apply water at low pressures and low volumes in multiple fine sprays using perforated hoses or multiple spray nozzles. Erect a protective enclosure constructed of polyethylene sheeting to cover area being sprayed.
   2. Water spray applications: Unless otherwise indicated, hold spray nozzle at least six inches (150 mm) from masonry surface and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.

G. Chemical Cleaner Application Methods: Apply chemical cleaners to masonry surfaces according to chemical cleaner manufacturer's written instructions; use brush or spray application. Do not spray apply at pressures exceeding 50 psi (345 kPa). Do not allow chemicals to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.

H. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed:
   1. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.

I. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.4 PRELIMINARY CLEANING

A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing remaining growth to dry as long as possible before removal. Remove loose soil and plant debris from open joints to whatever depth they occur.

B. Preliminary Cleaning:
   1. Before beginning general cleaning, remove extraneous substances that are resistant to planned cleaning methods. Extraneous substances include paint, calking, asphalt, and tar:
      a. Carefully remove heavy accumulations of rigid materials from masonry surface with sharp chisel. Do not scratch or chip masonry surface.
      b. Remove paint and caulking:
         1) Comply with requirements.
         2) Repeat application up to two (2) times if needed.
      c. Remove asphalt and tar:
         1) Comply with requirements.
         2) Apply paint remover to asphalt and tar by brush without pre-wetting.
         3) Allow paint remover to remain on surface for ten (10) to 30 minutes.
         4) Repeat application if needed.

3.5 PAINT REMOVAL

A. Paint Remover Application: Apply paint removers according to paint remover manufacturer's written instructions. Do not allow paint removers to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.

B. Paint Removal with Alkaline Paste Paint Remover:
   1. Remove loose and peeling paint using low to medium pressure water spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
   2. Apply paint remover to dry, painted surface with brushes.
   3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
   4. Rinse with hot water applied by low pressure spray to remove chemicals and paint residue.
   5. Repeat process if necessary to remove all paint.
   6. Apply acidic cleaner or manufacturer's recommended afterwash to surface, while surface is still wet, using low pressure spray equipment or soft fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended in writing by chemical cleaner or afterwash manufacturer.
   7. Rinse with cold water applied by low pressure spray to remove chemicals and soil.

3.6 CLEANING MASONRY

A. Cold Water Soak:
   1. Apply cold water by intermittent spraying to keep surface moist.
   2. Use perforated hoses or other means that apply a fine water mist to entire surface being cleaned.
   3. Apply water in cycles of five (5) minutes on and 20 minutes off.
   4. Continue spraying until surface encrustation has softened enough to permit its removal by water wash, as indicated by cleaning tests.
   5. Remove soil and softened surface encrustation from surface with cold water applied by low pressure spray.

B. Cold Water Wash: Use cold water applied by low pressure spray.

C. Hot Water Wash: Use hot water applied by low to medium pressure spray.

D. Detergent Cleaning:
1. Wet surface with hot water applied by low pressure spray.
2. Scrub surface with detergent solution using medium soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that surface remains wet.
3. Rinse with hot water applied by low pressure spray to remove detergent solution and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

E. Mold, Mildew, and Algae Removal:
1. Wet surface with cold water applied by low pressure spray.
2. Apply mold, mildew, and algae remover by brush or low pressure spray.
3. Scrub surface with medium soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that surface remains wet.
4. Rinse with cold water applied by low pressure spray to remove mold, mildew, and algae remover and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

F. Mild Acid Chemical Cleaning:
1. Wet surface with cold water applied by low pressure spray.
2. Apply cleaner to surface in two (2) applications by brush or low pressure spray.
3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer.
4. Rinse with cold water applied by low pressure spray to remove chemicals and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

3.7 FINAL CLEANING

A. Clean adjacent non-masonry surfaces of spillage and debris. Use detergent and soft brushes or cloths.

B. Remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

C. Remove masking materials, leaving no residues that could trap dirt.

END OF SECTION 04 01 23

SECTION 04 05 00 MORTAR AND GROUT

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 SUMMARY

A. This Section is related to mortar and grout installation and includes:
   1. Provisions of all materials, labor, and accessories as required and specified for complete mortar and grout installation in masonry walls.

B. Related Sections:
   1. Section 03 30 00: Cast-In-Place Concrete.
   2. Section 04 22 00: Concrete Unit Masonry.
   3. Section 07 92 00: Joint Sealants.
   4. Section 09 30 00: Tiling.

C. Reference Standards:
   1. ASTM C144 Aggregate for Masonry Mortar.
   2. ASTM C150 Portland Cement.
   3. ASTM C207 Hydrated Lime for Masonry Purposes.
   4. ASTM C270 Standard Specification for Mortar For Unit Masonry.
   5. ASTM C404 Aggregates for Grout.
   6. ASTM C476 Standard Specification for Grout for Masonry.
   7. ASTM C1019 Method of Sampling and Testing Grout.
   8. 2025 California Building (CBC), with State of California Amendments:
      a. 2025 California Building (CBC), Section 2103A.
   9. Masonry Standards Joint Committee (MSJC).

1.3 SUBMITTALS

A. Mix design for mortar and grout shall be submitted for review.

B. Supplier’s certificates indicating materials comply with the specifications below. They shall include, but are not necessarily limited to:
   1. Aggregates.
   2. Cement.
   3. Admixtures.

1.4 QUALITY ASSURANCE

A. Tests and Inspections:
   1. A testing program is required prior to start of construction. Testing program to be done in compliance with the 2025 CBC requirements and in collaboration with the testing laboratory, design team, Contractor, and Owner, and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
   2. All tests and inspections herein are to be performed by an independent testing laboratory approved by the building official.
   3. Mortar and grout tests:

a. At the beginning of masonry work, at least one (1) test sample each of mortar and grout shall be taken on three (3) successive working days, then once per week with at least one sample taken for each 5,000 square feet of wall area, or fraction thereof:
   1) Test specimens shall be made in accordance with ASTM C1019 for grout and ASTM C780 for mortar.
   2) Test specimens shall be continuously stored in moist air until tested.
   3) Mortar shall show a compressive strength of not less than 1,800 psi at 28 days. Grout shall show a compressive strength of not less than 2,000 psi at 28 days.

4. A special inspector shall be employed per CBC Section 1705A.4 during the placement of all units, placement of all reinforcing steel, during all grouting operations, and during taking of all test specimens.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cement: ASTM C150, Type I or II, low alkali; natural gray.

B. Hydrated Lime: ASTM C207, Type S.

C. Quicklime: ASTM C5.

D. Lime Putty:
1. Made from hydrated lime or quicklime:
   a. If made from quicklime, other than processed pulverized quicklime, slake lime and then screen through a No. 16 mesh sieve. Before using, store and protect slaked and screened lime putty for not less than ten (10) days.
   b. Processed pulverized quicklime shall be slaked for not less than 48 hours, and shall be cool when used.
   c. Lime putty prepared from hydrated lime may be used immediately after mixing.
   d. Lime putty prepared from quicklime or pulverized quicklime shall have a plasticity figure, after slaking and screening, of not less than 200, and shall weigh not less than 83 pounds per cubic foot. Lime putty prepared from hydrated lime shall conform to ASTM C207, Type S.

E. Aggregate:
1. For mortar: ASTM C144.
2. For grout: ASTM C404.

F. Admixture: **Sika Grout Aid by Sika Corporation U.S.**
1. Substitutions with Architect’s approval, pursuant to conditions of Divisions 00 and 01.

G. Water: Suitable for domestic consumption.

2.2 MORTAR

A. Mortar shall be Type S having a 28-day compressive strength of not less than 1,800 psi and shall conform to CBC Section 2103A.9.

B. Mortar shall be made with admixtures that are proportioned, added and mixed in strict accordance with manufacturer's directions.

C. Mortar mix shall be proportioned by volume; one-part portland cement, not less than 1/4-

part nor more than 1/2-part lime putty, and sand totaling not less than 2-1/4 nor more than three (3) times sum of volumes of cement and lime used:

1. Total clay content shall not exceed two percent (2%) of sand content or six percent (6%) of cement content.

2.3 GROUT

A. Grout shall have a 28-day compressive strength of not less than 2,000 psi. Proportion by volume, and with sufficient water to produce consistency for pouring without segregation so that grout will flow into masonry joints. Grout shall conform to CBC Section 2103A.13.

B. Fine Grout:
1. One-part portland cement, to which may be added not more than 1/10-part lime putty, and three-parts sand.
2. Fine grout shall be used for all grout spaces less than three inches (3") wide.

C. Coarse Grout:
1. One-part portland cement, to which may be added not more than 1/10-part lime putty, three-parts sand, and not less than one-part nor more than two-parts pea gravel (3/8-inch maximum aggregate size).
2. Coarse grout shall be used in grout spaces three inches (3") wide or more.

D. Add Sika Grout Aid admixture to grout at the rate of one (1) pound per 100 pounds cementitious material.

PART 3 EXECUTION

3.1 MIXING MORTAR AND GROUT

A. Accurately measure materials in suitably calibrated devices; shovel measurements are not acceptable. Each 94-pound sack of portland cement will be considered as one (1) cubic foot.

B. Place sand, cement, and water in mixer, in that order, and mix for at least two (2) minutes. Add lime putty and continue mixing as long as necessary to secure a uniform mass, but in no case less than ten (10) minutes.

C. Use mixers of at least one (1) sack capacity; batches requiring fractional sacks will not be permitted unless cement is weighed for each batch.

3.2 GROUTING PROCEDURES

A. Specified under Sections 04 21 13: Brick Masonry and 04 22 00: Concrete Unit Masonry.

3.3 RETEMPERING

A. When necessary to retemper mortar, add water and remix; retempering by dashing water over mortar will not be permitted.

B. Any mortar that is unused within 30 minutes after initial mixing and any mortar that has begun to set shall not be used.

3.4 DEFECTIVE MORTAR OR GROUT

A. Should the strength of mortar or grout fall below that specified, remainder of Work shall be

adjusted to reach required strength. Work in place representing inferior grout and mortar and indicating a strength less than the minimum specified shall be tested by taking and testing core samples. Number and location of cores shall be determined by the structural Engineer.

B. Should compression tests of cores fail to meet required strength, masonry shall be deemed to be defective and shall be removed and replaced at no cost to Owner.

C. Costs relative to taking and testing of core samples shall be paid by Owner and will be deducted from Contract amount. Cost of patching core holes shall be borne by Contractor.

END OF SECTION 04 05 00

SECTION 04 22 00 CONCRETE MASONRY UNIT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including, but not limited to:
1. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcement.
4. Masonry insulation.
5. Accessories necessary for a complete installation.

B. Related Sections:
1. Section 03 20 00: Concrete Reinforcing.
2. Section 05 50 00: Metal Fabrications.
3. Section 07 92 00: Joint Sealants.

C. Reference Standards:
1. ACI: American Concrete Institute.
2. ASTM: American Society of Testing Materials.
3. CMACN: Concrete Masonry Association of California and Nevada.
4. NCMA: National Concrete Masonry Association.
5. TEK Bulletins.
6. TMS: The Masonry Society.

1.3 DEFINITIONS

A. CMU: Concrete Masonry Unit.

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

A. Provide unit masonry and structural unit masonry that develops indicated net-area compressive strengths at 28 days:
1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 402/602.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

1.5 SUBMITTALS

A. Product Data: Technical data including schedules and illustrations to indicate the performance, fabrication procedures, product variations, and accessories for each type of product.

B. Shop Drawings:

1. Masonry units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Show elevations of reinforced walls.
3. Fabricated flashing: Detail corner units, end dam units, and other special applications.

C. Samples:
1. Submit each type and color of the following:
a. Exposed or decorative CMU.

D. Material Certificates:
1. Submit for each type and size:
a. Masonry units: Include data on material properties and material test reports substantiating compliance with requirements.
b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
c. Integral water repellent used in CMU.
d. Cementitious materials: Include name of manufacturer, brand name, and type.
e. Mortar admixtures.
f. Preblended, dry mortar mixes: Include description of type and proportions of ingredients.
g. Grout mixes: Include description of type and proportions of ingredients.
h. Reinforcing bars.
i. Joint reinforcement.
j. Anchors, ties, and metal accessories.

E. Mix Designs:
1. Submit for each type of mortar and grout with description of type and proportions of ingredients:
a. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
b. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

F. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 402/602.

G. Cold Weather and Hot Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

H. Statement of Understanding: Provide statement signed by Contractor and masonry subcontractors that for high-lift Grouting, the contractor has read, understood, and will follow all requirements of DSA Interpretation of Regulations (IR) 21-2.13. A copy of the IR shall be on site for review.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Building Code:
a. Comply with applicable requirements of Chapter 21A of the 2025 California Building Code:
1) Masonry standard: Comply with TMS 402/602 unless modified by requirements in the Contract Documents.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source.

D. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

PART 2 PRODUCTS

2.1 UNIT MASONRY

A. Masonry Standard: Comply with TMS 402/602, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed work or within 20 feet (6 m) vertically and horizontally of a walking surface.

C. Fire Resistance Ratings:
   1. Comply with requirements for fire resistance rated assembly designs indicated:
      a. Where fire resistance rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Shapes:
   1. Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated:
      a. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
      b. Provide bullnose units for outside corners unless otherwise indicated.

B. Integral Water Repellent:
   1. Provide units made with integral water repellent for exposed units and where indicated:
      a. Liquid polymeric, integral water repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E514/E514M as a wall assembly made with mortar containing integral water repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen:
         1) Manufacturers are subject to compliance with requirements; provide products by one of the following:
            a) BASF Corporation.
            b) GCP Applied Technologies.

C. CMU:
   1. ASTM C90, loadbearing and/or ASTM C129 non-load bearing:
      a. Fire Rating: Two (2) hours or four (4) hours.
      b. Unit compressive strength: Provide units with minimum average net-area compressive strength of 2,150 psi (14.8 MPa).
      c. Density classification: Lightweight unless otherwise indicated.
      d. Size (width): Manufactured to dimensions 3/8-inch (10 mm) less than nominal dimensions.
      e. Exposed faces: Provide color and texture matching the range represented by Architect's sample.
      f. Faces to receive plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.3 MASONRY LINTELS

A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMU matching adjacent CMU in color, texture, and density classification with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 MORTAR AND GROUT MATERIALS

A. Comply with 2025 CBC Chapter 21A for masonry mortar and grout.

B. Portland Cement:
   1. ASTM C150/C150M, 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:
      a. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.

C. Hydrated Lime: ASTM C207, Type S (loadbearing).

D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

E. Mortar Pigments:
   1. Natural and synthetic iron oxides and chromium oxides compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) Davis Colors.

2) Lanxess Corporation.
3) Solomon Colors, Inc.

F. Colored Cement Products:
1. Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements and containing no other ingredients:
a. Colored portland cement-lime mix:
1) Manufacturers are subject to compliance with requirements; provide products by one of the following:
a) Lehigh Hanson.
b) LafargeHolcim.
b. Formulate blend to produce color selected.
c. Pigments shall not exceed ten percent (10%) of portland cement by weight.

G. Aggregate for Mortar: ASTM C144.

H. Aggregate for Grout: ASTM C404.

I. Cold Weather Admixture:
1. Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated:
a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
1) BASF Corporation.
2) Euclid Chemical.
3) GCP Applied Technologies.

J. Water Repellent Admixture:
1. Liquid water repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer:
a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
1) BASF Corporation; Construction Systems.
2) Euclid Chemical Company (The); an RPM company.
3) Grace Construction Products.

K. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60 (Grade 420).

B. Reinforcing Bar Positioners:
1. Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Form units from 0.148-inch (3.77 mm) steel wire, hot dip galvanized after fabrication. Provide units designed for number of bars indicated:
a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
1) Heckmann Building Products, Inc.
2) Hohmann & Barnard, Inc.
3) Wire-Bond.

2.6 TIES AND ANCHORS

A. Ties and Anchors: Extend ties and anchors a minimum 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16 mm) cover on outside face.

B. Materials:
   1. Provide ties and anchors made from materials complying with the following unless otherwise indicated:
      a. Hot dip galvanized, carbon steel wire: ASTM A1064/A1064M, with ASTM A153/A153M, Class B-2 coating.
      b. Stainless steel wire: ASTM A580/A580M, Type 306.

C. Individual Wire Ties:
   1. W-shaped ties with ends bent 90 degrees to provide hooks not less than two inches (50 mm) long may be used for rock veneer.
   2. Wire: Fabricate from #9AWG corrosion resistant wire.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1, compressible up to 35 percent, of width and thickness indicated, formulated from urethane or PVC.

B. Preformed Control Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, 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 felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

2.8 MASONRY CLEANERS

A. Detergent Cleaner: Bucket and brush hand cleaning method, BIA Technical Notes 20.

B. Proprietary Acidic Cleaner:
   1. Cleaner designed for removing mortar/grout stains, efflorescence, and construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) PROSOCO, Inc.
         2) Diedrich Technologies, Inc.

2.9 MORTAR AND GROUT MIXES

A. 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 mortar exposed to view, regardless of weather conditions to ensure that mortar color is consistent.

B. 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 site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Type S.

D. Grout for Unit Masonry - Comply with ASTM C476:
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that complies with TMS 402/602 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C476, for specified 28-day compressive strength not less than 2,000 psi (14 MPa).

2.10 LIQUID SURFACE TREATMENTS

A. Penetrating Liquid Treatment:
   1. Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components, odorless, that penetrates, hardens, and densifies concrete surfaces:
      a. Basis-of-design product: Subject to compliance with requirements, provide Moxie International Inc.; **Moxie Shield 1400 Surface Sealer or Moxie Shield Shield 1300 Sealer**, P.O. Box 838 Loomis, CA 95650. Contact manufacturer's representative: P:916-251-0825, F: 877-330-1930 Email: info@moxieshield.com.
      b. Products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Protection of Masonry:
   1. During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress:
      a. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three (3) days after building masonry walls or columns.

C. Stain Prevention:
   1. Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry:
      a. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
      b. Protect sills, ledges, and projections from mortar droppings.
      c. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
      d. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold Weather Requirements:
   1. 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 TMS 402/602:

a. Cold weather cleaning: Use liquid cleaning methods only when air temperature is 40 degrees F (4 degrees C) and higher and will remain so until masonry has dried, but not less than seven (7) days after completing cleaning.

E. Hot Weather Requirements: Comply with hot weather construction requirements contained in TMS 402/602.

3.2 COORDINATION

A. Build openings and chases for heating, plumbing, electrical ducts, pipes, and conduits into masonry walls as necessary. Install bolts, toggles, flashings, beams, anchors, hangers, nailing strips, wall plugs, and frames as necessary:
   1. Coordinate related work incorporating installation of work to prevent subsequent cutting and patching.
   2. Coordinate installation of steel reinforcement for reinforced masonry.
   3. Coordinate dampproofing, waterproofing, and air infiltration membrane activities with masonry construction.
   4. Coordinate placement of concrete in masonry beams, lintels, soffits, and pilasters.

3.3 EXAMINATION

A. Examine conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the work:
   1. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the work.
   2. Verify foundations are within tolerances specified.
   3. Verify reinforcing dowels are properly placed.
   4. Verify substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation after correcting unsatisfactory conditions.

3.4 INSTALLATION

A. Thickness: Build single wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. 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.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing

masonry.

3.5 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 (12 mm) or minus 1/4 inch (6 mm).
   2. For location of elements in Plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) 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 ten feet (6 mm in 3 m), or 1/2-inch (12 mm) 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 ten feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
   3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in ten feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) 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 ten feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
   5. For lines and surfaces, do not vary from straight by more than 1/4 inch in ten feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
   6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in ten feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
   7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
   1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
   2. For exposed bed joints, do not vary from bed joint thickness of adjacent courses by more than 1/8 inch (3 mm).
   3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
   4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).
   5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.5 mm) from one masonry unit to the next.

3.6 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. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond. Do not use units with less than nominal four-inch (100 mm) horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course; do not tooth. When resuming work, clean masonry surfaces that are to receive

mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified. 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 CMU with grout.

3.7 MORTAR BEDDING AND JOINTING

A. Lay CMU:
1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

C. Cut joints flush for masonry walls to receive plaster or other direct applied finishes (other than paint) unless otherwise indicated.

3.8 ANCHORED ROCK VENEERS

A. Anchor rock veneers to concrete masonry backup with masonry anchor ties and veneer ties as indicated on the Drawings. Comply with the following requirements:
1. Embed anchor ties in masonry joints per Drawings.
2. Fasten veneer ties to masonry backup through loops of anchor ties projecting from masonry surface.
3. Space anchors ties as indicated, but not more than 12 inches o.c. vertically and 12 inches o.c. horizontally, with not less than one (1) anchor for each one (1) square foot of wall area. Install additional anchors at openings and at intervals, not exceeding eight inches (203 mm), around perimeter.

B. Provide not less than 1/2 inch of airspace between back of masonry veneer and face of masonry:
1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.9 CONTROL AND EXPANSION JOINTS

A. Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry:

1. Fit bond breaker strips into hollow contour in ends of CMU on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.10 LINTELS

A. Provide masonry lintels where shown and where openings of more than 24 inches (610 mm) for block size units are shown without structural steel or other supporting lintels.

B. Provide minimum bearing of eight inches (200 mm) at each jamb unless otherwise indicated.

3.11 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores:
   1. Construct formwork and shores as needed to support reinforced masonry elements during construction:
      a. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
      b. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 402/602.

C. Grouting:
   1. Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure:
      a. Comply with requirements in TMS 402/602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.12 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 comply with specified requirements shall be done at Contractor's expense.

B. Inspections:
   1. Special inspections according to Level C in TMS 402/602:
      a. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
      b. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
      c. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One (1) set of tests.

D. Testing Frequency: One (1) set of tests for each 5,000 square feet (464 sq. m) of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.

F. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for compressive strength.

G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, damaged, or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning:
   1. After mortar is thoroughly set and cured, clean exposed masonry:
      a. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
      b. Test cleaning methods on sample wall panel; leave 1/2 of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
      c. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
      d. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
      e. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
      f. Clean stone trim to comply with stone supplier's written instructions.

3.14 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from site.

B. Waste Disposal as Fill Material:
   1. Dispose of clean masonry waste, including excess or soil contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed:
      a. Crush masonry waste to less than four inches (100 mm) in each dimension.
      b. Mix masonry waste with at least two (2) parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31.
      c. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. Masonry Waste Recycling: Return broken CMU not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove and legally dispose excess clean masonry waste that cannot be used as fill or otherwise recycled, and masonry waste.

END OF SECTION 04 22 00

1. Fit bond breaker strips into hollow contour in ends of CMU on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.10 LINTELS

A. Provide masonry lintels where shown and where openings of more than 24 inches (610 mm) for block size units are shown without structural steel or other supporting lintels.

B. Provide minimum bearing of eight inches (200 mm) at each jamb unless otherwise indicated.

3.11 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores:
   1. Construct formwork and shores as needed to support reinforced masonry elements during construction:
      a. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
      b. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 402/602.

C. Grouting:
   1. Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure:
      a. Comply with requirements in TMS 402/602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.12 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 comply with specified requirements shall be done at Contractor's expense.

B. Inspections:
   1. Special inspections according to Level C in TMS 402/602:
      a. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
      b. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
      c. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One (1) set of tests.

D. Testing Frequency: One (1) set of tests for each 5,000 square feet (464 sq. m) of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.

F. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for compressive strength.

G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, damaged, or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning:
   1. After mortar is thoroughly set and cured, clean exposed masonry:
      a. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
      b. Test cleaning methods on sample wall panel; leave 1/2 of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
      c. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
      d. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
      e. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
      f. Clean stone trim to comply with stone supplier's written instructions.

3.14 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from site.

B. Waste Disposal as Fill Material:
   1. Dispose of clean masonry waste, including excess or soil contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed:
      a. Crush masonry waste to less than four inches (100 mm) in each dimension.
      b. Mix masonry waste with at least two (2) parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31.
      c. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. Masonry Waste Recycling: Return broken CMU not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove and legally dispose excess clean masonry waste that cannot be used as fill or otherwise recycled, and masonry waste.

END OF SECTION 04 22 00

SECTION 05 12 00 | STRUCT STEEL & MISC. IRON

PART 1 GENERAL

1.1 APPLICABLE SECTION

A. The requirements/provisions of the General and Supplementary Conditions and Division 1 Specification Section shall apply to this section.

1.2 DESCRIPTION OF WORK

A. The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary for, required in connection with or properly incidental to furnishing, fabricating, priming, and erecting structural steel and miscellaneous iron complete in place, as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom, except as hereinafter specifically excluded.

B. Work Included:
1. All structural steel indicated on the drawings.
2. Furnishing all column anchor bolts and base assemblies with nuts and washers.
3. Supervision of the placement of anchor bolt assemblies

C. Related Work Specified Elsewhere:
1. Cast-in-place Concrete; Section 03 30 00
2. Grouting of Column Bases; Section 03 30 00
3. Placement of Anchor Bolts, Assemblies, and Embeds; Section 03 30 00

1.3 REFERENCE STANDARDS

A. The following is a list of reference standards referred to in this portion of the specification:
1. ASTM A36, "Specification for Carbon Structural Steel"
2. ASTM A53, "Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless"
3. ASTM A307, "Specification for Carbon Steel Bolts and Studs"
4. ASTM A500, "Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes"
5. ASTM A572, “Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel”
6. ASTM A992, “Specification for Steel for Structural Shapes for use in Building Framing”
7. ASTM F1554 “Specification for Anchor Bolts, Steel”
8. ASTM F3125 “Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated”
9. SSPC, "Systems and Specifications, Steel Structures Painting Manual Volume 2" by Steel Structures Painting Council.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with all Federal, State, and Local codes and safety regulations. In addition, the fabrication, priming, and erection of structural steel shall comply with all the applicable provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
1. "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings" by the American Institute of Steel Construction, current edition.
2. "Codes of Standard Practice for Steel Buildings and Bridges" by said AISC, current edition.
3. A.W.S. "Structural Welding Code – Steel," D1.1, current edition.

4. A.W.S. "Structural Welding Code – Seismic Supplement," D1.8, current edition.
5. "Specifications for Structural Joints using ASTM A325 or A490 bolts," current edition as approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation, and endorsed by the AISC.

B. Qualifications: Welding processes and welding operators shall be qualified in accordance with AWS "Standard Qualification Procedure". Welders to be employed are to provide AWS certification for the type of welding necessary.

C. Mill Certificates: The Contractor shall provide Mill Certificates for structural steel and miscellaneous iron in accordance with the requirements of Part 1.05, "Submittals", of this specification section. When Mill Certificates cannot be provided, laboratory test reports shall be provided in accordance with the requirements of Part 1.05, "Submittals", of this specification section.

D. Sampling, Testing, and Inspection:
1. General:
   a. All materials and work shall be subject to inspection at the mill, the fabricating shop, and at the building site. Material or workmanship not complying fully with the drawings, and/or specifications will be rejected.
   b. If the inspector, through oversight or otherwise, has accepted material or work which is defective or contrary to specifications, this material or work, regardless of state of completion, may be rejected.
2. Owner: The Owner shall employ an independent testing agency or the Engineer as the Owner's agent to perform sampling, testing, and inspections as shown on the contact drawings and submit certified test results.
3. Contractor:
   a. The Contractor shall cooperate with and notify Owner's agent at least 24 hours in advance of inspections required and shall supply samples, test pieces, and facilities for inspection without extra charge.
   b. The Contractor shall identify and tag each lot of fabricated steel to be shipped to the site by heat numbers in such a manner that it can be accurately identified at the job site.
   c. The Contractor shall remove all unidentified steel received at the site.

1.5 SUBMITTALS

A. General Requirements
1. Submittals shall be made to Architect in accordance with the requirements of Division 1, General Requirements of these specifications.
2. Construction, and fabrication or ordering of materials shall not begin until Contractor has received submittals reviewed by Architect governing all aspects of the intended work.

B. Shop Drawings:
1. Shop drawings for steel fabrications shall be submitted for review.
2. Submittals shall include anchor bolt setting plans, erection drawings and fabrication drawings. Information shown on the shop drawings shall include, but not be limited to, the following:
   a. Anchor bolt setting plans shall show layout, anchor bolts sizes and grades, embedment, and template construction.
   b. Erection Drawings shall show layout, marking and position of each member, and field connections.
   c. Fabrication Drawings shall show details of members, including sizes, grades, connections, spacing of bolts and welds, designation of Architecturally Exposed Structural Steel, and the limits of paint applications.
3. Partial submittals shall be clearly identified by the contractor.

4. The omissions from the shop and installation drawings of any materials shown on the Specifications shall not relieve the contractor of the responsibility of furnishing and installing such materials, even though such drawings may have been returned and reviewed.
5. Shop drawings and calculations for temporary shoring and bracing shall be submitted for review. The shop drawings shall show layout, size of members and connection details. Calculations shall show all stresses in members and connections, from dead, live, and lateral loads in accordance with the requirements of the C.B.C. current governing edition. Shop drawings and calculations for temporary shoring and bracing shall be stamped and signed by a civil engineer registered in the State of California.
6. Contract drawings shall not be reproduced in whole or in part. Contract drawings modified into shop drawings will be returned without review.
7. Revised submittals shall have clear indications of revised or new information. Clouding is an acceptable form of identification.

C. Mill Certificates:
1. The Contractor shall provide Mill Certificates for each grade of steel for each heat to be used on project.
2. Mill Certificates shall meet the requirements of AISC 360 and all applicable ASTM standards.
3. Mill Certificates shall be furnished with each lot of material shipped to the site and shall be signed by the Contractor which will serve to certify that all structural steel materials installed comply with specified requirements.
4. When Mill Certificates cannot be provided, the Contractor shall hire a professional testing laboratory to verify compliance of each type of material to be used and provide laboratory test reports. The cost of testing shall be paid for by the Contractor.

D. Laboratory Test Reports:
1. Laboratory test reports shall show the name of testing agency, date of testing, types of tests performed and shall be signed by a principal of the testing agency who is a registered civil engineer in the State of California.
2. When required by other portions of these specifications, laboratory test reports shall be submitted for each type of steel for each heat to show compliance with appropriate ASTM Standards and these specifications.

E. Welding Procedure Specifications:
1. Welding procedure specifications for all prequalified joints shall be submitted per AWS D1.1, 5.1.2 to the Engineer and reviewed prior to beginning fabrication. Non prequalified joints shall be qualified per AWS requirements.

1.6 DEFINITIONS

A. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.
1. Provide “AESS” as follows: Exposed structural steel that is within 16 feet vertically and 10 feet horizontally of a walking surface and is visible to a person standing on that walking surface.

PART 2 PRODUCTS

2.1 MATERIAL

A. Structural Steel Wide Flange and Tee Shapes: Shall be new and shall conform to the requirements of ASTM A992.

B. Structural Steel Channels and Angles: Shall be new and shall conform to the requirements of ASTM A36.

C. Structural Steel Plate: Shall be new and shall conform to the requirements of ASTM A572.

D. Structural Steel Tubes: Shall be new and shall conform to the requirements of ASTM A500, Grade C.

E. Steel Pipe: ASTM A53, Types E or S, Grade B, with sulphur not exceeding .05%.

F. Arc-welding Electrodes: Arc-welding electrodes shall be E70 series electrodes for A36, A572 and A992 material, E80 Series for A706 reinforcing steel and E90 series for A615 reinforcing steel. Electrodes shall be as recommended by their manufacturers for the positions and conditions of actual use. All welds used in members and connections in the seismic Force Resisting System shall be made with filler metals meeting the requirements specified in AWS D1.8 clause 6.3.

G. High Strength Bolts: High strength bolts (HSB) shall conform to ASTM F3125 Grade A325.

H. Machine Bolts: Machine bolts (MB) and sag rods shall conform to ASTM A307, manufactured to American Standard Bolt and Nut dimensions with "Free Fit - Class 2" threads. All unfinished bolts shall have an approved lock washer under nut.

I. Prime Coat: Prime coat for interior members shall meet the requirements of SSPC-Paint 25 or acceptable equal. Prime coat for exterior members shall meet the requirements of SSPC-Paint 20 or acceptable equal.

J. Smooth Rods: Smooth Rods shall conform to ASTM A36.

K. Anchor Bolts: Anchor bolts shall conform to ASTM F1554 grade 36.

L. Headed Studs, Deformed Bar Anchors, and Threaded Studs: Headed Studs shall be H4L or S3L; Deformed Bar Anchors shall be D2L and Threaded Studs shall be CPL as manufactured by TRW Nelson Stud or equal.

M. High Strength Rods: High strength rods shall conform to ASTM F1554 grade 55, unless noted otherwise.

N. Nuts shall be as shown below and finish shall match fastener.

	Fastener Grade & Size	Nut Class	Nut Style
Bolts:			
ASTM F3125 Gr A325	Type 1, Uncoated	ASTM A563-C,C3,D,DH, DH3	Heavy Hex
	Type 1, Zinc Coated	ASTM A563-DH	Heavy Hex
	Type 3, Uncoated	ASTM A563-C3,DH3	Heavy Hex
ASTM F3125 Gr A490	Type 1, Uncoated	ASTM A563-DH,DH3	Heavy Hex
	Type 3, Uncoated	ASTM A563-DH3	Heavy Hex
Rods:			
ASTM F1554	¼" to 1½" Uncoated	ASTM A563-A	Heavy Hex
	Over 1½" to 3" Uncoated	ASTM A563-DH	Heavy Hex
	¼" to 3" Zinc Coated	ASTM A563-DH	Heavy Hex

O. Washers shall be flat circular, rectangular or square beveled washers and shall conform to ASTM F436 Type 1. Finish shall match nut. Washers shall be installed under the element being turned for A325 bolts and under both the head and the nut for A490 bolts.

2.2 FABRICATION

A. Welding: Welding shall be by operators who are qualified by test as per AWS "Standard Qualification Procedure" to perform type of work required.

B. High Strength Bolting: All high strength bolted connections shall be bearing type connections unless otherwise noted on the plans. Where noted on the plans, high strength bolted connections shall be slip critical type connections.

C. Bolts, rods, washers and nuts exposed to weather shall be hot dipped galvanized steel in compliance with ASTM A153.

D. Straightness (camber and sweep) Tolerance:
   1. Unless otherwise noted, straightness tolerances shall be per ASTM A6.
   2. Sweep tolerance for channels and angles: Maintain a maximum variation of 1/8” times the number of feet of total length divided by 5, unless alternate criteria is approved by the Engineer.

E. Painting:
   1. Priming: Painting under this section is limited to priming.
      a. The prime coat shall be applied in the shop and touched up after erection. Anchor bolts and column assemblies 2 inches and more below finish floor shall be left unpainted. High strength bolted connections shall be left unpainted within 3" of connection.
      b. Paint shall be delivered to shop in original sealed containers marked with manufacturer's name and brand identification.
      c. Use paint as prepared by the manufacturer without thinning or other admixture unless so stated by the manufacturer. Execute painting on a dry clean surface, free from rust, loose scale or grease. Do not do any painting in temperatures lower than 45 degrees F.

PART 3 EXECUTION

3.1 WORKMANSHIP

A. The workmanship shall be in accordance with AISC Standard Specifications, and shall be of the highest quality found in contemporary structural work.

B. All exposed gaps or bolt holes as a result of slotted gusset plates or erection bolts shall be filled and ground smooth. Erection bolts shall be removed after welding. Exposed ends of pipes and hollow sections shall be sealed with a cap plate and ground smooth unless noted otherwise on the architectural drawings.

C. For Architecturally Exposed Structural Steel (AESS) shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection. Handle and fabricate AESS with special care including the following:
   1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
   2. Grind sheared, punched, and flame-cut edges of AESS to remove burrs and provide smooth surfaces and edges.
   3. Fabricate AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
   4. Fabricate AESS with exposed surfaces free of seams to maximum extent possible.
   5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
   6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.

7. Fabricate AESS to the tolerances specified in AISC 303 Section 10.2 for steel that is designated AESS.
8. Seal-weld open ends of hollow structural sections with 5/16-inch closure plates for AESS.
9. Ease exposed edges to a radius of approximately 1/32 inch radius, unless otherwise shown on the drawings. Miter exposed corner joints and machine fit to a hairline joint.
10. Coping and Blocking Tolerance: Maintain a uniform gap of 1/8”+/- 1/32” at all copes and blocks.
11. Joint gap Tolerance: Maintain a uniform gap of 1/8”+/- 1/32”.
12. Straightness (camber and sweep) Tolerance: Maintain one half the standard camber and sweep tolerances for rolled shapes in ASTM A6, per AISC 303 Section 10.2.2.

3.2 ERECTION

A. The Contractor will be responsible to erect the complete structural frame plumb and true to line and grade, in conformance with the AISC Code of Standard Practice.

B. Temporary Bracing and Shoring:
1. The Contractor shall temporarily brace the frame in both directions and shall maintain columns plumb until the final connections of the framework and construction of diaphragms are complete.
2. The Contractor shall provide such temporary shoring and additional bracing of steel frame as required to adequately and safely support any or all loads imposed upon the structure during construction.
3. Submit shop drawings for temporary bracing and shoring in accordance with the requirements of Part 1.5 "Submittals", of this specification section.

C. Field Painting:
1. After erection, all field welds, field bolts and abraded or scratched surfaces shall be cleaned and given an additional spot coat of the same paint used for the shop coat. The entire work shall be left in a neat, clean and acceptable condition.

3.3 FIELD QUALITY CONTROL

A. Inspections: The Owner's agent will perform the inspections shown on the contract drawings.

B. Contractor:
1. The Contractor shall hire the Engineer responsible for the design of temporary bracing and shoring to inspect the work as detailed on the reviewed shop drawings.
2. The Engineer responsible for design, temporary bracing and shoring shall write a letter to the Architect certifying construction of temporary bracing and shoring is in accordance with the reviewed shop drawings, prior to start of construction requiring temporary bracing or shoring.

END OF SECTION - 05 12 00

SECTION 05 50 00 | METAL FABRICATIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Metal ladders.
   2. Pipe, downspout guards.
   3. Handrails and brackets.
   4. Mechanical Curbs.
   5. Accessories necessary for a coordinated and complete installation.

B. Related Sections:
   1. Section 03 30 00: Cast in Place Concrete.
   2. Section 09 21 16: Gypsum Board Assemblies.
   3. Section 09 24 00: Cement Plastering.
   4. Section 09 90 00: Painting and Coating.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance of Ladders: Provide ladders and landings capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

B. Thermal Movements:
   1. Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss:
      a. Temperature change (range): 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.

1.4 SUBMITTALS

A. Product Data: Submit data for miscellaneous metal fabrications and paint, coatings, and grout accessories.

B. Shop Drawings:
   1. Submit shop drawings detailing the fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items:
      a. For installed products indicated to comply with design loads, include structural analysis data, for information only, signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding Certificates.

D. Paint Compatibility Certificates: Submit manufacturers of topcoats applied over shop

primers, certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code - comply with applicable provisions of the CBC 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA):
      a. CBC Section 11B-504 where applicable.
   2. Welding - qualify procedures and personnel according to the following:
      a. AWS D1.1/D1.1M Structural Welding Code – Steel.
      b. AWS D1.2/D1.2M Structural Welding Code - Aluminum.
      c. AWS D1.3/D1.3M Structural Welding Code - Sheet Steel.
      d. AWS D1.6/D1.6M Structural Welding Code - Stainless Steel.
      e. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

B. Fabricator/Installer Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project for a minimum of five (5) years, with a record of successful in-service performance, with sufficient production capacity to produce required units without causing delay in the work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store metal fabrications in a dry, well ventilated, weathertight place. Deliver and handle to prevent any type of damage to the fabricated work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Metal Surfaces: 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 A36/A36M.

C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.

D. Stainless Steel Bars and Shapes: ASTM A276, Type 304.

E. Rolled Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

F. Rolled Stainless Steel Floor Plate: ASTM A793.

G. Abrasive Surface Floor Plate:
   1. Steel plate with abrasive granules rolled into surface or with abrasive material metallically bonded to steel:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) IKG Industries, a division of Harsco Corporation.
         2) SlipNOT Metal Safety Flooring; W.S. Molnar Company.

H. Steel Tubing: ASTM A500/A500M, cold formed steel tubing.

I. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.

J. Zinc Coated Steel Wire Rope - ASTM A741:
   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.

K. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.

L. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

M. Aluminum Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.

N. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

O. Fasteners:
   1. Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required:
      a. Provide stainless steel fasteners for fastening stainless steel.
      b. Steel bolts and nuts: Regular hexagon head bolts, ASTM A307, Grade A with hex nuts, ASTM A563 and, where indicated, flat washers.
      c. Steel bolts and nuts: Regular hexagon head bolts, ASTM A325, Type 3 with hex nuts, ASTM A 563, Grade C3 and, where indicated, flat washers.
      d. Stainless steel bolts and nuts: Regular hexagon head annealed stainless steel bolts, ASTM F593 with hex nuts, ASTM F594 and, where indicated, flat washers; alloy.
      e. Anchor bolts - ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563 and, where indicated, flat washers:
         1) Hot dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
      f. Anchors: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
      g. Post installed anchors - per Drawings:
         1) Material for interior locations: Carbon steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
         2) Material for exterior locations and where stainless steel is indicated: ASTM F593, and nuts, ASTM F594.
      h. Cast-in-place anchors in concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot dip galvanized per ASTM F2329.

P. Miscellaneous Materials:
   1. Shop primer for ferrous metal: Universal primer, organic zinc rich primer, complying with SSPC-Paint 20 and compatible with topcoat. Provide 10-99 (red) or 10-09 (gray) by Tnemec Company.
   2. Universal shop primer: Fast curing, lead and chromate free, universal modified alkyd primer and compatible with topcoat. Use primer containing pigments that make it easily distinguishable from zinc rich primer.
   3. Water based primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel and compatible with topcoat.
   4. Shop primer for galvanized steel: Primer formulated for exterior use over zinc coated

metal and compatible with finish paint systems indicated.

5. Galvanizing repair paint: High zinc dust content paint for regalvanizing welds in steel, complying with SSPC-Paint 20. Provide Tneme-Zinc 90-97 by Tnemec Company.
6. Bituminous paint: Cold applied asphalt emulsion complying with SSPC-Paint 12, containing no asbestos fibers, or cold applied asphalt emulsion complying with ASTM D1187.
7. Non-shrink, nonmetallic grout: Factory packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
8. Concrete materials and properties: Composed of ASTM C150 Type I Portland cement, ASTM C33 sand and coarse aggregates and potable water to produce a low slump mix suitable for placement. Grade coarse aggregate from 1/8 inch with at least 95 percent passing a 3/8-inch sieve and not more than ten percent (10%) passing a No. 8 sieve. Fill shall be proportioned to provide a minimum 28-day compressive strength of 3,000 psi (20 MPa).

2.2 FABRICATION

A. Shop Assembly:

1. Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation:
   a. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
   b. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
   c. Form exposed work with accurate angles and surfaces and straight edges.
   d. 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 so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
   e. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
   f. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
   g. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
   h. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
   i. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 inch by 1-1/2 inches (3.2 mm by 38 mm), with a minimum six-inch (150 mm) embedment and two-inch (50 mm) hook, not less than eight inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.
   j. Galvanize miscellaneous framing and supports at exterior locations; prime paint miscellaneous framing and supports at interior locations.

B. Miscellaneous Framing and Supports:
   1. Provide steel framing and supports necessary to complete the work and that are not a part of the structural framework, including, but not limited to, framing and supports for overhead lobby door frames, sliding doors, countertop and vanities, ceiling hung toilet compartments, tube framing for partial height walls, and mechanical and electrical equipment:
      k. 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. Cut, drill, and tap units to receive hardware, hangers, and similar items:
         1) Fabricate units from slotted channel framing where indicated.
         2) Furnish inserts for units installed after concrete is placed.

C. Shelf Angles:
   1. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19 mm) bolts, spaced not more than six inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated:
      a. Provide mitered and welded units at corners.
      b. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately two inches (50 mm) larger than expansion or control joint.
      c. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
      d. Galvanize and prime shelf angles located in exterior walls.
      e. Prime shelf angles located in exterior walls with zinc rich primer.
      f. Furnish wedge type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.3 LADDERS

A. Ladders - Comply with ANSI A14.3. For elevator pit ladders, comply with ASME A17.1/CSA B44:
   1. Steel ladders:
      a. Space siderails 18 inches (457 mm) apart unless otherwise indicated.
      b. Siderails: Continuous, 1/2 inch by 2-1/2-inch (12.7 mm by 64 mm) steel flat bars, with eased edges.
      c. Rungs:
         1) 3/4-inch (19 mm) diameter steel bars.
         2) Fit rungs in centerline of siderails; plug weld and grind smooth on outer rail faces.
         3) Provide nonslip surfaces on top of each rung, either by coating rung with aluminum oxide granules set in epoxy resin adhesive or by using a type of manufactured rung filled with aluminum oxide grout.
         4) Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung:
         5) Manufacturers are subject to compliance with requirements; provide products by one of the following:
            a) Harsco Industrial IKG, a division of Harsco Corporation.
            b) SlipNOT Metal Safety Flooring; W.S. Molnar Company.
      d. Provide platforms as indicated fabricated from welded or pressure locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch (12 mm) in least dimension.
      e. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted steel brackets.
      f. Galvanize ladders, including brackets and fasteners.

2.4 MISCELLANEOUS STEEL TRIM

A. Miscellaneous Steel Trim:
   1. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible:
      a. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work:
         1) Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction, spaced not more than six inches (150 mm) from each end, six inches (150 mm) from corners, and 24 inches (600 mm) o.c.
         2) Galvanize miscellaneous steel trim.

2.5 PIPE, DOWNSPOUT GUARDS

A. Fabricate pipe, downspout guards from 3/8 inch (9.5 mm) thick by 12 inch (300 mm) wide steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with two inch (50 mm) clearance between pipe and pipe guard. Drill each end for two (2) 3/4-inch (19 mm) anchor bolts.

B. Galvanize and prime pipe, downspout guards.

2.6 FABRICATION TOLERANCES

A. Squareness: 1/8 inch (3mm) maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch (1.5mm).

C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5mm).

D. Maximum Bow: 1/8 inch (3mm) in 48 inches (1.2m).

E. Maximum Deviation From Plane: 1/16 inch (1.5mm) in 48 inches (1.2m).

2.7 FINISHES

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.8 STEEL AND IRON FINISHES

A. Galvanizing:
   1. Hot dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products:
      a. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

D. Preparation for Shop Priming:
   1. Prepare surfaces to comply with requirements indicated below:
      a. Exterior items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
      b. Items indicated to receive zinc-rich primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
      c. Items indicated to receive primers specified in Section 09 96 00: High-Performance Coatings: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
      d. Other items: SSPC-SP 3, "Power Tool Cleaning."

E. Shop Priming:
   1. Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting:
      a. Stripe paint corners, crevices, bolts, welds, and sharp edges.

F. Stainless Steel Finishes:
   1. Remove tool and die marks and stretch lines, or blend into finish:
      a. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
      b. Bright, directional polish: No. 4 finish.
      c. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.9 EXPANDED METAL GRATINGS

A. Provide expanded metal gratings in material, finish, style, size, thickness, weight, and type indicated or, if not indicated, as recommended by manufacturer for indicated applications and as needed to support indicated loads. Manufacturer - Indiana Grating Inc. 212 W. Douglas St, Martinsville IN 46151. Grates to comply with CBC 11B-404, for accessible route of travel:
   1. Material: Steel
   2. Steel finish: Galvanized.
   3. Style designation: Light Duty Welded Steel Grating, see Drawings for details.

PART 3 EXECUTION

3.1 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

3.2 FIELD CONDITIONS

A. Field Measurements:
   1. Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication:
      a. Established dimensions: Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established

dimensions.
b. Provide allowance for trimming and fitting at site.

3.3 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:
1. Comply with the following requirements:
   a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   b. Obtain fusion without undercut or overlap.
   c. Remove welding flux immediately.
   d. At exposed connections, finish exposed welds and surfaces smooth and blended so 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. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

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

F. Corrosion Protection:
1. Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
   a. Cast aluminum: Heavy coat of bituminous paint.
   b. Extruded aluminum: Two (2) coats of clear lacquer.

3.4 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on shop drawings.

B. Anchor supports for overhead doors securely to, and rigidly brace from, building structure.

3.5 ERECTION TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch (6mm) per story, noncumulative.

B. Maximum Offset from True Alignment: 1/4 inch (6mm).

C. Maximum Out of Position: 1/4 inch (6mm).

3.6 ADJUSTING AND CLEANING

A. Touchup Painting:
   1. 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:
      a. Apply by brush or spray to provide a minimum 2.0 mil (0.05 mm) dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 90 00: Painting and Coating.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION - 05 50 00

SECTION 06 10 00 | ROUGH CARPENTRY

PART 1 GENERAL

1.1 GENERAL

A. The requirements/provisions of the General and Supplementary Conditions and Division 1 Specification Section shall apply to this section.

1.2 DESCRIPTION OF WORK

A. The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation, and facilities and performing all labor and services necessary for, required in connection with or properly incidental to furnishing and installing rough carpentry, as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom.

B. Work Included:
1. Furnishing and installing wood framing and sheathing
2. Furnishing and installing plywood sheathing
3. Furnishing and installing light gage metal connectors
4. Furnishing and installing bolts, lag screws, washers, spikes and nails necessary for connecting wood framing and sheathing
5. Installing miscellaneous metal connectors
6. Temporary bracing

C. Related Work Specified Elsewhere:
1. Concrete Formwork; Section 03 10 00
2. Structural Steel and Miscellaneous Iron; Section 05 12 00

1.3 REFERENCE STANDARDS

A. The following is a list of reference standards referred to in this portion of the specifications.
1. ASTM A307, "Specification for Carbon Steel Externally Threaded Standard Fasteners"
2. W.C.L.I.B., "Standard Grading and Dressing Rules No. 17."
3. Federal Specification FF-N-105B with Interim Amendment 4.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with all Federal, State and Local Codes and Safety Regulations. In addition, comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
1. California Building Code, current governing edition.
2. National Forest Products Association, "National Design Specification for Wood Construction", current edition.
3. American Plywood Association, "U.S. Product Standard PS1-09"
4. American Institute of Timber Construction, American National Standard ANSI/AITC A190.1-2012 for Wood Products-Structural Glued Laminated Timber"

B. Grade marks:
1. All framing lumber shall be identified by the grade stamp of the West Coast Lumber Inspection Bureau.
2. All plywood shall be identified as to species, grade, and glue type, and shall bear the identification grade mark of the American Plywood Association.
3. All glu-lam beams shall be stamped with an AITC product quality mark.

C. Testing and Inspection:
   1. The Owner shall employ an independent testing laboratory or the Engineer as the Owner's agent to perform the inspections and tests shown on the contract drawings and submit certified test results. The Contractor will cooperate with and notify Owner's agent at least 24 hours in advance of inspections required:

1.5 SUBMITTALS

A. General Requirements
   1. Submittals shall be made to Architect in accordance with the requirements of Division 1 General Requirements of these specifications.
   2. Construction of wood framing, glu-lam erection, and sheathing shall not begin until Contractor has received submittals reviewed by Architect governing all aspects of the intended work.

B. Product Data: Manufacturer's catalog sheets including instructions for use and description of application shall be provided on each of the following materials:
   1. Light gage metal connectors

C. Certificates of Conformance: The Contractor shall provide a Certificate of Conformance meeting the requirements of AITC for all glu-lam beams.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver and store lumber glu-lam beams on sleepers and cover for protection. See general conditions for additional delivery and storage requirements.

B. Glu-lam beams shall be individually wrapped for delivery.

1.7 SEQUENCING AND SCHEDULING

A. Obtain information and instructions from other trades and suppliers in ample time to schedule and coordinate the installation of items furnished by them to be installed prior to or in conjunction with rough carpentry so provision for their work can be made without delaying the project.

B. Do any cutting and repairing made necessary by failure or delay in complying with these requirements, at no cost to Owner.

PART 2 PRODUCTS

2.1 FRAMING

A. General: Framing shall be Douglas Fir Coast Region, conforming to West Coast Lumber Inspection Bureau Standard Grading and Dressing Rule No. 17, as amended to date.
   1. 2x, 3x, 4x, plates, joists, purlins and beams, No. 1 and better (1200F-b), Para. 123-b, unless noted otherwise on the drawings.
   2. 2x, 3x, 4x, joists, purlins and beams, Select Structural (1500F-b), 123-a, where noted on the drawings.
   3. 6x beams, Dense No. 1 (1550F-b). Para 130-bb.
   4. 2x, 3x, 4x ledgers, No. 1 (1000F-b), Para. 123-b, unless noted otherwise on the drawings.
   5. 4x4 posts, No. 1 (1500F-c), Para. 124-b, unless noted otherwise on the drawings.
   6. 4x6 posts, No. 1 (1500F-c), Para. 123-b, unless noted otherwise on the drawings.
   7. 6x6 and larger posts, Dense No. 1, (1200F-c), Para. 131-bb.
   8. 2x, 3x studs and blocking, No. 1 (1000F-b), Para. 123-b.
   9. Foundation plates: Pressure treated Douglas Fir No. 1.

B. All framing lumber 6" or larger in the least dimension shall be F.O.H.C.

2.2 PLYWOOD

A. General: Plywood shall conform to U.S. Product Standard PS 1-09, American Plywood Association. Each sheet shall be stamped with the PS and/or APA grademark.

B. Roof Plywood
1. Shall be 5 ply exposure 1, CDX, span rating 32/16, Species Group 2 or better.
2. Shall be 5 ply exposure 1, Structural I span rating 32/16, Species Group 1.

C. Wall Plywood
1. Shall be exterior type, T1-11 A-C span rating 16 o.c. Species Group 1 with grooves at 8" o.c.
2. Shall be 3 ply exposure 1, CDX, span rating 24/0, Species Group 2 or better.
3. Shall be 4 ply exposure 1, Structural I, span rating 32/16, Species Group 1.

D. Exposed Plywood for Mounting of Data / Mechanical / Electrical Equipment
Shall be 5 or better, ¾” with one side Face type A

2.3 LAMINATED MEMBERS

A. Laminated members not exposed to weather shall be Douglas Fir Coast Region unless noted otherwise on contract drawings. Members shall be in conformance with the Standard Specifications for Structural Glued Laminated Timber per ANSI A190.1 - 2012. Laminations shall conform to West Coast Lumber Inspection Bureau Standard Grading and Dressing Rule No. 17, as amended to date.
1. Glu-lam beams shall be industrial grade unless noted otherwise on the contract drawings.
2. AITC combination symbol 24F-V4, laminations DF/DF for simple span beams.
3. AITC combination symbol 24F-V8, laminations DF/DF at continuous span beams and cantilevers.

B. Laminated members exposed to weather shall be Alaska Cedar in conformance with the Standard Specifications for Structural Glued Laminated Timber per ANSI A 190.1-2012.
1. Glu-lam beams shall be appearance grade.
2. AITC combination symbol 2OF-V12, laminations AC/AC for simple span beams.

2.4 ENGINEERED WOOD MEMBERS

A. Laminated-Veneer Lumber: A composite of wood veneers with grain primarily parallel to member lengths, manufactured with an exterior-type adhesive complying with ASTM D2559. Product has the following allowable design values as determined according to ASTM D5456:
1. Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal-depth members.
2. Modulus of Elasticity, Edgewise: 2,000,000 psi.

B. Parallel-Strand Lumber: A composite of wood strand elements with grain primarily parallel to member lengths, manufactured with an exterior-type adhesive complying with ASTM D2559. Product has the following allowable design values as determined according to ASTM D5456:
1. Headers, Beams, and Joists:
   a. Extreme Fiber Stress in Bending, Edgewise: 2900 psi
   b. Modulus of Elasticity, Edgewise: 2,200,000 psi
2. Columns:
   a. Extreme Fiber Stress in Bending, Edgewise: 2400 psi
   b. Modulus of Elasticity: 1,800,000 psi

C. Laminated Strand Lumber: A composite of flaked wood strands with grains primarily parallel

to member lengths, manufactured with an exterior-type adhesive complying with ASTMD 2559. Product has the following allowable design values as determined according to ASTM D5456:

1. Headers, Beams, and Joists:
   a. Extreme Fiber Stress in Bending, Edgewise: 2325 psi typical or 1700 psi where noted.
   b. Modulus of Elasticity, Edgewise: 1,550,000 psi typical or 1,300,000 psi where noted.
2. Rim and Blocking:
   a. Extreme Fiber Stress in Bending, Edgewise: 1700 psi typical or 2325 psi where noted.
   b. Modulus of Elasticity, Edgewise: 1,300,000 psi typical or 1,550,000 psi where noted.
3. Columns:
   a. Extreme Fiber Stress in Bending, Edgewise: 1700 psi.
   b. Modulus of Elasticity, Edgewise: 1,300,000 psi.

2.5 LIGHT GAGE METAL CONNECTIONS

A. Light gage metal connectors shall be Simpson Company Strong Tie Connectors, or equal unless noted otherwise on the drawings.

2.6 NAILS

A. Nails shall be bright common wire nails, galvanized for exterior work and conform to Federal Specification FF-N-105B.

B. Nailing shall conform to CBC Table 2304.10.1 unless otherwise noted.

C. Nails in pressure treated lumber shall be hot dipped galvanized steel in compliance with ASTM A153.

2.7 SCREWS

A. Lag screws shall conform to ANSI/ASME Standard B18.2.1.

B. Wood screws shall conform to ANSI/ASME Standard B18.6.1.

2.8 BOLTS

A. Bolts: Bolts shall conform to ASTM A307, manufactured to American Standard Bolt and Nut dimensions with "Free Fit - Class 2" threads.

B. Anchor Bolts: Anchor bolts shall conform to ASTM F1554 grade 36.

C. Bolts in pressure treated lumber shall be hot dipped galvanized steel in compliance with ASTM A153.

2.9 PRESERVATIVE TREATMENT FOR WOOD

A. Preservative Treatment for Wood: Water-borne, non-arsenic, non-chromium type complying with AWPA Standard U1. Preservative treatment shall not contain pentachlorophenol, arsenic compounds, or creosote. In addition, the preservative treatment shall comply with the following:

1. Material: Paintable.

2. Comply with CARB limit on VOCs of 350 g/L using EPA Test Method 24.

3. Moisture Content: After treatment, re-dry wood to be used in enclosed locations to a moisture content of 19% or less.

4. Retreat all field cut ends and surfaces.

2.10 FIRE-RETARDANT-TREATED WOOD

A. Fire Retardant Treatment: Waterborne chemical treatment to comply with AWPA Standard P-5, achieve a flame spread index of 25 or less when tested in accordance with ASTM E84, and show no evidence of significant progressive combustion when the test is continued for an additional 20-minute period. Additionally, the flame front shall not progress more than 10.5 feet beyond the centerline of the burners at any time during the test. Use of ammonium phosphates is prohibited.

B. Apply in compliance with the applicable AWPA Standard for type of wood and application.

C. Provide fire retardant treatment for all wood noted on the Drawings to receive it.

D. Where treated items are indicated on the Drawings to receive a transparent or opaque paint finish, use a fire retardant treatment which will not bleed through or adversely affect the bond of the finish material.

E. Structural performance of fire retardant wood shall meet requirements of ASTM D5664 for lumber & ASTM D5516/D6305 for plywood.

F. Provide labeling in conformance with CBC Section 2303.2.4 on all fire treated material delivered to the job site.

G. Acceptable manufactures and products:

a. Koppers Performance Chemicals FirePRO

b. Hoover Treated Wood Products, Inc. Pyro-Guard

c. Hoover Treated Wood Products, Inc. Exterior Fire-X

d. Approved Equal

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. All framing operations shall conform to the requirements of the California Building Code.

B. Set horizontal and sloped members with crown up. Do not notch, bore or cut members for pipes, ducts, conduits, or other reasons except as shown on the drawings or as specifically approved by the Architect/Engineer. Make all bearings full and all blocking solid unless otherwise indicated on the drawings. Finish all bearing surfaces on which structural members are to rest so as to give sure and even support. Where framing members slope, cut or notch the ends as required to give uniform bearing surface.

C. Joists shall be set with the crowning edge up except at cantilevers.

D. Solid blocking shall be placed at ends of spans and over supports. Cross-Bridging or solid blocking in spans shall not exceed 8 feet or less if shown on structural drawings.

E. Furnish and set all columns and studs to size, centers, and locations indicated on the drawings. Unless marked otherwise, studs for furring and partitions shall be 2x4 or 2x6, set 16" o.c. plates on concrete floors shall not be set until the concrete is finished. Cripples shall be run to the floor plates.

F. Remove all wood, including form lumber, scrap lumber, shavings and sawdust in contact with ground. Leave no wood buried in any fill or backfill.

G. Furring and blocking shall be furnished and installed where required for reception of wallboard, formation or architectural features, concealment of pipes, conduits, ducts, attachment of supports for towel holders, toilet paper holders, and other fixtures. Contractor shall consult with the trades concerned and set furring and blocking they require.

H. Fire Blocking shall be installed as shown on drawings and in accordance with the applicable Building Code.

I. Framing of openings through walls, floors, attics, and roofs shall be provided for roof vents, mechanical equipment, lighting fixtures, ducts, etc. Where one or more joists are cut, the joists supporting the trimmers shall be framed in accordance with the drawings or if not detailed shall be doubled and well spiked. Where continuation of three or more joists is interrupted, the abutting headers and joists shall be reinforced with approved type of joists hangers.

J. Center joints or plywood accurately over supports and nail into solid wood. Protect all plywood from moisture by use of all required waterproof covering until the plywood has in turn been covered by the next succeeding component or finish.

K. Lumber not grade stamped, and lumber of improper grade, shall be removed from the job site and immediately replaced by grade stamped lumber of the proper grade.

L. Other Materials: All other lumber materials, not specifically described but required for the proper completion of the work, shall be new, first quality of their respective kinds and subject to the approval of the Architect/Engineer.

M. Where the plans do not require solid blocking or a tongue and groove connection at edges of plywood or OSB sheathing, the sheathing edges shall be supported with ply clips or ply cleats.

3.2 EXAMINATION

A. Surface Conditions: Prior to the work of this section, carefully inspect the installed work of other trades and verify that all such work has been so installed as to allow rough carpentry to produce surfaces to the required design.

3.3 WORKMANSHIP

A. All rough carpentry shall produce joints true, tight, and well nailed with all members assembled in accordance with the drawings and with all pertinent regulations.

B. Cut all wood members to fit. Do not shim.

C. Erect all members straight, plumb and accurately located.

D. Carefully select all structural members. Select individual pieces so that knots and obvious defects will not interfere with making proper connections. Lumber may be rejected by the Architect, whether or not it has been installed, for excessive warp, twist, bow, or crook, or for mildew, fungus or mold as well as for improper cutting or fitting. Cut out and discard all

defects which render a piece unable to serve its intended function.

3.4 INSTALLATION

A. Plates: Plates for partitions and walls shall be single at bottom and double at top. Splices in top plates shall be staggered not less than 48". Where plates are cut for passing pipes and similar items, they shall be reinforced on both sides with 1/8"x3"x18" steel plates punched for 10d nails 6" on center, staggered.

B. Power Driven Inserts: Wherever furring of any kind is attached to concrete or masonry, including lower plates to floors, the members shall be secured with 1/4" power driven inserts. Plates anchored to concrete floors shall be attached with pins not over 3 feet on center. All studs on vertical furring shall be attached with pins not over 4 feet on center. Each insert shall penetrate the concrete to a minimum of 1-1/2". Use washers with all inserts.

3.5 ERECTION

A. The Contractor will be responsible to erect the wood framing true to line and grade.

B. Temporary Bracing and Shoring:
1. The Contractor shall temporarily brace the wood framing in both directions and shall maintain walls, joists, beams, and other framing members plumb until the final connections of the framework and construction of diaphragms are complete.
2. The Contractor shall provide such temporary shoring and additional bracing of wood framing as required to adequately and safely support any or all loads imposed upon the structure during construction.

3.6 CLEAN UP

A. In addition to the requirements of General Conditions, keep premises clean and clear of debris caused from this portion of the work. Failure to perform clean up within 24 hours notice by the Architect or General Contractor shall be considered adequate grounds for having the work done by others at this subcontractor's expense.

3.7 FIELD QUALITY CONTROL

A. Inspections: The Owner's agent will perform the inspections as shown on the contract drawings.

END OF SECTION - 06 10 00

SECTION 06 19 60 PREFABRICATED WOOD I-JOISTS

PART 1 GENERAL

1.1 APPLICABLE SECTIONS

A. The requirements/provisions of the General and Supplementary Conditions and Division 1 Specification Section shall apply to this section.

1.2 DESCRIPTION OF WORK

A. The work included under this section consists of designing, fabricating, and installing OSB web joists as described in this section of the specifications, shown on the accompanying drawings or reasonably implied therefrom, except as hereinafter specifically excluded, including, but not limited to these major items.

`

B. Work Included:
   1. Design of all Wood I-Joists.
   2. Fabrication and erection of all Wood I-Joists as shown or called on the contract drawings.
   3. All loose material such as bolts, clips, nails, and bridging required in connection with the installation of Wood I-Joists.
   4. All material that is supported by or attached to Wood I-Joists as required to trim openings shown on the architectural and structural drawings.

C. Related Work Specified Elsewhere:
   1. Rough Carpentry; Section 06 10 00

1.3 REFERENCE STANDARDS

A. The following is a list of reference standards referred to in this portion of the specification:
   1. ASTM A307, "Specification for Carbon Steel Externally Threaded Standard Fasteners"
   2. W.C.L.I.B. "Standard Grading and Dressing Rules No. 17"

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with all Federal, State, and Local codes and safety regulations. In addition, the fabrication and erection of Wood I-Joists shall comply with all the applicable provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
   1. "California Building Code", current governing edition.
   2. National Forest Products Association, "National Design Specification for Wood Construction."

B. Qualifications:
   1. Fabrication and erection of Wood I-Joists shall be by a manufacturer with 5 years minimum experience in the design, fabrication and erection of Wood I-Joists. The manufacturer shall also have been in business to fabricate and erect Wood I-Joists continuously over the past 5 years.
   2. The design and detailing of Wood I-Joists shall be prepared, stamped, and signed by a registered civil engineer of the state of California.

C. Testing and Inspection:
   1. General:
      a. All materials and work shall be subject to inspection at the fabricating shop, and at the building site. Material or workmanship not complying fully with the drawings and specifications will be rejected.
      b. If the inspector, through oversight or otherwise, has accepted material or work which is defective or contrary to specifications, this material or work, regardless of state of completion, may be rejected.
   2. Owner: The Owner shall employ an independent testing agency or the Engineer as the Owner's agent to perform the inspections and tests shown on the contract drawings and submit certified test results. The contractor will cooperate with and notify Owner's agent at least 48 hours in advance of inspections required.

1.5 SUBMITTALS

A. General Requirements:
   1. Submittals shall be made to Architect in accordance with the requirements of Division 1, General Requirements of these specifications.
   2. Construction, and fabrication or ordering of materials shall not begin until Contractor has received submittals reviewed by Architect governing all aspects of the intended work.

B. Shop Drawings:
   1. Shop drawings shall show the complete I-joist plan layout. The shop drawings shall provide an elevation of each different type of joist showing dimensional layout, member sizes, type of material and connection details. The shop drawings shall also show all miscellaneous details including continuous bridging and diagonal bracing details. The shop drawings shall include specifications for all materials to be used in joist fabrication and erection. The allowable stresses for each type of material shall also be shown.
   2. Joist manufacturer shall obtain all necessary approvals from the public agencies governing construction.

PART 2 PRODUCTS

2.1 DESIGN

A. Design of Wood I-Joists, bridging, and diagonal bracing shall be in strict accordance with the California Building Code.

B. Wood I-Joist depths and layout shall be as called or shown on the structural drawings. Diagonal or continuous bridging shall be of a size and layout required by design and shown on the shop drawings. The joist designer shall coordinate the size and location of bridging as required to brace joists.

C. Wood I-Joists shall be supplied by the same fabricator (manufacturer) to insure uniformity of details and appearance.

D. It is the intent of the drawings and these specifications that the Wood I-Joists provide a neat uniform appearance as accepted by the Architect.

E. Design Loads: See Contract Drawings

F. Maximum Allowable Deflections:

Level	Location	Live Load	Dead + Live Load	Maximum
Roof	Cantilever Span	L/300	L/240	1”
	Interior Span	L/360	L/240	1”

G. Cantilever spans shall have identical limitations with L=2x overhang. 1 inch maximum

2.2 MATERIALS

A. Materials for fabrication of Wood I-Joists shall be in accordance with the Specifications shown on the shop drawings prepared by the joist design engineer.

B. All lumber shall conform to the “Standard Grading and Dressing rules #17", and as specified by the truss design engineer.

C. Flanges shall be laminated veneer lumber; machine stress rated and shall have a moisture content of between 7 and 16 percent at time of fabrication.

D. Joists shall be manufactured to the following tolerances:

1. Joist Depth = +/- 1/16 inch
2. Flange Width = +/- 1/16 inch

PART 3 EXECUTION

3.1 WORKMANSHIP

A. The workmanship shall be of the highest quality found in contemporary structural work.

3.2 ERECTION

A. The Contractor will be responsible to erect the Wood I-Joists plumb and true to line and grade.

B. Handling and erection shall be in accordance with these specifications and the referenced standards. Wood I-Joists and accessories shall be protected from harmful elements when stored at the job site. Store above the ground on platforms, pallets, or similar support. Keep trusses free of dirt and other deleterious matter.

C. Replace all joists damaged by shipping, storage, or erection.

D. Erection shall be by an installer fully familiar with the manufacturer's product and having previous installation experience.

E. Temporary Bracing and Shoring:
1. The Contractor shall temporarily brace the Wood I-Joists in both directions until the final connections of the framework and construction of diaphragms are complete.
2. The Contractor shall provide such temporary shoring and additional bracing of structural frame as required to adequately and safely support any or all loads imposed upon the structure during construction.

END OF SECTION - 06 19 60

SECTION 06 40 00 | ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Plastic laminate cabinets.
   2. Plastic laminate and solid surface countertops.
   3. Plastic laminate panels.
   4. Standing and running trim.
   5. Closet and utility shelving.
   6. Shop finishing.
   7. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 06 10 00: Rough Carpentry.
   2. Section 06 20 00: Finish Carpentry and Millwork.
   3. Section 09 90 00: Painting and Coating.

1.3 DEFINITIONS

A. Architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

A. Product Data:
   1. Technical data for each type of product indicated including cabinet hardware and accessories:
      a. Include data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings:
   1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components:
      a. Show details full size.
      b. Show locations and sizes of furring, blocking, and hanging strips including concealed blocking and reinforcement specified in other Sections.
      c. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, and other items installed in architectural woodwork.

C. Samples:
   1. Lumber with or for transparent finish, not less than five inches (125 mm) wide by 24 inches (600 mm) long, for each species and cut, finished on one (1) side and one (1) edge.
   2. Veneer faced panel products with or for transparent finish, eight inches by ten inches (200 by 250 mm), for each species and cut. Include at least one (1) face veneer seam and finish as specified.

3. Lumber and panel products with shop applied finish, 50 square inches (300 sq. cm) for lumber and eight inches by ten inches (200 mm by 250 mm) for panels, for each finish system and color, with 1/2 of exposed surface finished.
4. Plastic laminates, eight inches by ten inches (200 mm by 250 mm), for each type, color, pattern, and surface finish and specified edge material applied to one (1) edge.
5. Quartz surfacing materials, six inches (6”) square.
6. Corner pieces:
   a. Cabinet front frame joints between stiles and rails, as well as exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by six inches (150 mm) deep.
7. Exposed cabinet hardware and accessories, one (1) unit for each type and finish.

D. Qualification Data: For fabricator/installer.

E. Woodwork Quality Standard Compliance Certificates: Woodwork Institute (WI) Quality Certification Program certificates (CCP).

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Building code: Comply with applicable requirements of CBC Chapter 8 for Interior Finishes.
2. Accessibility:
   a. 2025 California Building Code; Section 11B-309 for Casework, Section 11B-404 Doors and Hardware and Section 11B-703 for Signage (where applicable).
   b. ADA Accessibility Guidelines (ADAAG) for Buildings and Facilities; final guidelines and revisions.
3. Quality standard: Unless otherwise indicated, comply with WI for premium grade architectural woodwork indicated for construction, finishes, installation, and requirements. Provide certified compliance labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.
4. Fire test response characteristics: Where fire retardant materials or products are indicated, provide materials and products with specified fire test response characteristics determined by testing identical products per test method indicated by UL. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

B. Fabricator Qualifications: Shop having minimum five (5) years’ documented experience who employs skilled workers who custom fabricate products similar to those required and who is a participating member of WI.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence matched wood veneers and transparent finished wood doors that are required to be of same species as woodwork.

D. Quality Standard: Unless otherwise indicated, comply with North American Architectural Woodwork Standards, meeting or exceeding ANSI A161.1, for grades of architectural woodwork indicated for construction, finishes, installation, and requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork is completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements

specified in "Project Conditions" Article.

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide materials that comply with requirements of WI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products:
   1. Hardboard: AHA A135.4.
   2. Medium density fiberboard:
      a. ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde; minimum 48 pcf density except that minimum for screw holding capacity on face shall be 300 pounds; minimum 3/4 inches (19 mm) thick, edged and faced as specified:
         1) Arauco; Trupan MDF, VESTA Technology.
         2) Roseburg Forest Products, Inc.; Roseburg MDF products.
         3) Approved equal.
   3. Particleboard: Unless otherwise noted by District, particleboard is not to be used.
   4. Softwood plywood: DOC PS 1, medium density overlay.

C. Lumber:
   1. Comply with applicable provisions for grading and workmanship of WI Quality Standards, and requirements specified. Provide lumber surfaced 4 sides (S4S) and fabricated to profiles shown. Kiln dry lumber to 19 percent moisture content:
      a. Furring, blocking, and shims: No. 1 Common; Southern Pine.
      b. Solid hardwood for opaque finish: Plain sawn Yellow Poplar, free from checks, splits, and sound knots.

D. Thermoset Decorative Panels:
   1. Particleboard or medium density fiberboard finished with thermally fused, melamine impregnated decorative paper complying with LMA SAT-1:
      a. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semi-exposed edges.

E. High Pressure Decorative Laminate - NEMA LD 3, grade indicated or as required by woodwork quality standard:
   1. Manufacturer is subject to compliance with requirements; provide high pressure decorative laminates by one of the following:
      a. Abet Laminati, Inc.
      b. Formica Corporation.
      c. Panolam Surface Systems by Panolam Industries International Incorporated.
      d. Wilsonart LLC.

2.2 FIRE RETARDANT TREATED MATERIALS

A. Where fire retardant treated materials are indicated, use materials complying with requirements acceptable to authorities having jurisdiction, and with fire test response characteristics specified:
   1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or defective.
   2. Use fire retardant treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.

3. Identify fire retardant treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

B. Fire Retardant Particleboard:
   1. Panels complying with requirements, made from softwood particles and fire retardant chemicals mixed together at time of panel manufacture to achieve flame spread index of 25 or less and smoke developed index of 50 or less per ASTM E84:
      a. For panels 3/4 inch (19 mm) thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: Modulus of rupture, 1,600 psi 11 MPa; modulus of elasticity, 300,000 psi 2,070 MPa; internal bond, 80 psi 550 kPa; and screw-holding capacity on face and edge, 250 and 225 lbf 1,100 and 1,000 N, respectively.
      b. For panels 13/16 inch to 1-1/4 inches (20 to 32 mm) thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: Modulus of rupture, 1,300 psi 9 MPa; modulus of elasticity, 250,000 psi 1,720 MPa; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf 1,100 and 780 N, respectively.
      c. Product: Subject to compliance with requirements, provide Duraflake FR by Arauco.

C. Fire Retardant Fiberboard: Medium density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire retardant chemicals mixed together at time of panel manufacture to achieve flame spread index of 25 or less and smoke developed index of 200 or less in accordance with ASTM E84.

2.3 CABINET HARDWARE AND ACCESSORIES

A. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers of items referenced to this standard. Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Frameless Concealed Hinges (European Type) - BHMA A156.9, B01602, Self-Closing:
   1. Provide 170-degree minimum opening capabilities. For end doors perpendicular to walls, provide 90-degree type.
   2. For doors 32 inches high or less, provide two (2) pairs of hinges, add 1/2 pair for every additional 20 inches.
   3. Products are subject to compliance with requirements; provide from one of the following:
      a. Hafele North America Co.
      b. Julius Blum, Inc.
      c. Mepla-Alfit, Inc.

C. Wire Pulls: Back mounted, solid metal, five inches (127 mm) long, 2-1/2 inches (63.5 mm) deep, and 5/16 inch (8 mm) in diameter.

D. Catches - Magnetic, Complying with BHMA A156.9 and B03161:
   1. Rockwood 901 by Assa Abloy.
   2. Comparable product.

E. Cabinet Shelf Rests - Nickel plated, 7 mm diameter shelf support pegs in brass sockets, complying with BHMA A156.9, B04013:
   1. Hafele 282.01.701 x 282.50.704 or comparable product.

F. Closet Rods and Flanges: 1-1/2-inch diameter, satin finished chrome plated steel or satin

finished stainless steel with matching end flanges.

G. Adjustable Shelf Standards and Brackets for Wall Hung Open Shelving - BHMA A156.9, B04071; With Shelf Rests, B04081:
   1. Standards: Model No. 87ANO Super Duty 87/186/187 Steel Series; lengths as indicated, by Knape & Vogt or comparable product.
   2. Brackets: Model No. 187 LL ANO 12 to 24 for 12-inch to 24-inch (300 mm to 600 mm) deep shelves by Knape & Vogt or comparable product.
   3. Shelf rests: Model No. 210 ANO End Rest and Model No. 211 ANO Center Rest with Model No. 129 RUB Rubber Cushions or comparable product.

H. Shelf Rests: BHMA A156.9, B04013; metal, two pin type with shelf hold down clip.

I. Silencers:
   1. Provide rubber silencers on jamb and/or head and sill strike areas of all cabinet doors and drawers, two (2) for paired doors, and three (3) for single doors:
      a. Size: Approximately 1/4-inch (6.4 mm) diameter.
      b. Color: Compatible with adjacent finish.

J. Drawer Slides - BHMA A156.9, B05091:
   1. Provide positive stop, self-closing side mounted, full extension, zinc plated steel drawer slides with steel ball bearings:
      a. Pencil drawer slides: Grade 1; for drawers not more than three inches (75 mm) high and 24 inches (600 mm) wide; Accuride 2006 having 3/4 extension carburized steel ball bearing, side mounting, 45-pound capacity medium duty load rating, cold rolled steel slide members and ball retainers, bright electro zinc plate finish.
      b. Box drawers (less than eight inches [8”] deep): Grade 1HD-100; for drawers not more than six inches (150 mm) high and 24 inches (600 mm) wide. Provide Accuride 4034; up to 24 inches wide, full extension carburized steel ball bearing, side mounting, 150-pound capacity medium duty load rating, cold rolled steel slide members and ball retainers, cushioned in and out stops, detent-in, progressive action, positive stop, clear zinc finish.
      c. Pedestal drawers (greater than eight inches [8”] deep): Accuride 4032; up to 24 inches wide, full extension carburized steel ball bearing, rail mounting, minimum 150-pound capacity heavy duty load rating, cold rolled steel slide members and ball retainers, cushioned in and out stops, detent-in, progressive action, positive stop, bright electro zinc plate finish.
      d. Lateral file drawer slides: For drawers more than six inches (150 mm) high or 24 inches (600 mm) wide; heavy-duty, up to 42 inches wide, 3640A by Accuride.
      e. Keyboard slide: Model No. 2109, color black, by Accuride, Inc.
      f. Refuse cabinets: Accuride C3600-201D, full extension carburized steel ball bearing, bracket mounting, heavy-duty, cold rolled steel slide members and ball retainers, cushioned in and out stops, progressive action, positive stop, clear zinc plate finish.

K. Door and Drawer Locks:
   1. Provide locks for each cabinet door and drawer as indicated on Drawings. Finish exposed portions of locks to match cabinet pull finish. Furnish two (2) keys with each lock and key locks inside one room alike and provide master key for locks in Project. Selections to meet BHMA A156.11 and E07041 (for drawers) or E07121 (for doors):
      a. Cam lock similar to Hafele 235.20.20x, chrome plated, with offset cam 219.13.9xx, sized to fit opening.
      b. Cam lock similar to Hafele 235.20.20x, chrome plated, with surface mounted strike 251.60.703.
      c. Pairs of doors:
         1) Inactive leaf: Furniture bolt similar to Hafele 252.02.644, polished chrome,

with strike 251.60.703.
2) Active leaf: Single door lock assembly.

L. Grommets for Cable Passage through Countertops:
1. Two-inch (51 mm), black, molded plastic grommets and matching plastic caps with slot for wire passage:
a. Product: Subject to compliance with requirements, provide TG series by Doug Mockett & Company, Inc.

M. Trash Grommet Through Countertop: TM1B, six-inch by two-inch (6” x 2”) polished stainless-steel grommet by Doug Mockett and Co., Inc.

N. Exposed Hardware Finishes:
1. For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated:
a. Satin chromium plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

O. Concealed Hardware: Provide finish complying with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire retardant treated softwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot dip galvanized anchors and inserts on inside face of exterior walls and as required for corrosion resistance. Provide toothed steel or lead expansion sleeves for drilled in place anchors.

C. Hanging (Zee Clip) Strips: Extruded aluminum zee type interlocking clips; type, size and quantity for the condition of use.

D. Screws: Select material, type, size, and finish required for each use. Comply with FS FF-S-111 for applicable requirements.

E. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.

F. Blind Splines: Specialty devices, as required for tight butt joining, types and size as recommended by woodwork fabricator.

G. Covercaps: Where mortises of fastener heads or drawdowns are exposed (blind holes) in finished work, provide black plastic covercaps.

H. Adhesive for Bonding Plastic Laminate:
1. Resorcinol:
a. Adhesive for bonding edges: Hot melt adhesive.

I. Stone Seam Adhesive:
1. Two-part, epoxy resin stone adhesive with an initial set time of not more than two (2) hours at 70 degrees F (21 degrees C), and with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
a. Color: Clear.

b. Products: Subject to compliance with requirements, provide Bonstone Materials Corporation - Duproxi or Akemi North America - Akepox.

J. Stone Sealer:
1. Colorless, nonstaining, single component, neutral curing silicone sealant that does not affect color or physical properties of stone surfaces, recommended by stone producer for application indicated. Subject to compliance with requirements, provide products by one of the following:
a. Bostik, Inc.
b. Custom Building Products.
c. Hillyard, Inc.

K. Stone Cleaner: Cleaner specifically formulated for stone types, finishes, and applications indicated, recommended by stone producer and by sealer manufacturer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

2.5 FABRICATION

A. Woodwork Grade:
1. WI Custom Grade woodwork complying with referenced quality standard:
a. Complete fabrication, including assembly, finishing, and hardware application, before shipment to site to the maximum extent possible. Disassemble components as necessary for shipment and installation. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting. The width of scribe and filler panels shall not exceed 1/2 inch or 1/2-inch clear dimension from adjacent wall to outside face of cabinet door in a 90-degree position, whichever is greater.
b. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify various parts fit as intended and check measurements of assemblies against field measurements indicated on shop drawings before disassembling for shipment.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Sand fire retardant treated wood lightly to remove raised grain on exposed surfaces before fabrication.

D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
1. Corners of cabinets and edges of solid wood (lumber) members 3/4 inch (19 mm) thick or less: 1/16 inch (1.5 mm).
2. Corners of cabinets and edges of solid wood (lumber) members 3/4 inch (19 mm) thick or less: 1-1/2 inch (38 mm).
3. Corners of cabinets and edges of solid wood (lumber) members and rails: 1/16 inch (1.5 mm).

E. Shop cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs:
1. Seal edges of openings in countertops with a coat of varnish.

F. Plastic Laminate Faced Wood Paneling - WS Premium Grade:

1. Plastic laminate - high pressure decorative laminate complying with NEMA LD 3:
   a. Faces: Grade SGF.
   b. Backs: Grade BKH.
   c. Exposed edges: Same as faces.
2. Colors, patterns, and finishes:
   a. Wood grains, matte finish:
      1) Grain direction: Vertical.
3. Panel core - particleboard or medium density fiberboard:
   a. Thickness: 3/4 inch (19 mm).
4. Exposed panel edges:
   a. Applied solid wood banding 11/16 inch (18 mm) thick by depth of panels.
5. Adhesive for bonding edges: Hot melt adhesive or adhesive for faces.
6. Assemble panels by gluing and concealed fastening.

G. Plastic Laminate Cabinets - WS Premium Grade:
1. WI type of cabinet construction: Flush overlay.
2. Materials:
   a. Laminate cladding for exposed surfaces - high pressure decorative laminate:
      1) Horizontal surfaces other than tops: Grade HGS.
      2) Post formed surfaces: Grade HGP.
      3) Vertical surfaces: Grade VGS.
      4) Edges: Grade HGS.
   b. Semi-exposed surfaces:
      1) Surfaces other than drawer bodies - thermoset decorative panels:
         a) Edges of plastic laminate shelves: Grade HGS, matching laminate in color, pattern, and finish.
         b) For semi-exposed backs of panels with exposed plastic laminate surfaces, provide surface of high pressure decorative laminate, Grade VGS.
      2) Drawer sides and backs: Solid hardwood lumber.
      3) Drawer bottoms: Hardwood plywood.
   c. Concealed backs of panels with exposed plastic laminate surfaces: High pressure decorative laminate, Grade BKL.
3. Colors, patterns, and finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces indicated in Finish Schedule.
4. Provide dust panels of 1/4 inch (6.4 mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.
5. Fabrication:
   a. Join case body members using concealed dado or dowel methods utilizing glue and pressure. Reinforce dado method with nailing or screws. Mechanical fasteners are not permitted:
      1) Base cabinet bottoms and subtops: Bottoms, 3/4-inch particleboard with low pressure laminate finish on interior side and phenolic backing sheet on concealed side. Subtops, 3/4-inch particleboard with phenolic backing sheet both sides. Fabricate all base cabinets with subtops.
      2) Wall cabinet tops and bottoms: Tops, one-inch (1”) particleboard with low pressure laminate finish on interior side and phenolic backing sheet on concealed side. Bottoms, one-inch (1”) particleboard with manufacturer's low pressure laminate finish both sides.
      3) Cabinet ends: 3/4-inch particleboard with low pressure laminate finish on interior side and phenolic backing sheet on concealed side. Install high pressure plastic laminate on exposed sides of cabinet ends.
      4) Cabinet backs - 1/4-inch hardboard with low pressure laminate finish for standard unexposed backs:
         a) Fabricate with continuous hot melt glue joint between sides, tops, bottoms, and back on concealed side.

b) Exposed backs: 3/4-inch particleboard with low pressure laminate finish on interior side and high pressure plastic laminate on exterior, exposed side.

5) Cabinet shelves (adjustable, semi-concealed): 3/4-inch particleboard with low pressure laminate finish on both sides. Provide one-inch (1") particleboard for shelves for unsupported spans over 36 inches.
6) Cabinet doors: 3/4-inch particleboard with high pressure plastic laminate on exterior side and heavy gauge balancing sheet on interior side.
7) Drawer fronts: 3/4-inch particleboard with high pressure plastic laminate on exterior side and heavy gauge balancing sheet on interior side.
8) Drawer construction - 1/2-inch solid hardwood back, sides, and subfront; tongued and dadoed into back and subfront, joints glued and pinned; 1/4-inch hardboard bottom tongued and dadoed in all four sides, back, and subfront. Provide additional support with continuous hot melt glue joint on underside of drawers between sides, back, subfront, and bottom:
   a) Reinforce drawer bottoms as required with spreaders.
   b) Apply drawer front to subfront in accordance with manufacturer's standard procedures.
   c) Dividers: 3/4-inch particleboard with manufacturer's low pressure laminate finish on both sides. Secure to inside of cabinet with manufacturer's standard plastic clips.
   d) Dust panels: Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers except where located directly under tops.
   e) Finish exterior exposed surfaces with high pressure plastic laminate. Laminate plastic to particleboard core with balancing sheet using urea resin formaldehyde glue. Fabricate using cold press method with regulated pressure for minimum eight hours at minimum 70 degrees F.

H. Countertops - WI Premium Grade:
1. Solid surface:
   a. Solid surfacing material thickness: 3/4 inch (19 mm).
   b. Colors, patterns, and finishes: Provide materials and products resulting in colors of solid surfacing material indicated on Drawings.
2. Quartz countertops:
   a. Seams:
      1) Fabricate countertops without seams to the extent possible. When seams are necessary, fabricate countertops in sections indicated for joining in field, with sealant filled seams 1/16 inch (1.5 mm) in width.
   b. Fittings: Drill countertops in shop for fittings and similar items.
   c. Fabricate with four-inch (4") backsplashes. Sand minor scratches and stains with #400 then #600 sandpaper.
3. Fabrication:
   a. Fabricate tops in one piece, unless otherwise indicated. Comply with solid surfacing material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing:
      1) Fabricate tops with shop applied edges of materials and configuration indicated.
      2) Fabricate tops with loose backsplashes for field application.
   b. Drill holes in countertops for plumbing fittings and soap dispensers in shop.
4. Countertop construction tolerances:
   a. Variation from plumb: For vertical lines and surfaces, do not exceed 1/16 inch in 48 inches (1.5 mm in 1,200 mm).
   b. Variation from level: Do not exceed 1/8 inch in 96 inches (3 mm in 2,400 mm), 1/4 inch (6 mm) maximum.
   c. Variation in joint width: Do not vary joint thickness more than 1/4 of nominal joint

width.

d. Variation in plane at joints (lipping): Do not exceed 1/64-inch (0.4 mm) difference between planes of adjacent units.
e. Variation in line of edge at joints (lipping): Do not exceed 1/64-inch (0.4-mm) difference between edges of adjacent units, where edge line continues across joint.

2.6 SHELVING

A. Closet and Utility Shelving:
1. Grade: WI Custom.
2. Shelf material: 3/4 inch (19 mm) medium density fiberboard with solid lumber edge.
3. Cleats: 3/4-inch (19 mm) solid lumber.

2.7 SHOP FINISHING

A. Grade: WI Premium grade.

B. Shop finish architectural woodwork at fabrication shop. Defer final touchup, cleaning, and polishing until installation.

C. Produce finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

D. Preparations for Finishing:
1. Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work:
a. Backpriming: Apply one (1) coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two (2) coats to back of paneling and to end grain surfaces. Concealed surfaces of plastic laminate clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative overlay.

E. Exposed Surfaces - WI Premium Grade:
1. Plastic laminate finish: Use hot plate method for gluing of plastic laminate surfacing materials; glued surfaces shall be in close contact throughout. Glue stains are not permitted.
2. Solid surfacing finish: As scheduled.

F. Unexposed Wood Finish: Water based alkyd type primer/sealer.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements:
1. Where woodwork is indicated to fit to other construction, verify 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:
a. Locate concealed framing, blocking, and reinforcements that support woodwork by

field measurements before being enclosed, and indicate measurements on shop drawings.

b. Established dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

3.2 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork will be supported and installed as indicated.

3.3 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Before installing architectural woodwork, examine shop fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.4 INSTALLATION

A. Grade: Install woodwork to comply with requirements for grade specified for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2,400 mm). Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

C. Fire Retardant Treated Wood: Handle, store, and install fire retardant treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails (or finishing screws) for exposed fastening, countersunk, and filled flush with woodwork and matching final finish if transparent finish is indicated.

E. Plastic Laminate Paneling:
1. Install paneling to comply with same grade as paneling to be installed:
   a. Install paneling level, plumb, true, and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2,400 mm). Install with no more than 1/16 inch in 96 inches (1.6 mm in 2,400 mm) vertical cup or bow and 1/8 inch in 96 inches (3 mm in 2,400 mm) horizontal variation from a true plane.
   b. Anchor paneling to supporting substrate with blind nailing. Do not use face fastening unless covered by trim.

F. Cabinets:
1. Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as

indicated:

a. Install cabinets with no more than 1/8 inch in 96 inches (3 mm in 2,400 mm) sag, bow, or variation from a straight line.
b. Maintain veneer sequence matching of cabinets with transparent finish.
c. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer head screws sized for 1 inch (25 mm) penetration into wood framing, blocking, or hanging strips or toggle bolts through metal backing or metal framing behind walls.

G. Countertops:

1. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop:
   a. Install countertops with no more than 1/8 inch in 96 inches (93 mm in 2,400 mm) sag, bow, or variation from a straight line.
   b. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.
   c. Caulk space between backsplash and wall with silicone sealant.

H. Solid Surface and Stone Countertop:

1. Install components plumb and level scribed to adjacent finishes. Fabricate with backsplashes. Sand minor scratches and stain:
   a. Align adjacent stone and solid surfacing material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
   b. Do not cut in field unless otherwise indicated. If countertops or splashes require additional fabrication not specified to be performed at site, return to fabrication shop for adjustment.
   c. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
   d. Set stone and solid surface materials to comply with requirements indicated on Drawings and shop drawings. Shim and adjust to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances. Install anchors and attachments indicated or necessary to secure countertops in place.
   e. Where backsplash is indicated, install backsplash and end splash by adhering to wall with water-cleanable epoxy adhesive and to countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
   f. Adhesive top mount sinks/bowls to countertops using manufacturer's recommended adhesives and color matched silicone sealants.
   g. Keep components clean during installation. Remove adhesives, sealants, and stains. Replace stained components.
   h. Apply sealant to joints and gaps; comply with Section 07 92 00: Joint Sealants. Remove temporary shims before applying sealant.
   i. Make plumbing connections to sinks in accordance with plumbing requirements.
   j. Protect surfaces from damage. Repair work or replace damaged work that cannot be repaired to Architect's satisfaction.

I. Closet and Utility Shelving:

1. Cut shelf cleats at ends of shelves about 1/2 inch (13 mm) less than width of shelves and sand exposed ends smooth:
   a. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled. Space fasteners maximum 16 inches (400 mm) o.c.
   b. Install shelf brackets according to manufacturer's written instructions, spaced maximum 36 inches (900 mm) o.c. Fasten to framing members, blocking, or metal

backing, or use toggle bolts or hollow wall anchors.

c. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners maximum 12 inches (300 mm) o.c.
d. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced maximum 36 inches (900 mm) o.c. and within six inches (150 mm) of end of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
e. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports:
    1) Fasten shelves to cleats with finish nails or trim screws, set flush.
    2) Fasten shelves to brackets to comply with bracket manufacturer's written instructions.

J. Touch up finishing work. Fill nail holes with matching filler where exposed.

K. Construction Tolerances:
1. Variation from plumb: For vertical lines and surfaces, do not exceed 1/16 inch in 48 inches (1.5 mm in 1,200 mm).
2. Variation from level: Do not exceed 1/8 inch in 96 inches (3 mm in 2,400 mm), 1/4-inch (6 mm) maximum.
3. Variation in joint width: Do not vary joint thickness more than 1/4 of nominal joint width.
4. Variation in plane at joints (lipping): Do not exceed 1/64-inch (0.4 mm) difference between planes of adjacent units.
5. Variation in line of edge at joints (lipping): Do not exceed 1/64-inch (0.4 mm) difference between edges of adjacent units, where edge line continues across joint.

3.5 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality: Provide temporary ventilation during work.

B. Waste Management:
1. Comply with requirements of Section 01 74 19: Construction Waste Management and Disposal:
    a. Select wood sizes to minimize waste; reuse scrap to the greatest extent possible. Clearly separate scrap for use on site as accessory components, including shims, bracing, and blocking.
    b. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
    c. Prevent saw dust and wood shavings from entering the storm drainage system.
    d. Do not burn scrap lumber that has been pressure treated.
    e. Do not send lumber treated with pentachlorophenol, CCA, or ACA to cogeneration facilities or waste to energy facilities.

3.6 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.

D. Countertops:
   1. Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately:
      a. In-progress cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
      b. Remove and replace countertops that are:
         1) Broken, chipped, stained, or otherwise damaged. Stone may be repaired if methods and results are approved by Architect. Repair solid surface in accordance with manufacturer recommendations when approved by Architect.
         2) Defective countertops.
         3) Defective joints, including misaligned joints.
      c. Replace complying with requirements and showing no evidence of replacement.

E. Stone: Clean stone countertops not less than six (6) days after completion of sealant installation, using clean water and soft rags. Do not use wire brushes, acid type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.

F. Stone Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions.

3.7 PROTECTION

A. Provide final protection and maintain conditions, acceptable to manufacturer and installer, ensuring woodwork is without damage or deterioration at time of Substantial Completion.

END OF SECTION - 06 40 00

SECTION 06 83 16 | FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Glass fiber reinforced plastic paneling.
   2. Trim accessories.
   3. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 06 10 00: Rough Carpentry.
   2. Section 07 92 00: Joint Sealants.
   3. Section 09 21 16: Gypsum Board Assemblies.

1.3 SUBMITTALS

A. Product Data: Technical data including supporting documentation of compliance with surface burning characteristics for FRP and accessories.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building code: Comply with applicable requirements of the 2025 CBC for interior plastic materials and interior wall finishes.
   2. Surface burning characteristics:
      a. Determined by testing identical products according to ASTM E84 by qualified testing agency. Identify products with appropriate markings of applicable testing agency:
         1) Flame spread index: 25 or less.
         2) Smoke developed index: 450 or less.

B. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS

A. Glass Fiber Reinforced Plastic Paneling:
   1. Gelcoat finished, glass fiber reinforced plastic panels complying with ASTM D5319:
      a. Provide USDA accepted panels for incidental food contact.
      b. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) Marlite (basis of design), 1 Marlite Dr, Dover, OH 4462. Ph: 800-377-1221. www.marlite.com
         2) Crane Composites, Inc.
         3) Glasteel.
         4) Nudo Products, Inc.

5) Parkland Plastics, Inc.

c. Nominal thickness: Not less than 0.09 inch (2.3 mm).
d. Surface finish: Smooth (no texture).
e. Color: Selected by Architect.

2.2 ACCESSORIES

A. Trim Accessories:
1. One-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges:
a. Color: Selected by Architect.

B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.

C. Concealed Mounting Splines: Continuous, where applicable, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory laminated panels and to be fastened to substrate.

D. Adhesive: Recommended by plastic paneling manufacturer.

E. Sealant: Mildew resistant, single component, neutral curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 92 00: Joint Sealants.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the work.

B. Proceed with installation after correcting unsatisfactory conditions.

3.3 PREPARATION

A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.

B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.

C. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.

D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

E. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of

walls not less than half the width of full panels so that trimmed panels at corners are not less than 12 inches (300 mm) wide:

1. Mark plumb lines on substrate at trim accessory panel joint locations for accurate installation.
2. Locate trim accessories panel joints to allow clearance at panel edges according to manufacturer's written instructions.

3.4 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install panels with fasteners. Layout fastener locations and mark on face of panels so that fasteners are accurately aligned:
   1. Drill oversized fastener holes in panels and center fasteners in holes.
   2. Apply sealant to fastener holes before installing fasteners.

D. Install factory laminated panels using concealed mounting splines in panel joints.

E. Install trim accessories with adhesive and nails; no staples. Do not fasten through panels.

F. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

G. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

H. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.

I. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION - 06 83 16

SECTION 07 14 00 FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section requirement including but not limited to:
   1. Polyurethane waterproofing.
   2. Accessories necessary for a complete installation.

1.3 SUBMITTALS

A. Product Data:
   1. Technical data for each type of waterproofing including construction details, material descriptions, and tested physical and performance properties of waterproofing:
      a. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings:
   1. Indicate locations and extent of waterproofing:
      a. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

C. Qualification Data: Submit installer’s qualification data.

D. Field quality control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity having minimum five (5) years’ documented experience and employs installers and supervisors who are trained and approved by waterproofing manufacturer.

B. Source Limitations for Waterproofing System: Obtain waterproofing materials from single source from single manufacturer.

C. Pre-Installation Conference:
   1. Conduct conference at site.
   2. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.5 WARRANTY

A. Written warranty signed by manufacturer in which manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period:
   1. Warranty period: Five (5) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SINGLE COMPONENT POLYURETHANE WATERPROOFING

A. Single Component, Modified Polyurethane Waterproofing; ASTM C836/C836M and Coal Tar Free:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. BASF Corporation; Construction Systems; (800) 526-1072.
      b. Carlisle Coatings & Waterproofing, Inc. (800) 527-7092.
      c. W.R. Meadows, Inc.; (800) 542-7665.
      d. Approved equal.

B. Single Component, Reinforced, Modified Polyurethane Waterproofing; ASTM C836/C836M and Coal Tar Free:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. BASF Corporation; Construction Systems.
      b. Carlisle Coatings & Waterproofing Inc.
      c. Urethane Polymers International, Inc.
      d. Approved equal.

2.2 TWO-COMPONENT POLYURETHANE WATERPROOFING

A. Two-Component, Modified Polyurethane Waterproofing; ASTM C836/C836M and Coal Tar Free:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. ITW Polymers Sealants North America, Inc.
      b. Carlisle Coatings & Waterproofing Inc.
      c. Gaco Western LLC.
      d. Urethane Polymers International, Inc.
      e. Approved equal.

2.3 LATEX RUBBER WATERPROOFING

A. Two-Component, Unreinforced, Latex Rubber Waterproofing; ASTM C836/C836M and Coal Tar Free:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. GCP Applied Technologies.
      b. Approved equal.
   2. Hydrostatic head resistance: 65 feet (20 m) minimum; ASTM D5385.

B. Two-Component, Reinforced, Latex Rubber Waterproofing; ASTM C836/C836M and Coal-Tar Free:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. GCP Applied Technologies.
      b. Approved equal.
   2. Hydrostatic head resistance: 197 feet (60 m) minimum; ASTM D5385.

2.4 AUXILIARY MATERIALS

A. Provide auxiliary materials recommended in writing by waterproofing manufacturer for

intended use and compatible with one another and with waterproofing:
1. Furnish liquid type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Primer, sealer, or surface conditioner; factory formulated acrylic latex, polyurethane, or epoxy recommended by manufacturer compatible with waterproofing membrane.

C. Sheet Flashing:
1. 50 mil (1.3 mm) minimum, nonstaining, uncured sheet neoprene
2. Adhesive: Contact adhesive.

D. Membrane Reinforcing Fabric: Fiberglass mesh or polyester fabric, recommended weight for type of waterproofing.

E. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.

F. Joint Sealant:
1. Multicomponent polyurethane sealant, compatible with waterproofing; ASTM C920, Type M, Class 25 or greater; Grade NS for sloping and vertical applications and Grade P for deck applications; Use NT exposure complying with requirements of Section 07 92 00: Joint Sealants; and recommended by manufacturer for substrate and joint conditions:
a. Backer rod: Closed cell polyethylene foam.

2.5 PROTECTION COURSE

A. Protection Course - ASTM D6506, semirigid sheets of fiberglass or mineral reinforced asphaltic core, pressure laminated between two asphalt saturated fibrous liners and as follows:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
a. Soprema, Inc.
b. W. R. Meadows, Inc.
c. Approved equal.
2. Thickness: 1/8 inch (3 mm), nominal, for vertical applications; 1/4 inch (6 mm), nominal, elsewhere.
3. Adhesive: Rubber based solvent type recommended in writing by waterproofing manufacturer.

B. Protection Course:
1. Fan folded, with a core of extruded-polystyrene board insulation faced on one side with plastic film, nominal thickness of 1/4 inch (6 mm), with compressive strength of not less than eight psi (55 kPa) according to ASTM D1621, and maximum water absorption by volume of 0.6 percent according to ASTM C272:
a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
1) Dow Chemical Company.
2) Approved equal.

C. Protection Course:
1. Fan folded, with a core of extruded-polystyrene board insulation faced on both sides with plastic film, nominal thickness of 1/4 inch (6 mm), with compressive strength of not less than eight psi (55 kPa) according to ASTM D1621, and maximum water absorption by volume of 0.6 percent according to ASTM C272:
a. Manufacturers are subject to compliance with requirements; provide products by

one of the following:
1) Kingspan Insulation.
2) Owens Corning.
3) Approved equal.

D. Protection Course: Extruded-polystyrene board insulation with continuous surface skins on both faces intact, unfaced; ASTM C578, Type X, 1/2 inch (13 mm) thick.

E. Protection Course: Molded-polystyrene board insulation, ASTM C578, Type I, 0.90-lb/cu. ft. (15-kg/cu. m) minimum density, one-inch (25 mm) minimum thickness.

2.6 MOLDED SHEET DRAINAGE PANELS

A. Nonwoven Geotextile Faced, Molded Sheet Drainage Panel:
1. Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded plastic sheet drainage core; with a nonwoven, needle punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21 mm) sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate of nine gpm to 18 gpm per foot (112 to 220 L/min. per m):
2. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. BASF Corporation; Construction Systems.
   b. Carlisle Coatings & Waterproofing Inc.
   c. GCP Applied Technologies.
   d. Soprema, Inc.
   e. Urethane Polymers International, Inc.
   f. W. R. Meadows, Inc.
   g. Approved equal.

2.7 INSULATION

A. Board Insulation:
1. Extruded polystyrene board insulation according to ASTM C578, shiplap edged.
   a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      1) Dow Chemical Company.
      2) Kingspan Insulation.
      3) Owens Corning.
      4) Approved equal.
   b. Type IV, 25-psi (173 kPa) minimum compressive strength.
   c. Type VI, 40-psi (276 kPa) minimum compressive strength.

2.8 INSULATION DRAINAGE PANELS

A. Unfaced, Wall Insulation Drainage Panels:
1. Extruded polystyrene board insulation according to ASTM C578, Type IV, 25-psi (173 kPa) minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels:
   a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      1) DiversiFoam Products.
      2) Dow Chemical Company.
      3) Approved equal.

B. Unfaced, Wall Insulation Drainage Panels:

1. Extruded polystyrene board insulation according to ASTM C578, Type VI, 40-psi (276 kPa) minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels:
   a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      1) DiversiFoam Products.
      2) Dow Chemical Company.
      3) Owens Corning.
      4) Approved equal.

C. Geotextile Faced, Wall Insulation Drainage Panels:
   1. Extruded polystyrene board insulation according to ASTM C578, Type IV, 25-psi (173 kPa) minimum compressive strength; fabricated with tongue and groove edges and with one side having grooved drainage channels faced with a nonwoven geotextile filter fabric:
      a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
         1) Owens Corning.
         2) T. Clear Corporation.
         3) Approved equal.

PART 3 GENERAL

3.1 FIELD CONDITIONS

A. Environmental Limitations:
   1. Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer:
      a. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than five degrees F (3 degrees C) above dew point.
      b. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements and other conditions affecting performance of the work:
   1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
   2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D4263.

B. Proceed with installation after correcting unsatisfactory conditions.

3.3 PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Close off deck drains and other deck penetrations to prevent spillage and migration of

waterproofing fluids.

D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete:
   1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D4259 with a self-contained, recirculating, blast cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form release agents. Remove remaining loose material and clean surfaces according to ASTM D4258.

E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

3.4 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS

A. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners according to waterproofing manufacturer's written instructions and to recommendations in ASTM C1471.

B. Apply waterproofing in two (2) separate applications and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.

3.5 JOINT AND CRACK TREATMENT

A. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions and to recommendations in ASTM C1471. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D4258:
   1. Comply with ASTM C1193 for joint sealant installation.
   2. Apply bond breaker on sealant surface, beneath preparation strip.
   3. Prime substrate along each side of joint and apply a single thickness of preparation strip at least six inches (150 mm) wide along each side of joint. Apply waterproofing in two (2) separate applications and embed a joint reinforcing strip in the first preparation coat.

3.6 WATERPROOFING APPLICATION

A. Apply waterproofing according to manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471.

B. Start installing waterproofing in presence of manufacturer's technical representative.

C. Apply primer over prepared substrate unless otherwise instructed in writing by waterproofing manufacturer.

D. Unreinforced Waterproofing Applications:
   1. Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate.
   2. Apply one (1) or more coats of waterproofing to obtain a seamless membrane free of entrapped gases and pinholes, with a dry film thickness of 90 mils (2.25 mm**)**.
   3. Apply waterproofing to prepared wall terminations and vertical surfaces.
   4. Verify manufacturer's recommended wet film thickness of waterproofing every 100 square feet (9.3 sq. m).

E. Reinforced Waterproofing Applications:
   1. Mix materials and apply waterproofing by roller, notched squeegee, trowel, or other

suitable application method.

2. Apply first coat of waterproofing, embed membrane-reinforcing fabric, and apply second coat of waterproofing to completely saturate reinforcing fabric and to obtain a seamless reinforced membrane free of entrapped gases and pinholes, with an average dry film total thickness required by manufacturer to achieve specified warranty.
3. Apply reinforced waterproofing to prepared wall terminations and vertical surfaces.
4. Verify manufacturer's recommended wet film thickness of waterproofing every 100 square feet (9.3 sq. m).

F. Cure waterproofing, taking care to prevent contamination and damage during application and curing.

G. Install protection course with butted joints over waterproofing before starting subsequent construction operations:
   1. For horizontal applications, install protection course loose laid over fully cured membrane.
   2. For vertical applications, set protection course in nominally cured membrane, which will act as an adhesive. If membrane cures before application of protection course, use adhesive.

3.7 MOLDED SHEET DRAINAGE PANEL INSTALLATION

A. Place and secure molded sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded sheet drainage panels during subsequent construction:
   1. For vertical applications, install board insulation or protection course before installing drainage panels.

3.8 INSULATION INSTALLATION

A. Install one (1) or more layers of board insulation to achieve required thickness over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.

B. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions.

C. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.9 INSULATION DRAINAGE PANEL INSTALLATION

A. Install drainage panels over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.

B. Ensure that drainage channels are aligned and free of obstructions.

C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.

D. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.10 FIELD QUALITY CONTROL

A. Testing Agency - [Owner will engage] a qualified testing agency to perform tests and inspections:
   1. Testing agency shall verify thickness of waterproofing during application for each 600 square feet (56 sq. m) of installed waterproofing or part thereof.
   2. Flood testing: Flood test each deck area for leaks, according to recommendations in ASTM D5957, after completing waterproofing but before overlaying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water:
      a. Flood to an average depth of 2-1/2 inches (64 mm) with a minimum depth of one inch (25 mm) and not exceeding a depth of four inches (100 mm). Maintain two inches (50 mm) of clearance from top of sheet flashings.
      b. Flood each area for 24 hours.
      c. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.

B. Manufacturer's Field Service: Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components and to furnish daily reports to Architect.

C. If test results or inspections show waterproofing does not comply with requirements, remove and replace or repair the waterproofing as recommended in writing by manufacturer, and make further repairs after retesting and inspecting until waterproofing installation passes.

D. Prepare test and inspection reports.

3.11 PROTECTION

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed board insulation or drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 14 00

SECTION 07 21 00 | THERMAL INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Polyisocyanurate foam plastic board.
   2. Glass fiber blanket.
   3. Acoustical Insulation.
   4. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 06 10 53: Miscellaneous Rough Carpentry.
   2. Section 09 21 16: Gypsum Board Assemblies.

1.3 SUBMITTALS

A. Product Data: Technical data and installation instructions for each type of insulation product specified.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Fire performance characteristics - Identify products with appropriate markings of applicable testing and inspecting organization:
      a. Surface burning characteristic: ASTM E84.
      b. Flame spread index: Maximum 25.
      c. Smoke developed index: Maximum 450.
      d. Fire resistance ratings: ASTM E119.
      e. Combustion characteristics: ASTM E136.
   2. Underwriter's Laboratories (UL) 723 Tests for Surface Burning Characteristics of Building Materials.
   3. SCAQMD – South Coast Air Quality Management District Regulations Rule 1168 Adhesive and Sealant Applications.

B. Single Source Responsibility for Insulation Products: Obtain each type of building insulation from single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of Work.

C. Environmental Requirements:
   1. Manufacture extruded polystyrene with HCFC or other CFC free blowing agents. Mark insulation boards and packages with manufacturer's name and product designation. Unmarked boards and packages will be rejected:
      a. Wherever possible, provide boards from manufacturers who recycle insulation materials.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam plastic board insulation:
   1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
   3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 PRODUCTS

2.1 POLYISOCYANURATE FOAM PLASTIC BOARD

A. Polyisocyanurate Board - ASTM C1289, Type II, Class 1 or 2, Grade 2 (20psi) or Grade 3 (30 psi):
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Atlas Roofing Corporation.
      b. Hunter Panels.
      c. DuPont.
      d. Firestone Building Products.
      e. Rmax, Inc.
      f. Sarnafil (for roofing)
      g. Approved equal.
   2. Fire propagation characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 GLASS FIBER BLANKET

A. Glass Fiber Blanket, Unfaced - ASTM C665, Type I; with maximum flame spread and smoke developed indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Johns Manville (Basis of Design).
      b. CertainTeed Corporation.
      c. Guardian Building Products, Inc.
      d. Owens Corning.
      e. Approved equal.

B. Glass Fiber Blanket, Polypropylene Scrim Kraft Faced - ASTM C665, Type II (non-reflective faced), Class A (faced surface with a flame spread index of 25 or less); Category 1 (membrane is a vapor barrier):
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Johns Manville (Basis of Design).
      b. CertainTeed Corporation.
      c. Owens Corning.
      d. Approved equal.

2.3 ACOUSTICAL INSULATION

A. Glass Fiber Noise Reducer Blanket, Kraft-faced - ASTM C665, Type II; with maximum flame spread and smoke developed indexes of 25 and 50, respectively, per ASTM E84; combustion characteristics. To be installed on interior wood stud framing:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. CertainTeed Corporation (Basis of Design).
      b. Guardian Building Products, Inc.
      c. Johns Manville; a Berkshire Hathaway company.
      d. Owens Corning.
      e. Approved equal.

2.4 INSULATION FASTENERS

A. Adhesively Attached, Spindle Type Anchors:
   1. Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place:
      a. Plate: Perforated, galvanized carbon steel sheet, 0.030-inch (0.762 mm) thick by two inches (50 mm) square.
      b. Spindle: Low carbon galvanized steel coated; fully annealed; 12 gauge 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation.

B. Adhesively Attached, Angle Shaped, and Spindle Type Anchors:
   1. Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place:
      a. Angle: Formed from 0.030-inch (0.762 mm) thick, perforated, galvanized carbon steel sheet with each leg two inches (50 mm) square.
      b. Spindle: Copper coated, low carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation.

C. Insulation Retaining Washers:
   1. Self-locking washers formed from 0.016-inch (0.41 mm) thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter:
      a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
         1) Crawl spaces.
         2) Ceiling plenums.
         3) Attic spaces.

D. Insulation Standoff: Spacer fabricated from galvanized mild steel sheet for fitting over spindle of insulation anchor to maintain air space of two inches (50 mm) between face of insulation and substrate to which anchor is attached.

E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

F. 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 Contractor.

2.5 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass fiber insulation: ASTM C764, Type II, loose fill; with maximum flame spread and smoke developed indexes of 5, per ASTM E84.
2. Spray polyurethane foam insulation: ASTM C1029, Type II, closed cell, with maximum flame spread and smoke developed indexes of 75 and 450, respectively, per ASTM E84, and shall conform to all SCAQMD and EPA air quality regulations.

B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

C. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

B. Sequence work to ensure fireproofing and firestop materials are in place before beginning work.

3.2 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

B. Foam in Place Insulation:
1. Verify that substrates are clean, dry, and free of substances that are harmful to insulation:
   a. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Board and Batt Insulation:
1. Install insulation that is undamaged, dry, and unsoiled and has not been exposed to ice, rain, or snow at any time:
   a. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
   b. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

C. Cavity Wall Insulation:

1. Foam plastic board insulation:
   a. Install pads of adhesive spaced approximately 24 inches (610 mm) o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates:
      1) Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in.

D. Framed Construction - Blanket Insulation:
   1. Install in cavities formed by framing members according to the following requirements:
      a. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
      b. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
      c. Maintain three-inch (76 mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
      d. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
      e. For metal framed wall cavities where cavity heights exceed 96 inches (2,438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
      f. For wood framed construction, install blankets according to ASTM C1320 and as follows:
         1) With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
      g. Miscellaneous voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
         1) Glass fiber insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
         2) Spray polyurethane insulation: Apply according to manufacturer's written instructions.

E. Reflective Insulation:
   1. Install sheet reflective insulation according to ASTM C727:
      a. Install sheet radiant barriers according to ASTM C1744.
      b. Install interior radiation control coating system according to ASTM C1321.

F. Continuous Insulation for Exterior Walls (Polyisocyanurate Board):
   1. Install continuous insulation board according to manufacturer's written instructions:
      a. Fastener components shall include a minimum two-inch diameter plastic plate/washer and self-taping screws attached directly to stud framing.
      b. All joints, penetrations, and flashings shall be taped and/or otherwise sealed with manufacture’s recommended products.

3.4 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION - 07 21 00

SECTION 07 21 16 | BATT INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section is related to batt Insulation and includes information regarding the provision of fiberglass batt thermal insulation for exterior envelope assemblies.

B. Reference Standards:
   1. Materials shall meet the property requirements of one or more of the following specifications as applicable to the specific product or end use:
      a. American Society for Testing of Materials (ASTM):
         1) ASTM C423 Test Method for Sound Absorption Coefficient by the Reverberation Room Method.
         2) ASTM C518 Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter.
         3) ASTM C665 Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
         4) ASTM C1320 Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
         5) ASTM E84 Test Method for Surface Burning Characteristics of Building Materials.
         6) ASTM E119 Test Methods for Fire Tests of Building Construction and Materials.

1.3 SUBMITTALS

A. Product Data: Submit data on product characteristics, performance criteria, and limitations, including installation instructions.

1.4 QUALITY ASSURANCE

A. Sustainable Design:
   1. Provide products which have received the following certifications:
      a. UL Certified Environmental Product Declaration in accordance with ISO 14025. Applies to EcoTouch® Faced and Unfaced Insulation.
      b. UL Environment EcoLogo CCD-106, applies to EcoTouch® Faced and Unfaced Insulation.
      c. GREENGUARD Indoor Air Quality Certified® and GREENGUARD Children & Schools Certified℠, applies to EcoTouch® Unfaced Batts and EcoTouch® Faced Batts and Rolls.
      d. GREENGUARD Formaldehyde Free, applies to EcoTouch® Unfaced and EcoTouch® Faced Batts and Rolls.
      e. Scientific Certification Systems SCS-MC-01025, SCS Certified minimum 65 percent recycled glass content (with at least 41 percent post-consumer recycled and the balance of pre-consumer recycled glass content), applies to EcoTouch® Unfaced Batts and Rolls.
      f. Scientific Certification Systems SCS-MC-02676, SCS Certified minimum 58

percent recycled glass content (with at least 36 percent post-consumer recycled and the balance of pre-consumer recycled glass content), applies to EcoTouch® Faced Batts and Rolls.

g. USDA Certified Biobased Products: EcoTouch® unfaced – 98 percent; EcoTouch® Kraft-faced – 57 percent; EcoTouch® FSK-faced – 78 percent.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original packaging.

B. Store and protect products in accordance with manufacturer's instructions. Store in a dry indoors location. Protect insulation materials from moisture and soiling.

C. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

D. Do not install insulation that has been damaged or wet; remove it from jobsite:
   1. An exception may be allowed in cases where Contractor is able to demonstrate that wet insulation when fully dried out (either before installation or afterward following exposure to system operating temperatures) will provide installed performance that is equivalent in respects to new, completely dry insulation. In such cases, consult the insulation manufacturer for technical assistance.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN

A. Thermal Insulation: EcoTouch® PINK® FIBERGLAS™ Insulation with PureFiber® Technology by Owens-Corning, Toledo, OH 43659; www.owenscorning.com.

2.2 MATERIALS

A. EcoTouch® Flame Spread 25 Batt Insulation - ASTM C665, Type II (PSK facing), Class A and Type III (FSK facing), Class A preformed formaldehyde free glass fiber batt, poly/scrim/Kraft (PSK) or foil/scrim/Kraft (FSK) faced on one side:
   1. Flame spread less than 25, smoke developed index less than 50 per ASTM E84.
   2. ICC building construction classification: All types.
   3. Perm rating: 0.02 maximum per ASTM E96.

B. Accessories:
   1. Provide accessories per insulating system manufacturer's recommendations, including the following:
      a. Tape: Polyethylene self-adhering type for Kraft faced insulation and bright aluminum self-adhering type for foil faced insulation.
      b. Insulation fasteners: Impale clip of galvanized steel; type recommended by insulation manufacturer for particular use intended.
      c. Mechanical insulation fasteners: FM approved, corrosion resistant, size required to suit application.
      d. Wire mesh: Galvanized steel, hexagonal wire mesh.
      e. Spindle fasteners: Corrosion-resistant wire spindles.
      f. Ventilation baffles: Formed plastic, metal, or cardboard sized to fit full width of rafter spaces.

2.3 PERFORMANCE CRITERIA

A. Wood Frame Construction - Walls, R-Value - Per ASTM C518:
   1. R-13, 3-1/2-inch thickness, 15-inch or 23-inch width, 93-inch length at 2x4 studs.
   2. R-21, 5-1/2-inch thickness, 15-inch or 23-inch width, 93-inch length at 2x6 studs.
   3. R-30, 9-1/2-inches thick, 15-inch or 23-inch width, 93-inch length at 2x8 studs.
   4. R-30, 9-1/2-inches thick, 15-inch or 23-inch width, 93-inch length at 2x10 studs.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be installed. Verify that adjacent materials are dry and ready to receive insulation. Verify mechanical and electrical services within walls have been tested and inspected.

B. Provide written report listing conditions detrimental to performance of work in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's installation instructions and ASTM C1320.

B. Friction-fit blanket insulation in place, until the interior finish is applied. Install batts to fill entire stud cavity, with no gaps, voids, or areas of compression. If stud cavity is less than eight feet (8’) in height, cut lengths to friction fit against floor and ceiling tracks. Walls with penetrations require that insulation be carefully cut to fit around outlets, junction boxes, and other irregularities:
   1. Do not install insulation on top of or within three inches (3”) of recessed light fixtures unless the fixtures are approved for such use.

C. Within exterior wall framing, install insulation between pipes and backside of sheathing. Cut or split insulation material as required to fit around wiring and plumbing.

D. Where showers and bathtubs are located on exterior walls, install insulation and vapor retarder air barrier between units and exterior.

E. If eave ventilation baffles are required, install ventilation baffles at eaves to hold insulation down from roof sheathing and provide positive ventilation from eave to attic space.

F. Fluff insulation to full thickness for specified R-value before installation. Do not compress insulation in the cavity during installation, creating gaps or voids that could diminish thermal value.

G. Trim insulation neatly to fit spaces. Fill miscellaneous gaps and voids with insulation.

H. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.

I. For unfaced batt insulation, install with friction fit or retain in place with manufacturer’s recommended fasteners or mesh.

J. For batt insulation with factory-applied facing, install with vapor retarder membrane facing warm in the winter side of building spaces or as specified by local building code. Lap ends and side flanges of membrane over or between framing members. Tape to seal tears, cuts,

or misalignments in membrane.

K. Secure insulation in place using one of the following methods: Friction fit; staple or nail facing flanges in place as needed, tape in place, retain in place with spindle fasteners, retain in place with wire mesh secured to framing members.

3.3 PROTECTION

A. Protect installed insulation from damage due to weather and physical abuse until protected by permanent construction.

END OF SECTION - 07 21 16

SECTION 07 22 00 | ROOF AND DECK INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes roof insulation over the properly prepared deck substrate.

B. Related Sections:
1. Section 07 54 19: PVC Thermoplastic Membrane Roofing.
2. Section 07 51 10: Cold Process Built-Up Roofing.
3. Section 07 62 00: Roof Related Sheet Metal.

C. Reference Standards:
1. American Society for Testing and materials (ASTM):
   a. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
   b. ASTM B29 Standard Specification for Refined Lead.
   c. ASTM B32 Standard Specification for Solder Metal.
   d. ASTM C165 Standard Test Method for Measuring Compressive Properties of Thermal Insulation.
   e. ASTM C208 Standard Specification for Cellulosic Fiber Insulation Board.
   f. ASTM C209 Standard Test Method for Cellulosic Fiber Insulating Board.
   g. ASTM C272 Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
   h. ASTM C518 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
   i. ASTM C578 Standard Specification for Perlite Thermal Insulation Board.
   j. ASTM C728 Standard Test Methods for Fire Test of Roof Coverings.
   k. ASTM C1289 Standard Specification for Faced Rigid Polyisocyanurate Thermal Insulation.
   l. ASTM C1396 Standard Specification for Gypsum Wallboard.
   m. ASTM D5 Standard Test Method for Penetration of Bituminous Materials.
   n. ASTM D36 Standard Test Method for Softening Point of Bitumen (Ring and Ball Apparatus).
   o. ASTM D312 Standard Specification for Asphalt Used in Roofing.
   p. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
   q. ASTM D1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
   r. ASTM D1622 Standard Test Method for Apparent Density of Rigid Cellular Plastics.
   s. ASTM D1863 Standard Specification for Mineral Aggregate Used on Built-Up Roofs.
   t. ASTM D2126 Standard Test Method for Response off Rigid Cellular Plastics to Thermal Humid Aging.
   u. ASTM D2178 Standard Specification for Asphalt Glass Felts used in Roofing and Waterproofing.
   v. ASTM D4601 Standard Specification for Asphalt-Coated Glass Fiber Base Sheet

Used in Roofing.
w. ASTM D5147 Standard Sampling and Testing Modified Bituminous Sheet Material.
2. Cast Iron Soil Pipe Institute, Washington, D.C. (CISPI).
a. Factory Mutual Research (FM): Roof Assembly Classifications.
3. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.
4. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.
5. Warnock Hersey (WH): Fire Hazard Classifications.
6. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
7. Steel Deck Institute, St. Louis, Missouri (SDI).
8. Southern Pine Inspection Bureau, Pensacola, Florida (SPIB).
9. Insulation Board, Polyisocyanurate (FS HH-I-1972).
10. Insulation Board, Thermal (Fiberboard) (FS LLL-1-535B).

1.3 SUBMITTALS

A. Product Data: Provide manufacturer's specification data sheets for each product in accordance with Section 01 33 00: Submittal Procedures.

B. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.

C. Provide a sample of each insulation type.

D. Shop Drawings:
1. Submit manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets, and saddles.
2. Shop drawing shall include outline of roof, location of drains, a complete board layout of tapered insulation components, thickness, and the average "R" value for the completed insulation system.

E. Certification:
1. Submit roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.
2. Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

1.4 QUALITY ASSURANCE

A. Fire Classification, ASTM E108.

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. Pre-Installation Meeting: Refer to Division 07 (roofing specifications) for pre-installation meeting requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.

B. Store all insulation materials in a manner to protect them from the wind, sun, and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the Project site.

C. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).

D. Store materials off the ground. Any warped, broken, or wet insulation boards shall be removed from the site.

PART 2 PRODUCTS

2.1 PRODUCTS, GENERAL

A. Refer to Section 01 60 00: 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:
1. Products proposed as equal to the products specified in this Section shall be submitted in accordance with bidding requirements and Division 01 provisions:
   a. 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 of California. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.
   b. Include a list of three (3) projects of similar type and extent, located within a 100-mile radius from the location of the Project. In addition, the three (3) projects must be at least five (5) years old and be available for inspection by the Architect, Owner, or Owner's representative.
   c. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.
   d. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

2.2 INSULATION MATERIALS

A. Thermal Insulation Properties and Approved Insulation Boards:
1. Rigid polyisocyanurate roof insulation; ASTM C1289:
   a. Qualities: Rigid, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
   b. Thickness: Minimum 6 inches.
   c. R-Value: Minimum 30.
   d. Compliances: UL, WH, or FM listed under Roofing Systems; Federal Specification HH-I-1972, Class 1.
   e. Acceptable products:
      1) ENRGY-3; Johns Manville.
      2) H-Shield; Hunter.

3) EnergyGuard; GAF.
4) Approved equivalent.

2. Tapered polyisocyanurate roof insulation; ASTM C1289:
   a. Qualities: Factory tapered, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
   b. Thickness: Minimum as needed for taper crickets for proper slope to drains, tapered design required as part of submittal process.
   c. Average R-Value: Minimum varies.
   d. Tapered Slope: One inch (1”).
   e. Compliances: UL, WH, or FM listed under Roofing Systems; Federal Specification HH-I-1972, Class 1.
   f. Acceptable products:
      1) ENRGY 3; Johns Manville.
      2) EnergyGuard; GAF.
      3) H-Shield; Hunter.
      4) Approved equivalent.
3. High density fiberboard roof insulation; ASTM C208:
   a. Qualities: Rigid, composed of interlocking fibers factory blended treated with asphalt on the top side.
   b. Board size: Four feet by eight feet (4’ x 8’).
   c. Thickness: Minimum 1/2 inch.
   d. Compliances: UL, WH, FM listed under Roofing Systems; Federal Specification LLL-I-535-B.
   e. Acceptable manufacturers:
      1) Blue Ridge; Celotex.
      2) Temple Inland.
      3) Georgia-Pacific.
      4) Approved equivalent.
4. Dens-deck prime roof board:
   a. Qualities: Nonstructural glass mat faced, noncombustible, water-resistant treated gypsum core panel.
   b. Board size: Four feet by eight feet (4’x8’).
   c. Thickness: 1/2 inch.
   d. R-Value: .56.
   e. Compliances: UL, WH, or FM listed under Roofing Systems.

2.3 RELATED MATERIALS

A. Fiber Cant and Tapered Edge Strips:
   1. Preformed rigid insulation units of sizes/shapes indicated, matching insulation board or of perlite or organic fiberboard, as per the approved manufacturer:
      a. Acceptable manufacturers:
         1) The Garland Company, Inc.
         2) Celotex.
         3) Johns Manville.
         4) GAF.
         5) Approved Equivalent.

B. Protection Board: Pre-molded semi-rigid asphalt composition board 1/2 inch.

C. Roof Board Joint Tape: Six inches (6”) wide glass fiber mat with adhesive compatible with insulation board facers.

D. Asphalt: ASTM D312, Type III Steep Asphalt.

E. Roof Deck Insulation Adhesive:

1. Insul-Lock E HR - dual-component, high rise foam adhesive with 45 percent rapidly renewable material content as recommended by insulation manufacturer and approved by FM indicated ratings:
   a. Tensile strength (ASTM D412): 250 psi.
   b. Density (ASTM D1875): 8.5 lbs./gal.
   c. Viscosity (ASTM D2556): 22,000 to 60,000 cP.
   d. Peel strength (ASTM D903): 17 lb/in.
   e. Flexibility (ASTM D816): Pass at -70 degrees F.

F. Fasteners:
   1. Corrosion resistant screw fastener as recommended by roof membrane manufacturer:
      a. Factory Mutual tested and approved with three inches (3") coated disc for I-90 rating; length required to penetrate metal deck one inch (1").

PART 3 EXECUTION

3.1 EXECUTION, GENERAL

A. Comply with requirements of Section 01 73 00: Execution.

3.2 INSPECTOR OF SURFACES

A. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation:
   1. Verify that work that penetrates roof deck has been completed.
   2. Verify that wood nailers are properly and securely installed.
   3. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
   4. Do not proceed until defects are corrected.
   5. Do not apply insulation until substrate is sufficiently dry.
   6. Broom clean substrate immediately prior to application.
   7. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.
   8. Verify that temporary roof has been completed.

3.3 INSTALLATION

A. Base Layer(s) - Attachment with Mechanical Fasteners:
   1. Approved insulation board shall be fully attached to the deck with an approved mechanical fastening system. As a minimum, the amount of fasteners shall be in accordance with manufacturer's recommendation for FM I-90 system. Otherwise, a minimum of one (1) fastener per two (2) square feet shall be installed.
   2. Filler pieces of insulation require at least two (2) fasteners per piece if size of insulation is less than four (4) square feet.
   3. Spacing pattern of fasteners shall be as per manufacturer's recommendations to meet the FM requirements. Placement of any fastener from edge of insulation board shall be a minimum of three inches (3"), and a maximum of six inches (6").
   4. Minimum penetration into deck shall be as recommended by the fastener manufacturer. There is a one inch (1") minimum for metal, wood, and structural concrete decks where not specified by the manufacturer. For gypsum and cement-wood fiber decks, penetration shall be determined from pull-out test results with a minimum penetration of 1-1/2 inches.
   5. Gypsum and Cementitious Wood Fiber Decks: Where the roof deck is visible from the building interior, Contractor shall ensure no penetration of fasteners through underside of the deck. Any holes or spalling caused by fastener installation shall be repaired by

the roofing contractor. Where the new roof system thickness exceeds an amount so that a minimum of 1-1/2 of penetration cannot be achieved with an Olympic TB Fastener, or approved equivalent, then (and only then) toggle bolts may be used to secure installation to the deck.

6. Tape joints of insulation as per manufacturer's requirements.

B. Top Layer - Attachment with Insulation Adhesive Approved by FM:

1. Ensure all surfaces are clean, dry, free of dirt, debris, oils, loose or embedded gravel, unadhered coatings, deteriorated membrane, and other contaminants that may inhibit adhesion.
2. Apply insulation adhesive directly to the substrate using a ribbon pattern with 1/4-inch to 1/2-inch wide beads 12 inches o.c., using either the manual applicator or an automatic applicator, at a rate of one (1) gallon per one hundred (150) square feet per cartridge.
3. Immediately place insulation boards into wet adhesive. Do not slide boards into place. Do not allow the adhesive to skin over before installing insulation boards.
4. Briefly step each board into place to ensure contact with the adhesive. Substrates with irregular surfaces may prevent the insulation board from making positive contact with the adhesive. Relief cuts or temporary weights may be required to ensure proper contact.
5. All boards shall be cut and fitted where the roof deck intersects a vertical surface. The boards shall be cut to fit a minimum of 1/4 inch away from the vertical surface.
6. Tape joints of insulation as per manufacturer's requirements.

3.4 CLEANING

A. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing membrane.

3.5 CONSTRUCTION WASTE MANAGEMENT

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

END OF SECTION - 07 22 00

SECTION 07 24 00 | EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Exterior Insulation and Finish System (EIFS): Class PB system consisting of a secondary weather resistive barrier, adhesive, expanded polystyrene insulation board (EPS), base coat, reinforcing mesh, and finish.

B. Related Sections:
1. Section 06 10 00: Rough Carpentry.
2. Section 06 10 53: Miscellaneous Rough Carpentry.
3. Section 06 16 00: Sheathing.
4. Section 09 90 00: Painting and Coating.

C. Related Standards:
1. Exterior Insulation Manufacturers Association (EIMA):
   a. Guideline Specification for Exterior Insulation and Finish Systems, Class PB and Class PM.

1.3 SUBMITTALS

A. Shop Drawings: Indicate details of construction including attachments, joint patterns, penetrations, interface with flashings, and adjacent materials.

B. Quality Assurance Submittals:
1. Contractor's certification that:
   a. Products of this Section, as provided, meet or exceed specified requirements.
   b. Manufacturers of products of this Section meet specified qualifications.
   c. Applicator of products of this Section meets specified qualifications.
2. Manufacturer's instructions:
   a. Printed installation instructions for each specified product.
   b. Manufacturer's safety data sheets (SDS) for each specified product.

C. Samples: Submit two (2) samples of the EIFS for each finish, texture, and color to be used on the Project. Samples shall be of sufficient size to accurately represent each color and texture being utilized on the Project.

D. Test Reports: When requested, Contractor shall submit copies of selected test reports verifying the performance of the EIFS.

E. Closeout Submittals: Warranty documents, issued and executed by manufacturer of EIFS materials.

1.4 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum of five (5) years of experience.

B. Applicator: Company knowledgeable in the proper installation of the EIFS and experienced and competent in the installation of EIFSs. Additionally, the contractor shall be a current factory trained applicator.

C. Mockup:
1. Provide mockup of system materials illustrating method of attachment located where directed by Architect.
2. Construct mockup ten feet long by ten feet wide (10'l x 10'w), including sheathing board substrate, drainage system, insulation, surface finish, color, texture, perimeter and control joints, and typical interface with adjacent construction for Architect's approval.
3. The approved mockup shall be part of the finished work and will become the basis of standard for color, texture, and workmanship for which all EIFS work will be judged.
4. If mockup is not approved, remove mockup and construct new mockup until approved by Architect.

D. Pre-Installation Conference: Refer to Section 01 31 00: Project Management and Coordination.

1.5 WARRANTY

A. Warrant the work specified herein for seven (7) years against defects in materials and against becoming unserviceable or causing an objectionable appearance resulting from defective or nonconforming workmanship.

B. Defects shall include, but not be limited to the following:
1. Cracking.
2. Peeling or other delaminating or releasing from substrate.
3. Noticeable deterioration or discoloring.

1.6 DELIVERY, STORAGE, AND HANDLING

A. All materials shall be delivered to the jobsite in original, unopened packages with labels intact. Questionable materials shall not be used.

B. Minimum storage temperature shall be in accordance with manufacturer's instructions depending on product used.

C. Protect all products from weather and direct sunlight.

PART 2 PRODUCTS

2.1 ACCEPTABLE PRODUCTS/MANUFACTURERS

A. Specifications are based on "Outsulation Plus MD" manufactured by Dryvit Systems, Inc., West Warwick RI; (800) 556-7752. Manufacturers listed below whose products meet or exceed the specifications may be used on the Project with Architect's approval. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions:
1. Finestone, Jacksonville, FL; (866) 659-3133.
2. Parex, Inc. Redan, GA; (800) 537-2739.
3. Sto Corp., Atlanta, GA; (800) 221-2397.
4. Apprved equal.

2.2 COMPONENTS

A. Exterior Sheathing Board: As specified in Section 09 21 16: Gypsum Board Assemblies.

B. Air/Weather Barrier: An air and secondary weather barrier for the specified sheathing substrate, including the 100 percent acrylic barrier material, tapes, flashings, and all other materials and components recommended by the EIFS manufacturer.

C. Adhesive: Manufacturer's recommended adhesive to adhere drainage material.

D. Track: Manufacturer's recommended UV treated PVC "J" channels with weep holes, with and without drip edge as recommended by manufacturer, or required.

E. Drainage Strip: Manufacturer's recommended corrugated plastic strip installed to allow weepage at base of wall and at the heads of all penetrations and at expansion/control joints of EIFS as instructed by manufacturer.

F. Adhesives: Manufacturer's recommended type used to adhere the insulation board to the air/weather barrier. Always use a vertical notched trowel adhesive pattern to adhere insulation board as instructed by manufacturer. Apply the adhesive so that the ribbons run vertically when the insulation board is placed on the wall.

G. Base Coats: Manufacturer's recommended type used to embed the reinforcing mesh on the face of the insulation board. Back-wrap all exposed edges as instructed by manufacturer.

H. Insulation Board: Manufacturer's recommended expanded polystyrene (EPS) insulation board.

I. Reinforcing Meshes: Manufacturer's recommended balanced, open weave, glass fiber fabric treated for compatibility with other system materials, in sizes and weights recommended to suit intended use.

J. Finish Coat Materials: Manufacturer's recommended finish type in color and texture selected by the Architect from manufacturer's standard water-based, acrylic coatings with integral color and texture, and formulated with dirt pickup resistance (DPR) chemistry.

2.3 ACCESSORIES

A. Insulation Adhesive: Type recommended by manufacturer to suit intended use.

B. Insulation Fasteners: Type recommended by manufacturer to suit intended use.

C. Trim and Control Joints: Provide galvanized steel, with attachment flanges of type recommended by manufacturer to suit intended use.

D. Sealant Materials: Type specified in Section 07 92 00: Joint Sealants.

2.4 PRE-COATED FOAM SHAPES

A. Architectural Shapes and Details: As indicated on Drawings.

B. Joint Reinforcing Mesh: Self-adhering glass fiber mesh (joint tape type) weighing a minimum of 2.8 oz/s.yd. per foam shape manufacturer instructions.

C. Glass Fiber Mesh: alanced, open weave, 3.5 oz/yd per foam shape manufacturer

instructions.

D. Rigid Insulation Core: EPS conforming to physical properties of ASTM C578, Type I, 1.0 lb/cu.ft. density.

E. Adhesive: Per foam shape manufacturer’s instructions.

F. Pre-Coat: Lightweight polymer-modified acrylic cementitious coating applied to EPS shape, in minimum thickness of 0.125 inch.

G. Primer and Finishes: Acrylic polymer based primer and finish by manufacturer approved by foam shape manufacturer for compatibility with pre-coat cementitious coating.

H. Fasteners: Corrosion resistant mechanical fasteners with plastic washer as instructed by foam shape manufacturer for temporary fastening of foam shapes during installation.

I. Acceptable Manufacturers:
1. Decorawall, Inc.
2. Invicta Foam Products, LLC.

2.5 OTHER MATERIALS

A. Provide other materials not specifically described but required for a complete and proper installation.

PART 3 EXECUTION

3.1 SEQUENCING AND SCHEDULING

A. Schedule work with other construction trades to maintain integrity of exterior wall to prevent water penetration behind EIFS. Allow sufficient time for curing of EIFS materials prior to sealant application.

3.2 PROJECT CONDITIONS

A. Application of wet materials shall not take place during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.

B. Application of wet materials shall be at a minimum ambient temperature that shall be in accordance with manufacturer's instructions depending on product. The temperatures shall be maintained for a minimum of 24 hours thereafter, or until completely dry.

3.3 EXAMINATION

A. Verify substrate is of correct type.

B. Verify substrate is dry and flat within 1/4 inch in a four-foot (4’) radius, with tight connections, and that there are no surface voids, projections, or other conditions that may interfere with the EIFS installation.

C. Verify that all needed flashings and other waterproofing details have been completed, if such completion is required prior to the EIFS application.

D. Notify Architect of all discrepancies and do not start work until such discrepancies are

corrected.

E. Beginning work of this Section before unacceptable conditions have been corrected is prohibited.

3.4 PREPARATION AND PROTECTION OF SUBSTRATE

A. The EIFS materials shall be protected by permanent or temporary means from weather and other damage prior to, during, and following application until dry.

B. Protect adjoining work and property during installation.

C. The substrate shall be free of foreign materials such as oil, dust, dirt, form release agents, efflorescence, paint, wax, water repellants, moisture, frost, and any other condition that may inhibit adhesion.

3.5 INSTALLATION

A. Install EIFS in accordance with the manufacturer's application instructions.

B. The overall minimum base coat thickness shall be sufficient to fully embed the mesh in accordance with manufacturer's instructions.

C. EIFS surfaces in contact with sealant shall be coated in accordance with manufacturer's instructions. Sealants shall not be applied directly to textured finishes or base coat surfaces.

D. Foam Shapes:
1. Surface preparation: The substrate shall be of a material approved by the foam shape manufacturer for compatibility with adhesive. The surface of the substrate shall be clean and free of debris, and level, plane and true, being 1/4-inch in 48 inches.
2. Properly back-wrap foam shapes with manufacturer approved mesh.
3. Apply adhesive to the entire back surface using a notched trowel. Immediately, while adhesive is wet, apply by firmly pressing and properly positioning the foam shape on to the substrate base coat as instructed by manufacturer. Apply mechanical fasteners as required by manufacturer.
4. Peel mesh on the back face of the shape along the entire length and fold over to extend the mesh at the bottom and top of the shape on the substrate. Apply base coat on the mesh extended from the shape onto the substrate and trowel to an acceptable smooth finish for application of finish coat.
5. Mitre and butt joints shall have fiber mesh tape applied with at least two inches (2”) of tape applied to each side of joint. Apply cementitious base coat after mesh installation. Allow to dry and sand smooth.
6. Apply sealant in accordance with manufacturer’s instruction and sealant systems at expansion joints with exposed foam shape surfaces treated with base coat and reinforcing fiber mesh.
7. Apply finish coat.

3.6 FIELD QUALITY CONTROL

A. Contractor shall be responsible for the proper application of the EIFS materials.

3.7 CLEANING

A. All excess materials shall be removed from the jobsite by Contractor.

B. All surrounding areas where the EIFS has been applied shall be left free of debris and foreign substances resulting from work of this Section.

3.8 PROTECTION

A. The EIFS shall be protected from weather and other damage until permanent protection in the form of flashings, sealants, etc. are installed.

END OF SECTION - 07 24 00

SECTION 07 25 00 | WEATHER BARRIERS

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Commercial weather barrier assemblies.
   2. Flexible flashing.
   3. Weather barrier flashing.
   4. Fluid-applied flashing.
   5. Weather barrier accessories.
   6. Drainage material.

B. Related Sections:
   1. Section 04 22 00: Concrete Unit Masonry.
   2. Section 04 72 00: Cast Stone Masonry.
   3. Section 07 21 00: Thermal Insulation.
   4. Section 07 46 46: Fiber-Cement Siding.
   5. Section 09 24 00: Cement Plastering.

1.3 DEFINITIONS

A. Weather Barrier:
   1. A combination of materials and accessories that do the following:
      a. Prevents the accumulation of water as a water-resistive barrier.
      b. Minimizes the air leakage into or out of the building envelope as a continuous air barrier.
      c. Provides sufficient water vapor transmission to enable drying as a vapor-permeable membrane.

B. Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly.

C. Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of the building envelope per ASHRAE 90.1 Section 5.4.3.1.

D. Vapor Diffusion: A slow movement of individual water vapor molecules from regions of higher to lower water vapor concentration (higher to lower vapor pressure).

E. Vapor Permeable Membrane: The property of having a water-vapor permeance rating of ten (10) perms (575 ng/Pa x s x sq. m) or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E96. Vapor permeable material permits the passage of moisture vapor through vapor diffusion.

1.4 SUBMITTALS

A. Product Data:
   1. Technical data for each type of product:
      a. Building wrap: Submit data on air and water-vapor permeance based on testing according to referenced standards.

B. Shop Drawings: Show details of weather barrier at terminations, openings, and penetrations. Show details of flexible flashing applications.

C. Preconstruction Mockup:
1. Owner will engage in a third-party testing program.
2. Test reports: Prepared by a qualified testing agency for each mockup.
3. Record drawings: As-built drawings showing changes as a result of the mockup and illustrated in the CCD approved by DSA if applicable.

D. Manufacturer's Instructions: For installation of each product specified.

E. Sample of manufacturer's warranty.

F. Reports: Field test and inspection reports, as applicable.

G. Installer's weather barrier manufacturer training certificate.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Installer: Company specializing in installing weather barriers with minimum five (5) years' experience and approved by manufacturer.

B. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

C. Pre-Installation Meetings: To be conducted onsite.

PART 2 PRODUCTS

2.1 WEATHER BARRIER

A. Commercial Building Wrap - ASTM E2357 passed, Air Barrier Association of America (ABAA) evaluated air barrier assembly, and assembly water resistance per ASTM E331; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized for nine (9) month exposure; and acceptable to authorities having jurisdiction:
1. Basis of design product:
a. Subject to compliance with requirements, provide DuPont Safety & Construction E. I. du Pont de Nemours and Company; Tyvek® CommercialWrap® D or a comparable product by one of the following:
1) VaproShield.
2) Dow Chemical Company.
3) Raven Industries, Inc.
4) Approved equal.
2. Performance characteristics:
a. Air permeance: Not more than 0.001 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.005 L/s x sq. m at 75 Pa) when tested in accordance with ASTM E2178.
b. Water vapor permeance: Not less than 23 perms (1,300 ng/Pa x s x sq. m) per ASTM E96/E96M, Desiccant Method (Procedure A) or not less than 28 perms (1,600 ng/Pa x s x sq. m) per ASTM E96, Water Method (Procedure B).
c. Water penetration resistance: Hydrostatic head resistance greater than 7.7 feet (2.35 m) in accordance with AATTC TM127.
d. Drainability: 98 percent or greater when tested in accordance with ASTM E2273.
e. Weather barrier system to have a VOC content of 30 g/L or less.

2.2 WEATHER BARRIER FLASHING

A. Conformable Weather Barrier Flashing - Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure, 176 degrees F (80 degrees C) for seven (7) days:
   1. Basis of design product:
      a. Subject to compliance with requirements, provide DuPont Safety & Construction FlexWrap™ NF or comparable product by Architect:
         1) Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.
         2) ASTM E331 applies to water penetration testing of exterior windows, skylights, doors, and curtain walls.
         3) Water penetration: No leakage at 15 psf (720 Pa) per ASTM E331.
         4) Low temperature adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 degrees F (-4 degrees C) as Class A (without primer use).
         5) Adhesion after water immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

B. Strip Flashing - Composite flashing material composed of spunbonded polyethylene laminate with 100 percent butyl-based, dual-sided, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, 176 degrees F (80 degrees C) for seven (7) days:
   1. Basis of design product:
      a. Subject to compliance with requirements, provide DuPont Safety & Construction StraightFlash™ or comparable product approved by Architect:
         1) ASTM E331 applies to water penetration testing of exterior windows, skylights, doors, and curtain walls.
         2) Water penetration: No leakage at 15 psf (720 Pa) per ASTM E331.
         3) Low temperature adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 degrees F (-4 degrees C) as Class A without primer use.
         4) Adhesion after water immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

2.3 FLUID-APPLIED FLASHING

A. Fluid-Applied Flashing - Trowel or brush applied, non-water soluble, single component, silyl terminated polyether technology (STPE), vapor permeable, flashing material:
   1. Basis of design product:
      a. Subject to compliance with requirements, provide DuPont Safety & Construction E. I. du Pont de Nemours and Company; Tyvek® Fluid Applied Flashing & Joint Compound+ or comparable product approved by Architect:
         1) VOC content: ASTM C1250, less than two percent (2%) by weight and between 25 to 30 g/L.
         2) Water vapor transmission: ASTM E96, Method B, greater than 20 perms (1,100 ng/Pa x s x sq. m) at 25 mils (0.635 mm) thick.
         3) Minimum tensile strength: ASTM D412, 165 lb/sq. ft. (1,140 kPa).
         4) Minimum elongation at break: ASTM D412; 360 percent.

2.4 WEATHER BARRIER ACCESSORIES

A. Building-Wrap Tape - Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in commercial building wrap:
   1. Basis of design product: DuPont Safety & Construction E. I. du Pont de Nemours and Company; Tyvek® Tape.

B. Closed-Cell Polyurethane Foam Insulation - Low pressure, low expansion, single component polyurethane foam, with maximum flame-spread and smoke-developed indexes of 15 and 25, respectively, per ASTM E84:
   1. Basis of design product: DuPont Safety & Construction E. I. du Pont de Nemours and Company; DuPont™ Window & Door Foam.
   2. Pressure build-up: 0.0247 psi (0.170 kPa) maximum, AAMA 812.
   3. Deflection: 0.0050 inch (0.127 mm) maximum, AAMA 812.

C. Fasteners with Self-Gasketing Washers - Commercial building wrap manufacturer's recommended pneumatically or hand-applied fasteners with 2-inch (50 mm) diameter, high-density polyethylene cap washers with UV inhibitors:
   1. Basis of design product: DuPont Safety & Construction E. I. du Pont de Nemours and Company; Tyvek® Wrap Caps.

D. Primer for Flashings - Synthetic rubber-based product; spray applied. Strengthen adhesive bond at low temperature applications between weather products such as self-adhered flashing products, commercial building wraps, and common building sheathing materials:
   1. Basis of design product: DuPont Safety & Construction E. I. du Pont de Nemours and Company, DuPont™ Adhesive Primer.
   2. Peel adhesion test - Passes in accordance with ASTM D3330, Test Method F, for the following:
      a. Peel Angles: 0, 25, 72, and 180 degrees.
      b. Substrates: Concrete masonry units (CMU), exterior gypsum sheathing, oriented strand board (OSB), aluminum, and vinyl.
   3. Chemical compatibility: Pass; AAMA 713.
   4. Flame spread index: 5; ASTM E84.
   5. Smoke development index: 0; ASTM E84.

E. Sealants: Provide sealants that comply with ASTM C920, elastomeric polymer sealant to maintain watertight conditions. Refer to Section 07 92 00: Joint Sealants.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, with installer present, for compliance with requirements.

B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation:
   1. Verify that rough sill framing for doors and windows is sloped downwards towards the exterior and is level across width of the opening.

C. Verify that surfaces to receive weather barrier flashing are clean, dry, and free of frost.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Direct water onto an acceptable weather barrier drainage plane with an unobstructed path to exterior of wall:
   1. Provide a drainage path for water intrusion through window and door attachment system that collects at window and door sills and directs water to the exterior or weather barrier.

3.3 COMMERCIAL BUILDING WRAP INSTALLATION

A. General: Comply with weather barrier manufacturer's written instructions and warranty requirements.

B. Cover exposed exterior surface of sheathing with weather barrier securely fastened to framing immediately after sheathing is installed:
   1. Maintain continuity of air and water barrier assemblies.
   2. Start weather barrier installation at a building corner, leaving 12 inches (300 mm) of weather barrier extended beyond corner to overlap.
   3. Install weather barrier horizontally starting at lower portion of wall surface.
   4. Provide minimum six inches (150 mm) overlap at horizontal and vertical wrap seams in a shingle manner to maintain continuous downward drainage plane and air and water barrier.

C. Seams:
   1. Seal seams with building wrap tape per manufacturer's recommended installation instructions:
      a. Shiplap horizontal seams in weather barrier to facilitate proper drainage.

D. Fasteners:
   1. Use weather barrier manufacturer’s recommended fasteners to secure weather barrier and install fasteners according weather barrier manufacturer’s installation guidelines:
      a. Do not use temporary fasteners to permanently attach weather barrier.
      b. Do not place fasteners with gasketing washers where weather barrier flashing will be installed.
      c. Install fasteners with gasketing washers through flashing where recommended by manufacturer.

E. Openings:
   1. Completely cover openings with weather barrier, then cut weather barrier membrane to openings according to weather barrier manufacturer's installation guidelines:
      a. Provide head and jamb flaps and seam overlaps to maintain continuous drainage.
      b. Repair damage to weather barrier using method recommended by weather barrier manufacturer.
      c. Install flashing according to weather barrier manufacturer's installation guidelines.

3.4 WEATHER BARRIER FLASHING INSTALLATION

A. Installation:
   1. Remove wrinkles and bubbles, and reposition weather barrier as necessary to produce a uniform, smooth surface:
      a. Ensure that ambient and substrate surface temperatures are acceptable in accordance with manufacturer instructions and recommendations.
      b. Wipe surfaces to remove moisture, dirt, grease, and other debris that could interfere with adhesion.
      c. Apply weather barrier manufacturer’s recommended primer over concrete, masonry, and glass-mat gypsum wall sheathing substrates to receive weather barrier flashing.
      d. Lap weather barrier flashing a minimum of two inches (50 mm) onto weather barrier.
      e. Apply pressure over entire surface using roller or firm hand pressure.

B. Rough Openings:
   1. Shiplap flashing with weather barrier in a shingle manner to maintain a continuous downward drainage plane and air and water barrier in accordance with manufacturer’s written instructions:
      a. Retain first option below for stud framing that is nominally four inches (100 mm)

thick. Retain second option for stud framing that is nominally six inches (150 mm) thick.
b. Apply 6-inch (150 mm) (for stud framing that is nominally four inches 4” thick) and 9-inch (230 mm) (for stud framing that is nominally six inches 6” thick) wide conformable weather barrier flashing at door and window sills.
c. Ensure that sill flashing does not slope to the interior.
d. Install backer rod in joint between frame of opening product and flashed rough opening on the interior.
e. Apply sealant or closed-cell polyurethane foam insulation around entire opening/fenestration product to create air seal around interior perimeter of window openings in accordance with weather barrier manufacturer’s instructions.
f. Weather barrier flashing selection and application methods are specific to type of opening product and rough opening configuration. When building envelope design requirements exceed ASTM E1677, 65 mph equivalent structural load, and 15 mph equivalent wind-driven rainwater infiltration resistance, use butyl-based DuPont™ "StraightFlash™" and wrap cap screws in subparagraphs below.
g. Around door and window openings, apply butyl-based flashing to flaps of weather barrier.
h. Use strip flashing with wrap cap screws to secure head flap of the windows.

C. Penetrations:
1. Apply weather barrier manufacturer's recommended weather barrier flashing patches behind fastening plates, such as brick-tie base plates, metal-flashing clips, and metal channels:
a. Seal weather barrier around each penetration with weather barrier manufacturer's recommended self-adhered flashing product or sealant. Integrate products with flanges into the weather barrier.

D. Terminations:
1. Provide minimum two inches (50 mm) overlap using strip flashing on adjoining roof and base of wall systems to maintain continuous downward drainage plane:
a. Secure weather barrier with fasteners and weather barrier flashing.

3.5 FLUID-APPLIED FLASHING INSTALLATION

A. Before installing fluid-applied flashing, do the following:
1. Ensure drainage path is not blocked or disrupted. Do not install on walls that do not feature a continuous path for moisture drainage. Blocked or disrupted paths for drainage can result in excess moisture buildup in wall cavity. Do not install below grade.
2. Remove surface dust, dirt, and loose mortar.
3. Verify that surface is free of grease and other contaminants and that surface is smooth.
4. Fill joints in concrete masonry units, and voids in cast-in-place concrete with trowel-applied fluid-applied flashing to ensure surface is flush and smooth.
5. Allow masonry mortar and cast-in-place concrete a minimum of 24 hours to cure before installing fluid-applied flashing.

B. Fluid-Applied Flashing Installation:
1. Using a trowel or brush, apply fluid-applied flashing around perimeter of window and door openings to a minimum thickness of 25 mils (0.635 mm):
a. Extend flashing a minimum of two inches (50 mm) onto exterior face of adjacent surface.
b. Inspect for gaps and pinholes in fluid-applied flashing and apply additional coats until no gaps and pinholes appear.
c. Joint applications - using a trowel or a brush, fill cracks and voids up to 1/4 inch (6 mm) in width:

1) For joints and cracks between 1/4 inch and 1/2 inch (6 mm and 12 mm) wide, cover first with mesh tape.
2) For joints and cracks between 1/2 inch and 1 inch (12 mm and 24 mm) wide, cover first with butyl-based strip flashing.
3) Apply a bead, then trowel smooth.
4) Seam coverage should be a minimum of two inches (50 mm) wide and 15 to 20 mils (0.38 mm to 0.51 mm) thick.
5) Inspect for gaps and pinholes in fluid-applied flashing and apply additional coats until no gaps and pinholes appear.

3.6 DRAINAGE MATERIAL INSTALLATION

A. Install drainage material with grooves or channels running vertically in compliance with manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory authorized service representative to train installers and observe subject test wall areas and installations.

B. Field Quality Control Testing:
   1. Perform the following test on [representative areas of structural-sealant-glazed curtain walls] [mockups] [insert requirements]:
      a. Air infiltration whole building: ASTM E779 at not more than [0.40 cfm/sf (2.00 L/s per sq. m)] [0.25 cfm/sf (1.25 L/s per sq. m)] [0.15 cfm/sf (0.75 L/s per sq. m)] at 1.57 lb/sq. ft. (75 Pa), pursuant to local building codes.
      b. Water penetration:
         1) ASTM E105 at a minimum [uniform] [and] [cyclic] static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" article, but not less than [2.86 lbf/sq. ft. (137 Pa)] [6.24 lbf/sq. ft. (300 Pa)] [10.0 lbf/sq. ft. (500 Pa)] [12.5 lbf/sq. ft. (600 Pa)]. No water penetration shall occur as defined in ASTM E1105:
            a) Perform a minimum of [two (2)] [three (3)] [insert number] tests in areas as directed by Architect.
            [OR]
            b) Perform tests in each test area as directed by Architect. Perform at least three (3) tests, prior to [ten (10), 30, and 70 percent completion] [insert requirements].

C. Prepare test and inspection reports.

3.8 CLEANING

A. Immediately remove release paper and scrap from work area and dispose of material in accordance with requirements of Section 01 73 00: Execution, and Section 01 74 19: Construction Waste Management and Disposal.

3.9 PROTECTION

A. Protect installed weather barrier from the following:
   1. Damage from cladding, structure, or a component of the structure (e.g., window, door, or wall system).

2. Contamination from building site chemicals, premature deterioration of building materials, or nonstandard use or application of products.
3. Foreign objects or agents, including the use of materials incompatible with weather barrier products.
4. UV exposure in excess of products' stated limits.

END OF SECTION - 07 25 00

SECTION 07 26 00 | UNDER-SLAB VAPOR BARRIER

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Products supplied under this Section:
   1. Vapor barrier for installation under concrete slabs.
   2. Accessories.

B. Related Sections:
   1. Section 03 30 00: Cast-in-Place Concrete.

C. Reference Standards:
   1. American Society for Testing and Materials (ASTM):
      a. ASTM E1643 Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
      b. ASTM E1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
   2. Technical Reference - American Concrete Institute (ACI):
      a. ACI 302.1R Guide to Concrete Floor and Slab Construction.
      b. ACI 302.2R Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.3 SUBMITTALS

A. Quality Control/Assurance:
   1. Summary of test results per Paragraph 9.3 of ASTM E1745.
   2. Manufacturer’s samples and literature.
   3. Manufacturer’s installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
   4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

1.4 QUALITY ASSURANCE

A. Pre-Construction Meeting:
   1. Contact vapor barrier manufacturer to coordinate a pre-construction meeting for training on best means and methods and also schedule a review of the vapor barrier installation either by digital review or in person.

PART 2 PRODUCTS

2.1 MATERIALS

A. Vapor barrier shall have all of the following qualities:
   1. Maintain permeance of less than 0.01 Perms (grains/[$ft^2 \cdot hr \cdot inHg$]) as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-

7.1.5).
2. Other performance criteria:
   a. Strength: ASTM E1745 Class A.
   b. Thickness: 15 mils minimum.
3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1

B. Vapor Barrier Products:
1. Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com. Basis of design.
2. Griffolyn VAPORguard by Reef Industries, 713-507-4250. www.reefindustries.com.
3. PMPC by W.R. Meadows, 800-342-5976. http://www.wrmeadows.com/pmpc/.

2.2 ACCESSORIES

A. Seams:
1. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

B. Sealing Penetrations of Vapor Barrier:
1. Stego Mastic by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
2. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
3. Perimeter/edge seal: Stego Crete Claw by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
4. Stego Term Bar by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
5. Stego Tack Tape (double-sided sealant tape) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
6. Use of one-sided seaming tape to seal the perimeter must be submitted to the architect for pre-approval.

C. Penetration Prevention:
1. Beast Foot by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

D. Vapor Barrier-Safe Screed System:
1. Beast Screed by Stego Industries, LLC, (877) 464-7834 www.stegoindustries.com.

PART 3 EXECUTION

3.1 PREPARATION

A. Ensure that subsoil is approved by Architect or geotechnical Engineer:
1. Level and compact base material.

3.2 INSTALLATION

A. Install vapor barrier in accordance ASTM E1643:
1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab:
   a. Seal vapor barrier to the entire slab perimeter using Stego Crete Claw, per manufacturer's instructions.
   b. Overlap joints six inches (6”) and seal with manufacturer’s seam tape.
3. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
4. Seal all penetrations (including pipes) per manufacturer’s instructions.

5. For interior forming applications, avoid the use of non-permanent stakes driven through the vapor barrier. Use blunt-end and/or threaded nail stakes (screed pad posts) and insert them into Beast Foot. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
6. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
7. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
8. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
9. For a vapor barrier-safe, fixed-elevation concrete screeding application, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

END OF SECTION - 07 26 00

SECTION 07 42 43 COMPOSITE WALL PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section Includes:
   1. Exterior, panelized fiber cement cladding system and accessories to complete a drained and back-ventilated rainscreen.
   2. Interior fiber cement panelized cladding system and accessories.

B. Related Sections:
   1. Section 05 12 00: Structural Steel Framing.
   2. Section 05 40 00: Cold-Formed Metal Framing.
   3. Section 07 21 00: Thermal Insulation.
   4. Section 07 25 00: Weather Barriers.
   5. Section 07 62 00: Sheet Metal Flashing and Trim.
   6. Section 07 92 00: Joint Sealants.

C. Reference Standards:
   1. American Architectural Manufacturers Association (AAMA):
      a. AAMA 509 Voluntary Test and Classification Method of Drained and Back Ventilated Rain Screen Wall Cladding Systems
   2. ASTM International (ASTM):
      a. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
      b. ASTM C1185 Standard Test Methods for Sampling and Testing Non-Asbestos Fiber Cement.
      c. ASTM C1186 Standard Specification for Flat Fiber-Cement Sheets.
      d. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.
      e. ASTM E228 Standard Test Method for Linear Thermal Expansion of Solid Materials with a Vitreous Silica Dilatometer.
      f. ASTM E330 Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
      g. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
   3. Underwriters Laboratories (UL):
      a. UL 723/ASTM E84 Standard Test for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A. Submit under provisions of General Conditions.

B. Product Data: Submit manufacturer’s product description, standard detail drawings relevant to the Project, storage and handling requirements, and installation instructions.

C. Product Test Reports and Code Compliance: Documents demonstrating product compliance with local building code, such as test reports or evaluation reports from qualified, independent testing agencies.

D. Shop Drawings: Submit drawings, including plan, section, and elevation drawings, showing installation details that demonstrate product layout, dimensions, finish colors, edge/termination conditions/treatments, compression and control joints, openings, and penetrations.

E. Samples: Submit samples of each product type proposed for use.

1.4 PERFORMANCE REQUIREMENTS

A. Fiber Cement Cladding – Must Comply with ASTM C1186, Type A Requirements:
1. Linear variation with change in moisture content: 0.17 percent linear change.
2. Wet flexural strength, lower limit: 580 psi.
3. Water tightness: No water droplets observed on any specimen.
4. Freeze-thaw: No damage or defects observed.
5. Warm water: No evidence of cracking, delamination, swelling, or other defects observed.
6. Heat-rain: No crazing, cracking, or other deleterious effects, surface or joint changes observed in any specimen.

B. Mean Coefficient of Linear Thermal Expansion (ASTM E228): Max 1.0*10^-5 in./in. F.

C. Surface Burning (UL 723/ASTM E84):
1. Flame spread: 0.
2. Smoke Developed: 5.

D. Wind Load (ASTM E330):
1. Refer to manufacturer installation guidelines for ultimate test pressure data corresponding to framing dimensions, fastener type, and attachment clips. Project engineer(s) must determine Zone 4 and 5 design pressures based on Project specifics:
   a. Minimum lateral deflection: L/120.
2. Wind design speed: 101 MPH

E. Water Penetration (ASTM E331): No water leakage observed into wall cavity.

F. Weather Resistant: No cracking, checking, crazing, erosion, or other detrimental effects observed.

G. Steady-State Heat Flux and Thermal Transmission Properties Test (ASTM C518): Thermal resistance R value of 1.23 F.

H. Fire Resistance (ASTM E119): The wall assembly must successfully endure 60-minute fire exposure without developing excessive unexposed surface temperature or allowing flaming on the unexposed side of the assembly.

I. Drained and Back Ventilated Rainscreen (AAMA 509): System must pass all component tests.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:
1. All fiber cement panels specified in this Section must be supplied by a manufacturer with a minimum of ten (10) years of experience in fabricating and supplying fiber cement cladding systems:
   a. Products covered under this Section are to be manufactured in an ISO 9001 certified facility.
2. Provide technical and design support as needed regarding installation requirements

and warranty compliance provisions.

B. Installer Qualifications: All products listed in this Section are to be installed by a single installer trained by manufacturer or representative.

C. Mock-Up Wall: Provide a mock-up wall as evaluation tool for product and installation workmanship.

D. Pre-Installation Meetings: Prior to beginning installation, conduct conference to verify and discuss substrate conditions, manufacturer's installation instructions and warranty requirements, and Project requirements.

1.6 WARRANTY

A. Provide manufacturer's 50-year warranty against manufactured defects in fiber cement panels.

B. Provide manufacturer's 15-year warranty against manufactured defects in panel finish.

C. Warranty provides for the original purchaser. See warranty for detailed information on terms.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Panels must be stored flat and kept dry before installation. A waterproof cover over panels and accessories should be used at all times prior to installation.

B. If panels are exposed to water or water vapor prior to installation, allow to completely dry before installing. Failure to do so may result in panel shrinkage at ship lap joints, and such action may void warranty.

C. Panels must be carried on edge. Do not carry or lift panels flat. Improper handling may cause cracking or panel damage.

D. Direct contact between the panels and the ground should be avoided at all times. It is necessary to keep panels clean during installation process.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Nichiha Corporation, 18-19 Nishiki 2-chome Naka-ku, Nagoya, Aichi 460-8610, Japan.

B. Acceptable Manufacturer's Representative: Nichiha USA, Inc., 6465 E. Johns Crossing, Suite 250, Johns Creek, GA 30097. Toll free: 1.866.424.4421, Office: 770.805.9466, Fax: 770.805.9467, www.nichiha.com:
   1. Basis of design product - Nichiha Illumination Series (see A series elevations for locations):
      a. Profile colors: Designer-specified custom color (finished in U.S.).
      b. Profiles: Small with added score line.
      c. Optional accessories:
      d. Manufactured corners with 3-1/2-inch returns for each profile color.
      e. Dimensions: Nominal – 18 inches high by six-feet or 10-feet long (6'h x 6' or 10'l); Actual - 455mm (h) by 1,818 mm or 3,030 mm (l).
      f. Panel thickness: 5/8 inch (16 mm actual).

g. Finish: Satin.
h. Weight: 35.27 pounds per six-foot (6') panel; 57.32 pounds per ten-foot (10') panel.
i. Coverage: Nine (9) square feet per six-foot (6') panel; 15 square feet per ten-foot (10') panel.
j. Factory sealed on six (6) sides.

C. Substitutions: Not permitted.

2.2 MATERIALS

A. Fiber cement panels manufactured from a pressed, stamped, and autoclaved mix of Portland cement, fly ash, silica, recycled rejects, and wood fiber bundles.

B. Panel surface pre-finished and machine applied.

C. Panels profiled along all four edges, such that both horizontal and vertical joints between the installed panels are ship-lapped.

D. Factory-applied sealant gasket added to top and right panel edges; all joints contain a factory sealant.

2.3 INSTALLATION COMPONENTS

A. Ultimate Clip System:
1. Starter track:
   a. Horizontal panel installations - FA 700 – 10 feet long galvalume.
   b. Vertical panel installations (10-foot panels only) – FA 300T – six-foot-six-inch (6'-6") long galvalume.
2. Panel clips - JEL 777 "Ultimate Clip" (10mm rainscreen for 5/8-inch AWP) – 400 series stainless steel:
   a. Joint tab attachments included for six-foot (6') horizontal installations.
3. Single flange sealant backer – FHK 1017 (10mm) – 6.5-foot long fluorine coated galvalume.
4. Double flange sealant backer – FH 1020 (10mm) – ten-foot (10') long fluorine coated galvalume.
5. Corrugated spacer – FS 1005 (5mm), FS 1010 (10mm) – four-foot (4') long.
6. Finish clip (optional) – JE310 (5mm).

B. Aluminum Trim (Optional): Paint as specified in finish schedule.

C. Fasteners: Corrosion resistant fasteners, such as hot-dipped galvanized screws appropriate to local building codes and practices must be used. Use stainless steel fasteners in high humidity and high-moisture regions. Panel manufacturer is not liable for corrosion resistance of fasteners. Do not use aluminum fasteners, staples, or fasteners that are not rated or designed for intended use. See manufacturer's instructions for appropriate fasteners for construction method used.

D. Flashing: Flash all areas specified in manufacturer's instructions. Do not use raw aluminum flashing. Flashing must be galvanized, anodized, or PVC coated.

E. Sealant: Sealant shall be polyurethane, or hybrid, and comply with ASTM C920.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
   1. Fiber cement panels can be installed over braced wood, steel studs and sheathing including plywood, OSB, plastic foam, or fiberboard sheathing. Fiber cement panels can also be installed over structural insulated panels (SIPs), concrete masonry units (CMUs) and concrete block structures (CBSs) with furring strips, and pre-engineered metal construction.
   2. Allowable stud spacing: See manufacturer's installation instructions for details.
   3. A weather resistive barrier is required when installing fiber cement panels. Use an approved weather resistive barrier (WRB). Refer to local building codes.
   4. Appropriate metal flashing should be used to prevent moisture penetration around all doors, windows, wall bottoms, material transitions, and penetrations. Refer to local building codes for best practices.

B. Examine site to ensure substrate conditions are within specification for proper installation.

C. Do not begin installation until unacceptable conditions have been corrected.

D. Do not install panels or components that appear to be damaged or defective. Do not install wet panels.

3.2 INSTALLATION

A. General:
   1. Install products in accordance with the latest installation guidelines of the manufacturer and all applicable building codes and other laws, rules, regulations, and ordinances. Review all manufacturer installation, maintenance instructions, and other applicable documents before installation:
      a. Consult with your local dealer or Nichiha Technical Department before installing any Nichiha fiber cement product on a building higher than 45 feet or three (3) stories. Special installation conditions may be required.

B. Panel Cutting:
   1. Always cut fiber cement panels outside or in a well-ventilated area. Do not cut the products in an enclosed area.
   2. Always wear safety glasses and NIOSH/OSHA approved respirator whenever cutting, drilling, sawing, sanding, or abrading the products. Refer to manufacturer MSDS for more information.
   3. Use a dust-reducing circular saw with a diamond-tipped or carbide-tipped blade:
      a. Recommended circular saw: Makita 7-1/4" Circular Saw with Dust Collector (#5057KB).
      b. Recommended blade: Tenryu Board-Pro Plus PCD Blade (#BP-18505).
      c. Shears (electric or pneumatic) or jig saw can be used for complicated cuttings, such as service openings, curves, radii, and scrollwork.
   4. Silica dust warning: Fiber cement products may contain some amounts of crystalline silica, a naturally occurring, potentially hazardous mineral when airborne in dust form. Consult product MSDS or visit www.osha.gov/SLTC/silicacrystalline/index.html.

3.3 CLEANING AND MAINTENANCE

A. Review manufacturer guidelines for detailed care instructions.

END OF SECTION - 07 42 43

SECTION 07 52 00 | MODIFIED BITUMEN MEMBRANE ROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes entire roofing assembly, but is not limited to:
   1. Modified bitumen membrane roofing.
   2. Tapered edge strips, cant strips, and wood nailers.
   3. Flashings, including sheet metal perimeter edge (fascia) not specified elsewhere in specifications.

B. Related Sections:
   1. Section 06 10 00: Rough Carpentry.
   2. Section 07 62 00: Sheet Metal Flashing and Trim.
   3. Section 07 72 00: Roof Accessories.
   4. Division 22: Plumbing.
   5. Division 23: Heating, Ventilating, and Air Conditioning (HVAC).
   6. Division 26: Electrical.

C. Reference Standards:
   1. 2025 California Building Code (CBC) including Division of State Architect references.
   2. American Society for Testing and Materials (ASTM):
      a. C920 Standard Specification for Elastomeric Joint Sealants.
      b. D41 Standard Specification for Asphalt Primer Used in Roofing, Damproofing, and Waterproofing.
      c. D312 Standard Specification for Asphalt Used in Roofing.
      d. D2178 Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
      e. D4601 Standard Specification for Asphalt-Coated Glass Fiber Sheet Used in Roofing.
      f. D4897 Standard Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing.
      g. D6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
   3. ASCE-7 Wind uplifts requirements for geographical area.
   4. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.
   5. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Architectural Sheet Metal Manual.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s printed instructions, schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, fastener, fastener pattern layout, roof membrane, flashing membrane, adhesives, primers, sealants, and include ASCE-7 wind uplift calculations and accessories to be used in the Work.

B. Provide asphalt fume recovery plan, for equipment data and proposed loading and heating procedures to limit ground level asphalt fumes.

C. Certifications:
   1. Manufacturer’s written certification that installer is approved and licensed to install specified roofing system.
   2. Manufacturer’s affidavit that materials used in Project contain no asbestos.

D. Referenced Standards - Two (2) copies of each referenced standard and retain approved copies at site:
   1. NRCA Roofing and Waterproofing Manual, current edition.

E. Shop Drawings:
   1. Roof layout to confirm roofing as shown on Drawings.
   2. Furnish proposed details that differ from those indicated on Drawings.
   3. Furnish detailed Project sequencing, staging, material loading, manpower plans, and Project construction schedule. Refer to Section 01 31 00: Project Management and Coordination.
   4. Furnish manufacturer’s literature, including mock warranty.

F. Samples:
   1. Submit roofing material samples.
   2. Job specific warranty that is to be issued upon Project completion.
   3. Submit mock-up of all fabricated sheet metal items.
   4. Submit 12-inch by 12-inch sample of all types of roof membranes to be installed.

G. Temperature Charts: Bitumen heating devices 24-hour temperature charts.

H. Test Reports:
   1. Bitumen manufacturer’s test reports relative to the following for each batch of bitumen furnished:
      a. Acceptable bitumen temperature: As recommended by the bitumen manufacturer and EVT label on containers.
      b. Thermometers: Two (2) hand held, “8F” thermometers complying with related ASTM standard to Architect for his checking kettle temperature.

I. Provide site visit reports of manufacturer’s visit to the Architect.

1.4 QUALITY ASSURANCE

A. General:
   1. Unless otherwise indicated on the Drawings, the materials to be used on this Project are those specified.
   2. A competent superintendent will be onsite at all times while roofing work is in progress. This superintendent is not to perform roofing work. Superintendent will have full authority to act on behalf of Contractor as Contractor’s agent.
   3. Install materials in accordance with Contract Documents and the manufacturer's current published application procedures and the general recommendations of NRCA.
   4. It will be Contractor's responsibility to obtain and/or verify any necessary dimensions, and Contractor shall be responsible for the correctness of same. Any drawings supplied are for reference only.
   5. Contractor shall plan and conduct the operations of the work so that each section started on one day is complete, details installed and thoroughly protected, and in watertight condition before the close of work for that day.
   6. Materials will be securely fastened in place in a watertight, neat, and workmanlike manner. All workmen shall be thoroughly experienced in the particular class of work upon which employed. Work shall be performed in accordance with these specifications and shall meet the approval in the field of the Architect.
   7. All waste materials, rubbish, etc., shall be removed from the premises as

accumulated. Rubbish shall be carefully handled to reduce the spread of dust, and shall be deposited at an approved disposal site. At completion, all work areas shall be left broom clean and all Contractor's equipment and materials removed from the site.

8. Work and materials hereinafter specified shall be best of kind described and, unless specified otherwise, shall be new and of best quality. All roofing materials utilized in performance of each type of work shall be the products of one manufacturer or supplier. Unless otherwise indicated, the materials to be used in this specification are those specified and denote the type, quality, performance, etc. required. All proposals shall be based upon the use of the specified material.
9. All materials used on the Project shall be asbestos free.

B. Installer:
   1. Installer shall submit résumé and list of project experience for the proposed system, to be reviewed by Project Manager and jobsite superintendent.
   2. Installer shall submit list of all subcontractors with evidence of subcontractors' insurance coverage, in compliance with contract requirements.
   3. Installer shall have approval by manufacturer of accepted roofing system for installation, and issuance of specified warranty for a minimum of three (3) years. Proof of license agreement dated at least three (3) years prior to date of bid opening shall also be provided.
   4. Installer shall be an experienced single firm specializing in the type of roofing and sheet metal work specified, with a minimum of five (5) years of previous successful experience on projects similar in size and scope.
   5. No subcontracting of sheet metal fabrication or installation will be allowed. Roofing contractor must have a sheet metal shop on the company premises.

C. Regulatory Requirements:
   1. All work shall conform to those requirements identified by the Division of the State Architect for public schools and the 2025 edition of the California Building Code:
      a. This roof is identified as a Class A Roof.

D. Laboratory Testing and Samples:
   1. Architect may require tests and inspections as necessary to verify quality of roofing materials and workmanship. Laboratory tests will be performed in accordance with ASTM procedures.
   2. Owner will select testing laboratory and will pay for work required by testing laboratory. Contractor shall assume all costs for extraction and patch of all samples.
   3. Contractor shall pay for inspections and retesting of work that fails.
   4. Contractor shall correct all deficiencies identified by the Architect in accordance with manufacturer's recommended procedures at no cost to Owner.

E. Inspections/Tests:
   1. The Architect's and manufacturer's representative shall at all times have access to the jobsite and work areas. Contractor will provide proper and safe facilities for such access and inspection:
      a. Architect inspections: The Architect will be providing periodic inspections throughout the duration of the Project. Architect's representative shall be required to inspect after completion of each major phase of roof construction for approval.
      b. Manufacturer inspections:
         1) An inspection shall be made by a representative of the material manufacturer to ensure that said Project is installed in accordance with the manufacturer's specifications and illustrated details. Written reports by the manufacturer shall be turned over to the Architect.
         2) The authorized material manufacturer's field representative shall be responsible for:
            a) Keeping the Architect informed after periodic

inspections as to the progress and quality of the work observed.

b) Calling to the attention of Contractor those matters observed that are considered to be in violation of the contract requirements.

c) Reporting to the Architect, in writing, any failure or refusal of Contractor to correct unacceptable practices called to his attention.

d) Confirming, after completion of the work, and based on his observation and test, that he has observed no application procedures in conflict with these specifications.

F. Pre-Installation Conference: Pre-installation meeting shall be conducted onsite.

1.5 WARRANTY

A. All materials shall be manufactured, specified, or accepted in writing by membrane manufacturer issuing the warranty.

B. Make arrangements with the materials manufacturer to provide required inspections for issuance of warranty. Final warranty shall be submitted to Architect at time of Substantial Completion.

C. Roofing Manufacturer:
1. Warrant the roofing and associated work for 20 years from date of Substantial Completion as follows:
   a. The warranty shall be a no dollar limit (NDL) with no penal sum type, with total replacement cost.
   b. The warranty shall guarantee the entire roof system and associated work against defective materials and workmanship of installation, with no exclusion for ponding water.
   c. The roof system, including roof insulation, flashing, metal work, labor, and material shall be guaranteed against failure of workmanship and materials. Repair of the system, including materials and labor, shall be done at no cost to the Owner.

D. The roofing contractor shall jointly, with any subcontractors employed by him, guarantee the work required and performed under this contract is free from defects in workmanship and materials, and that the building will be and remain waterproof for a five (5) year warranty period, after the Architect accepts the work as substantially complete. The warranty shall be in approved notarized written form to obligate Contractor and subcontractors to make good the requirements of the warranty. The warranty will be held jointly with the bonding company for the first two (2) years and the manufacturer for the remaining three (3) years.

E. Substantial Completion of Work:
1. Manufacturer’s warranty: Manufacturer’s written warranty as specified.
2. Maintenance procedures: Three (3) copies of manufacturer’s printed instructions for Owner’s use regarding care and maintenance of roof.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original unopened packaging with all tags and labels intact and legible. Carton and can labels shall indicate appropriate warnings, storage conditions, lot numbers, and usage instructions. Handle and store materials and equipment in such a manner as to avoid damage. Coordinate material storage with District.

B. Manufacturer's packaging and/or roll plastic is not acceptable for exterior storage. Tarpaulin with grommets shall be the minimum acceptable for exterior coverings. All materials stored as above shall be a minimum of four inches (4") off the substrate, and the tarpaulin tied off with rope.

C. Products liable to degrade as a result of being frozen shall be maintained above 40 degrees F in heated storage.

D. Moisture sensitive products shall be maintained in dry storage areas or properly covered. Roofing insulation and felts must always be covered or stored in a dry area when not being used.

E. The proper storage of materials is the sole responsibility of Contractor. Materials damaged in shipping or storage shall not be used. Wet or damaged roofing materials shall be discarded, removed from jobsite, and replaced with new materials prior to application.

F. No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form. Do not place materials or equipment in such a manner as to overload structure.

PART 2 PRODUCTS

2.1 GENERAL

A. Unless noted otherwise, specifications are based on products of manufacturers listed below. Manufacturers whose products meet or exceed the specifications, who have manufactured and installed roof materials and systems of the type specified for a minimum of ten (10) years, and who maintains a single source responsibility for the total roofing system, as described herein, may apply for approval as a substitution in accordance with Division 01 requirements regarding substitutions. The following are approved manufacturers:

1. Malarkey Roofing Products (Basis of Design)
   3131 N. Columbia Blvd.
   P. O. Box 17217
   Portland, OR USA 97217

   Toll Free Tel: 800-545-1191; Tel: 503-283-1191; Fax: 503-289-7644
   Email contact: jkouba@malarkeyroofing.com
   Website: WWW.MALARKEYROOFING.COM

2. GAF Wayne, NJ (800) 766-3411.
3. Johns Manville Denver, Colorado (800) 922-5922.

2.2 ROOFING SYSTEM ASSEMBLY

A. System Specification Types used:
   1. Wood Deck: M3-WI-BBS-M
   2. Metal Deck: M3-MI-BBS-M

B. System Design: Comply with requirements of the following:
   1. Codes and Standards: Applicable at project location.
   2. ASCE 7: Minimum design loads.
   3. Fire Hazard Classification: ASTM E108, UL, or Intertek Fire Hazard Classification specified, Class A.

C. Insulation:
   1. Type: Manufacturer's recommended reformed rigid polyisocyanurate board, ASTM C1289 and Federal Specification (FS) HH-I-1972/Gen and HH-I-1972/2, with a 20 psi minimum compressive strength.
   2. Type: Non-tapered.
   3. Type: Tapered edge strip: 1-1/2 inches to zero inch (0”) or as required, field verify, 18 inches by 48 inches. Install at all expansion joints, curbs, projections, crickets, saddles, and base flashings. Approved material shall be as manufactured by Cant Products or pre-approved equal.
   4. Thickness: 5” minimum.
   5. Thickness: To achieve an average R-value of 34.8.
   6. Layer common with roof deck shall be mechanically fastened to the roof deck. Remaining layers shall be fastened with a two part low rise adhesive approved by the Manufacturer’s requirements.

D. Cover Board Over Insulation:
   1. 1/4" thick DensDeck Prime Roof Board (Basis of Design) or approved equal.
   2. 1/4" USG Securock Brand Gypsum-Fiber.
   3. 1/4" DEXcell Glass Mat Roof Board by National Gypsum Company.

E. Insulation Accessories: Cant strips, tapered edges, and as recommended by manufacturer.

F. Sheet Materials:
   1. Malarkey 501 Paragon MOD Base, ASTM D4601 Type II, 90 lb (41 kg), 3 square roll.
   2. Malarkey 524G RCap Plus Reflective Cap, ASTM D3909, CRRC Listed, CEC Title 24 Part 6 Cool Roof Requirements, 78 lb (35.4 kg), 1 square roll.

G. Adhesives shall be UL and FM listed and approved:
   1. Modified Bitumen Adhesive, ASTM D3019 Type III, low VOC, cold process adhesive. Karnak 66 Spray Grade or ASTM D4479.
   2. Insulation Adhesive, low rise foam adhesive. Millennium One Step™ or PG-1 by Royal Adhesives.

H. Flashing Materials:
   1. Malarkey 524G RCap Plus Reflective Cap, ASTM D3909, CRRC Listed, CEC Title 24 Part 6 Cool Roof Requirements, 78 lb (35.4 kg), 1 square roll.

I. Mechanical Fasteners for base course of insulation:
   1. FM approved fasteners for wood deck as specified, of sufficient length to provide sufficient penetration into deck, per requirements of Factory Mutual and acceptable to membrane manufacturer; nails with 1 inch (25 mm) diameter metal cap.
   2. Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

J. Walkway Pads:
   1. Provide cut sections of granule surfaced polyester reinforced modified bitumen sheet:
      a. Walk pads shall have contrasting granule color from roofing surfacing.
      b. Provided walk pads shall be installed at point of roof access, and at service points of all roof mounted equipment.
      c. Protection pads shall have rounded corners and extend minimum four inches (4”) beyond edge of equipment.
      d. Provide new protection pads under all pipe supports, at HVAC and mechanical access points, raised electrical conduit, and in front of all roof top doors and openings.
   2. Apoc AP5040 DEK-TOP Walkway Pads (Basis of Design): 1/2 inch thick, minimum.

Pad Size: 3 feet by 4 feet.

3. Malarkey 140 Recycled Rubber Walkboard Pad: Reconstituted rubber, textured, slip-resistant, manufactured as a rooftop walk pad for foot traffic and acceptable to roofing system manufacturer, 1/2 inch (13 mm) thick, minimum. Pad Size: 3 feet by 4 feet (0.9 m x 1.2 m).

K. Sealants:
   1. A single component, high performance, elastomeric sealant conforming to ASTM D232 or ASTM C920 requirements. Acceptable types are as follows:
      a. Sonolastic NP 1 manufactured by Sonneborn LLC; Minneapolis, MN (612) 835-3434.

2.3 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Other materials shall be as shown, specified, or required and be of the best grade for the proposed use as recommended by the manufacturer:
   1. Expansion joint: As detailed on Drawings and outlined in NRCA and SMACNA manuals.
   2. Low level expansion joints, as noted on the Drawings. Install as per manufacturer's recommendations:
      a. Situra Inc. RedLINE low level expansion joint details.
      b. Approved substitute: Soprema's Sopra Joint.
   3. Sealant backer rod:
      a. Provide compressible rod stack of polyethylene foam, polyurethane foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam, or other flexible, permanent, durable, non-absorptive material as recommended by sealant manufacturer for back-up of, and compatibility with, sealant.
      b. Where used with hot-applied sealant, provide heat-resistant type that will not be deteriorated by sealant application temperature as indicated.
   4. Pipe hangers and supports: Provide and install all necessary supports for gas lines, conduit, chilled water lines, duct work, condensate lines, etc.
   5. Cant strips: Shall be perlite where used for non-structural purposes, or treated solid wood where used for structural purposes meeting NRCA, Factory Mutual, and Underwriters Laboratory guidelines. If solid wood cant is used where insulation exists, cant is to be toe nailed into a treated solid wood nailer the same height as insulation.
   6. Termination bar:
      a. Material: Extruded aluminum bar with lip profile.
      b. Size: 0.090-inch thick by 3/4-inch wide with 3/16-inch lip width and a 45-degree lip angle, factory punched 1/4-inch by 3/8-inch oval holes spaced six inches (6") on center.
      c. Approved manufacturer: OMG Roofing Products or approved equal.
   7. Liquid applied roof flashing material:
      a. Flashing pipe penetrations, low curb details, I-beams, and other similar or unconventional conditions.
      b. Approved product/manufacturer:
         1) Soprema-Alsan RF Flashing by Soprema.
         2) PermaFlash Bituminous Flashing System by Johns Manville.
         3) ParaPro 123 Flashing System by Siplast.
         4) Approved equal.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Weather Condition Limitations:
   1. Proceed with roofing work when existing and forecasted weather conditions permit work to be performed in accordance with manufacturer's recommendations and warranty requirements:
      a. Roofing application with moisture present will not be accepted; apply roofing in dry weather.
      b. Do not attempt construction of the roofing system when the reported or calculated dew point are within three (3) degrees of each other.
      c. Do not apply roofing when ambient temperature is below 45 degrees F.

B. Contractor to monitor and record readings every two (2) hours or when conditions change. Contractor will have records available for review when required by Architect and/or District.

C. Do not allow waste products, petroleum, grease, oil solvents, mineral oil, and other contaminants to come into contact with the roofing system before or during installation.

3.2 GENERAL INSTALLATION

A. Drains, penetrations, and terminations shall be installed in strict accordance with practices set forth in the NRCA Roofing Manual or manufacturer of membrane. Mechanical equipment requiring fastening shall be fastened with hex head screws with neoprene washers.

B. Cants: Provide cants at all intersections with vertical surfaces. Install in accurate lengths, cut to suit conditions; miter all corners and intersections.

C. Cut-Offs: Provide cut-offs at the end of each day's work to cover exposed felts and insulation. Before resuming work, remove cut-offs without damaging insulation and cover boards.

3.3 INSULATION APPLICATION, INSULATED ROOF ASSEMBLIES

A. 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 (6 mm) with insulation. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.

B. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or more, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (152 mm) in each direction.

C. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt applied within plus or minus 25°F (14°C) of equiviscous temperature.

D. Fully Adhered Insulation: Set each layer of insulation in a solid mopping of hot roofing asphalt applied within plus or minus 25°F (14°C) of equiviscous temperature.

E. Ribbon Strip Adhered Insulation: Set each layer of insulation in low rise foam adhesive. Adhesive bead spacing shall be:
   1. Adhesive Spacing at Corners (inches on center): 32

2. Adhesive Spacing at Perimeter (inches on center): 16
3. Adhesive Spacing at Field (inches on center): 8

3.4 FIELD QUALITY CONTROL AND INSPECTIONS

A. Some of the indicated materials are extremely flammable and/or toxic. Use precautions indicated on can and/or carton labels.

B. Due caution should be exercised so as not to alter the structural integrity of the deck. When cutting through any deck, care should be taken so as not to damage the deck or any part of the deck.

C. If torches are used, Contractor shall maintain a three (3) hour fire watch after completion of torching of each day’s work. Provide a 20-pound fire extinguisher near torch at all times. Use a thermal infrared thermometer to monitor all roof areas.

D. Contractor is to verify the location of all interior ducts, electrical lines, piping, conduit, and/or similar obstructions. Contractor is to perform all work in such a manner as to avoid contact with the above-mentioned items.

E. Roof cuts shall be performed and repaired at Contractor's expense. Cuts shall be made in the areas indicated by the Architect's representative. Send required roof cuts to roof membrane manufacturer for laboratory examination. Roof cuts required by the Architect's representative shall be furnished to the Architect's representative for testing.

F. Remove not more than one (1) 12-inch by 12-inch cut per 5,000 square feet of roof area or fraction thereof.

G. Field audit will follow criteria outlined in current roof membrane manufacturer's reference manual.

H. Repair sampled areas with feathered-in patch consisting of same number of plies as in the roof specification.

I. Correct deficiencies in roof as prescribed in current roof membrane manufacturer's reference manual and as approved by Architect's representative.

3.5 CLEANING AND PROTECTION

A. Contractor shall keep the jobsite clean and free from all loose materials and foreign matter. Contractor shall take necessary precautions to keep outside walls clean and shall allow no roofing materials to remain on the outside walls.

B. Leave all areas around jobsite free of trash, debris, roofing materials, equipment, and related items after completion of work.

C. All bituminous or roofing related materials shall be removed from ladders, stairs, railings, and similar parts of the building.

D. Remove bitumen stains from walls, walkways, and driveways.

END OF SECTION - 07 52 00

SECTION 07 54 19 | PVC THERMOPLASTIC MEMBRANE ROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section is related to work pertaining to the roofing system, including mechanical, plumbing, and electrical items penetrating the roof system and includes:
   1. Installation of adhered PVC thermostatic roofing membrane with flashings and other components to comprise a roofing system.
   2. Flashing and caulking.
   3. Tapered roof insulation.
   4. Crickets.
   5. Cover board.
   6. Wood nailers and shims.
   7. Sheet metal terminations.
   8. Walkway protection.
   9. Expansion joints.
   10. Deck repair/replacement.
   11. Other work incidental to the complete and proper installation of a watertight roofing system as shown on the Drawings and specified herein, and in accordance with all applicable requirements of the Contract Documents.

B. Related Sections:
   1. Section 06 10 00: Rough Carpentry.
   2. Section 07 21 00: Thermal Insulation.
   3. Section 07 62 00: Sheet Metal Flashing and Trim.
   4. Section 07 72 00: Roof Accessories.
   5. Section 07 92 00: Joint Sealants.

C. Reference Standards:
   1. American Society for Testing and Materials (ASTM):
      a. A385 Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
      b. D570 Water Absorption of Plastics.
      c. D751 Method of Testing Coated Fabrics.
      d. D4434 Poly (Vinyl Chloride) Sheet Roofing.
      e. E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
      f. E108 (Rev. A) Fire Tests of Roof Coatings.
   2. ASCE-7 Wind uplifts requirements for geographical area.
   3. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.
   4. Single Ply Roofing Institute (SPRI).
   5. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Architectural Sheet Metal Manual.
   6. California Building Code (CBC).
   7. Underwriter's Laboratories Inc. (UL):
      a. UL RMSD Roofing Materials and Systems Directory, Current Edition.
      b. UL 790 Fire Resistance of Roofing Coverings Materials, Current Edition.
      c. Exterior Fire Exposure Classification: Class A, ASTM E108, for application and slopes shown.

d. UL 90 Wind uplift requirements.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in NRCA's The NRCA Roofing and Waterproofing Manual apply to work of this Section.

1.4 SUBMITTALS

A. Product Data: For each type of product. MSDS sheets. Manufacturer’s printed instructions, schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, adhesive, and accessories to be used in the Work.

B. Shop Drawings:
1. Furnish from copies of the manufacturer’s literature or from copies of NRCA Roofing and Waterproofing Manual, current edition:
   a. For roofing system, include plans, elevations, sections, details, and attachments to other work, including:
      1) Base flashings and membrane terminations.
      2) Tapered insulation, including slopes.
      3) Roof plan showing orientation of steel roof deck and orientation of roofing, fastening spacing, and patterns for mechanically fastened roofing.
      4) Insulation fastening patterns for corner, perimeter, and field-of-roof locations including roof drains and roof access panels, per ASCE-7.
      5) Furnish Project sequencing, staging, material loading, manpower plans, and Project construction schedule for approval.

C. Samples:
1. Furnish samples of roof membrane.
2. Furnish sample of metal edge to be installed.

D. Research/evaluation reports for components of roofing system, from ICC-ES.

E. Sample warranties for manufacturer's special warranties.

F. Certifications:
1. Manufacturer’s written certification that installer is approved and licensed to install specified roofing system (submit a copy with Proposal Form).
2. Manufacturer’s affidavits that materials used in Project contain no asbestos.
3. Installer shall submit resume and project experience list for proposed system for project manager and jobsite superintendent.
4. Installer shall submit written certification that there are no undocumented workers being employed by them or any subcontractor on this Project and that covers all workers on this Project by workmen’s compensation.
5. Installer shall submit list of all subcontractors with evidence of subcontractor’s insurance coverage in compliance with contract requirements.
6. Manufacturer’s written certification of approval/acceptance of these specifications and details.

G. Referenced Standards: Two (2) copies of each referenced standard and retain approved copies at site.

H. Upon substantial completion of work, submit the following to Architect for his submission to Owner:

1. Manufacturer’s warranty: Manufacturer’s written warranty as specified.
2. Contractor’s warranty: Contractor’s written warranty as specified.
3. Maintenance procedures: Three (3) copies of roof system manufacturer’s printed instructions for Owner’s use regarding care and maintenance of roof. Refer to Section 01 78 23: Operation and Maintenance Data.
4. Affidavits from material manufacturers, suppliers, and sub-contractors for release of liens.
5. Refer to sections: 01 77 00: Closeout Procedures and 01 78 39: Project Record Documents for additional requirements of close-out documents.
6. Maintenance data: For roofing system to include in maintenance manuals.
7. Field quality-control reports.

1.5 PERFORMANCE REQUIREMENTS

A. General Requirements: Provide an installed thermoplastic single ply roofing system, flashing, and related work that is watertight and will not permit the passage of liquid water, able to withstand wind loads, 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, as demonstrated by roofing system manufacturer based on testing and field experience.

C. Roofing System Design - Comply with SPRI Wind Design Guide for Fully Adhered Roofing Systems for the following ground roughness exposure and system design:
   1. Performance testing shall be in accordance with ANSI/FM 4474, FM 4450, FM 4470, UL 580 or UL 1897.
   2. Roof system design pressures: Calculated in accordance with ASCE 7, or applicable standard, for the specified roof system attachment requirements:
      a. Roof Components and Cladding pressures are worst case pressures based on 10 sf. tributary area.
         1) Wall Components & Cladding Pressures:
            +23.6 (14.16) psf, -25.6 (-15.36) psf - Zone 4 Governs, LRFD (ASD).
         2) Roof Components & Cladding Pressures:
            +16.0 (9.6) psf, -37.6 (-22.56) psf - Zone 1, LRFD (ASD).
   3. Mechanically attached bottom layer of rigid insulation, adhesively anchor remainder of system.

D. American Architectural Manufacturer’s Association (AAMA).

E. American National Standards Institute (ANSI).

F. 2025 California Building Code (CBC).

G. Occupational Safety and Health ACT (OSHA).

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is ISO 9001 certified for roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

C. Regulatory Requirements:
   1. Classification by Underwriters' Laboratories, Inc. as a Class A roof covering.
   2. Roof must meet Class A surface flame spread and smoke density measurements, per ASTM E84: Flame spread 0-25, smoke-developed 0-450.
   3. Roofing system shall be installed in accordance with ASCE-7 wind uplift requirements for geographical location and a 90 MPH three (3) second gust wind speed zone with an importance factor of 1.15 based on CBC requirements. Wind-resistance loads listed below have a safety factor of 2.0 incorporated into the calculation.
   4. Follow local, state, and federal regulations of safety standards and codes. Refer to applicable building code or California Building Code for roofing system installation requirements and limitations.

D. Installer shall be an experienced single firm specializing in the type of roofing and sheet metal work required, employing only experienced workers for the class of work in which they are employed, having at least five (5) years' successful experience on projects similar in size and scope and acceptable and licensed as applicators by the material manufacturer.

E. Application of materials shall be in accordance with the manufacturer's recommendations. In the instance of a conflict between these specifications and those of the manufacturer, the most stringent shall take precedence.

F. Pre-Installation Conference:
   1. Pre-installation roofing conference is to be conducted at Project site:
      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 affects 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.

1.7 WARRANTY

A. Manufacturer System Warranty:
   1. Provide 15-year system warranty. The system warranty shall provide for the roof membrane, all accessories that comprise a roof system and contractor labor. The warranty shall be non-prorated, provide for no dollar limit (NDL), and shall not exclude ponding water and no time limited shall be assigned for any such ponding water during the warranty period.

B. Installer Warranty:
   1. Provide separate five (5) year workmanship warranty. In the event any work related to roofing, flashing, or metal is found to be within the installer warranty term defective or otherwise not in accordance with the Contract Documents, the installer shall repair

that defect to the Owner and copy be sent to the manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original unopened packaging with all tags and labels intact and legible. Carton and can labels shall indicate appropriate warnings, storage conditions, lot numbers, and usage instructions. Handle and store materials and equipment in such a manner as to avoid damage. The proper storage of materials is the sole responsibility of Contractor. Materials damaged in shipping or storage shall not be used. Wet or damaged roofing materials shall be discarded, removed from jobsite, and replaced with new materials prior to application.

B. Manufacturer's packaging and/or roll plastic is not acceptable for exterior storage. Tarpaulin with grommets shall be accepted minimum for exterior coverings. All materials stored, as above shall be minimum of four inches (4") off the substrate, and the tarpaulin tied off with rope.

C. Moisture sensitive products shall be maintained in dry storage areas or properly covered. Roofing insulation and felts must always be covered or stored in a dry area when not being used.

D. Products liable to degrade as a result of being frozen shall be maintained above 40 degrees F in heated storage.

E. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

F. 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.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. PVC Thermoplastic Membrane Roofing is subject to compliance with requirements; provide either the named product or a comparable product by one of the other manufacturers specified:
   1. Sarnafil G 410-80 Feltback, 80 mil by Sika Corp. (basis of design).
      a. Sika Corporation – Roofing
         100 Dan Road, Canton MA 02021
         (800) 451-2504
         usa.sika.com/sarnafil
   2. FleeceBACK PVC 80 mil by Carlisle SynTec System
   3. EverGuard PVC 80-mil Fleece-Back by GAF Commercial Roofing Products
   4. Or equal (reference Section 01 25 13: Product Substitution Procedures).

2.2 ROOF ASSEMBLY

A. Class A roofing (assembly from bottom up):
   1. New roof structure:
      a. Plywood decking.
      b. Rigid insulation (sloped).
      c. Separation board (1/4-inch DensDeck minimum).
      d. Membrane Roofing.

2.3 MEMBRANE

A. Membrane shall conform to:
   1. ASTM D-4434 (latest version), "Standard for Polyvinyl Chloride Sheet Roofing". Classification: Type II.
   2. NSF/ANSI Standard 347, “Sustainability Assessment for Single Ply Roofing Membranes”. Certification Level: Platinum.
   3. The manufacture to guarantee that the membrane thickness meets or exceeds the specified thickness when tested according to ASTM D-751.

B. Single ply membrane system shall be a complete system, all components of which are provided by one manufacturer:
   1. G 410 80 mil feltback fiberglass reinforced membrane with an integral factory-applied lacquer coating to repel dirt and sustain reflectivity and factory applied nine (9) ounce geotextile felt backing:
      a. Membrane shall conform to ASTM D4434, classification Type II, Grade I.

C. Color: EnergySmart feltback - white, initial reflectivity of 0.83, initial emissivity .092, solar reflective index (SRI) of >104.

2.4 COVERBOARD/ ROOF BOARDS

A. Coverboard:
   1. Fiberglass mat gypsum roof boards to be DensDeck Prime by Georgia Pacific, complying with ASTM C1177: 1/4-inch thickness.

2.5 INSULATION

A. Sarnatherm
Rigid polyisocyanurate insulation board with glass fiber reinforced felt facers, meeting ASTM C-1289 Type II, Class 1, Grade 2 (20 psi) or Grade 3 (25 psi).

B. Sarnatherm CG
Rigid polyisocyanurate insulation board with coated polymer bonded glass fiber mat facers, meeting ASTM C-1289 Type II, Class 2, Grade 2 (20 psi) or Grade 3 (25 psi).

C. Tapered Board Insulation (ASTM C578):
Expanded polystyrene (EPS) insulation board.

2.6 ATTACHMENT COMPONENETS

A. Membrane Adhesive
   1. Sarnacol 2170 Adhesive
      Solvent-based reacting adhesive used to attach membrane.

   2. Sarnacol 2170 VC Adhesive
      Solvent-based, VOC compliant*, reactivating adhesive used to attach membrane.
      *Check local jurisdiction for VOC compliance.

   3. Sarnacol 2175
      Solvent-based, VOC compliant*, spray applied canister adhesive used to attach bareback membrane.
      *Check local jurisdiction for VOC compliance.

4. Sarnacol 2121 Adhesive
   Water-based adhesive used to attach membrane.

5. Sarnacol AD Feltback Membrane Adhesive
   Two-component foamable polyurethane board adhesive applied in ribbons used to attach feltback membrane.

6. Sarnacol OM Feltback Membrane Adhesive
   Two-component foamable polyurethane board adhesive applied in ribbons used to attach feltback membrane.

7. Sarnacol OM Adhesive (canister version)
   Two-component foamable polyurethane board adhesive applied in ribbons used to attach feltback membrane.

2.7 INSULATION/ COVERBOARD ATTACHMENT

A. Sarnacol 2163
   Two-component foamable polyurethane board adhesive applied in ribbons or full applications. No temperature restrictions.

B. Sarnacol AD Board Adhesive
   Two-component foamable polyurethane board adhesive applied in ribbons or full applications. The minimum ambient and surface temperature required is 25°F (-4°C) and rising.

C. Sarnacol OM Board Adhesive
   Two-component foamable polyurethane board adhesive applied in ribbons or full applications. The minimum ambient and surface temperatures required is 40°F (4.4°C) and rising.

D. Sarnacol OM Board Adhesive WG (winter grade)
   Two-component foamable polyurethane board adhesive applied in ribbons or full applications. Can be applied in temperatures between 0°F (-18°C) to 65°F (18°C).

E. Sarnacol OM Adhesive (canister version)
   Two-component foamable polyurethane board adhesive applied in ribbons or full applications used to attach insulation and roof boards.

F. Polyset CR-20
   Two-component foamable polyurethane board adhesive applied in ribbons used to attach insulation and roof boards.

G. Sarnaplate
   26 gauge, 3” (76 mm) square or round steel plate with a Galvalume coating, used with #12, #14, and #15 Sarnafasteners to attach Sarnatherm insulation, Sarnatherm roof boards, gypsum roof boards, or other Sika approved boards to the roof deck.

H. Sarnafastener #12
   #12 corrosion-resistant fastener used with Sarnaplates to attach Sarnatherm insulation, Sarnatherm roof boards, gypsum roof boards, or other Sika approved boards to the roof deck.

I. CR Base Sheet Fastener
   1.2” (30 mm) or 1.75” (44 mm) long G90 galvanized steel one-piece fastener assembled with a 2.75” (70 mm) round steel plate with a Galvalume coating, used to attach base sheets to lightweight insulating concrete.

J. Olylok Locking Impact Nail
1.4” or 1.8” long locking impact nail designed to attach base-ply to wood fiber decks.

2.8 VAPOR RETARDERS

A. Vapor Retarder PE 10
1. 10 mil (0.25 mm) thick polyethylene vapor retarder/air barrier.

2.9 FLASHING MATERIALS

A. Wall / Curb Flashing

1. Sarnafil G 410 SA Flashing Membrane
2. Sarnafil Detail Membrane PVC

B. PERIMETER EDGE FLASHING
1. Sarnaclad
24 gauge, G90 galvanized steel with PVC-coating on one side for heat-weldability.

C. MISCELLANEOUS FLASHING
1. Sarnacircles
Round circle patch.

2. Sarnacorners - Inside
Injection molded inside corner.

3. Sarnacorners - Outside
Injection molded outside corner.

4. Sarnastack Universal
Injection molded stack/pipe boot to flash pipes, vent stacks and cylindrical penetrations.

5. Sarnastack Split A, B, C
Prefabricated stack/pipe boot open along one side to flash pipes, vent stacks and cylindrical penetrations when access is obstructed.

6. Sarnareglet
Extruded aluminum flashing termination reglet used at walls and large curbs for exposed applications. Use prefabricated Sarnareglet mitered inside and outside corners where walls intersect.

7. Sarnadrain with U-Flow
Seamless one-piece heavy-duty aluminum drain with a coated flange for hot-air welding of Sarnafil membranes.

8. Sarnastop
1” wide extruded aluminum, low profile bar used with certain Sarnafasteners to secure membrane to the roof deck or to walls/curbs at terminations, penetrations and at angle changes of the substrate.

9. Sika Joint Tape SA
Self-adhering polymeric rubberized tape with woven polyester facer used to smooth and locally reinforce transitions.

2.10 WALKWAY PROTECTION

A. Provide textured walkway material three-feet (3') wide meeting OSHA requirements and provided by the membrane manufacturer (see specification this Section).

B. Sarnatred-V
Polyester reinforced, 96 mil (2.4 mm) thick, weldable membrane with surface embossment similar to a chevron pattern. Used as a protection layer from rooftop traffic.

2.11 MISCELLANEOUS ACCESSORIES

A. Aluminum Tape
2" (51 mm) wide pressure-sensitive aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond-breaker under the coverstrip at Sarnaclad joints.

B. SikaLastomer-65
Tape used to seal membrane at penetrations and securements, metals, or Vapor Retarder PE 10.

C. Perimeter Warning Tape
2" (51 mm) wide yellow tape with a release liner used in required areas. Exceeds reflectivity 3 requirements and Federal spec. L-S-300, Class 1.

D. Perimeter Warning Membrane
4" (10.2 cm) wide yellow Sarnafil G 410 Membrane used in required areas.

E. SarnaRoof Membrane Cleaner 100
Used to clean roof membrane.

F. Sarnacol 2175 Cleaner
Used to flush and clean the Sarnacol 2175 spray hose, spray gun and spray tip.

2.12 SEALANTS AND PITCH POCKET FILLERS

A. Sikaflex-1A
Moisture-cured, one-component polyurethane-based, non-sag elastomeric sealant used in wall, curb and drain terminations. It is also used as a sealant at pipe penetrations and under certain metal flashings. Sikaflex-1a can be used as a pourable sealer pocket filler.

B. Sikasil SG-10
One-component silicone adhesive.

C. Sarnafiller
Two-component urethane adhesive for pitch pocket toppings.

D. Mastic TG
Cold applied, fiber reinforced high strength SBS modified bitumen mastic that is specially formulated to detail around penetrations and flashings where Sika vapor retarders and ply sheets are used as a temporary roof.

2.13 MISCELLANEOUS FASTENERS AND ANCHORS

A. All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum or stainless steel. Mixed metal type components shall be assembled in such a manner as to

avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins.

2.14 RELATED MATERIALS

A. Wood Nailer
Code compliant wood nailers shall be installed at the perimeter of the entire roof and around such other roof projections and penetrations as specified on Project Drawings. Thickness of nailers must match the height of the insulation and roof board to achieve a smooth transition.

B. Plywood
When bonding directly to plywood, a minimum 1/2” (13 mm) CDX (C side out), smooth-surfaced exterior grade plywood with exterior grade glue shall be used. Rough-surfaced plywood or high fastener heads will require the use of Sarnafelt behind the flashing membrane. Plywood shall have a maximum moisture content of 19% by weight on a dry weight basis.

C. Miscellaneous Accessories: Provide concrete splash blocks at roof leader terminated six-inches (6”) above roof. Coordinate bird and bug screens. Roof hatch access steps and flashing. Mechanical equipment curbs and access panels.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Weather Limitations - Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements:
   1. Environmental requirements:
      a. Apply roofing in dry weather.
      b. Do not expose roof components and flashing in inclement weather or when it is predicted 30 percent or more possibility for inclement weather.
      c. When ambient temperature is below 40 degrees Fahrenheit, expose only enough sensitive cements, sealants, and adhesives as required for use within a four (4) hour period.
      d. Do not expose membrane and accessories to a constant temperature of 180 degrees Fahrenheit.

B. Inspections/Tests:
   1. The Owner’s, Architect’s, and manufacturer’s representatives shall at all times have access to the jobsite and work areas. Contractor will provide proper and safe facilities for such access and inspection:
      a. Owner/Architect inspections:
         1) Provide periodic inspections throughout the duration of the Project. Representative shall inspect after completion of each major phase of construction for approval.
      b. Manufacturer inspections:
         1) An inspection shall be made by a representative of the material manufacturer four (4) times per month during performance of work and at all major phases of construction, to ensure that said project is installed in accordance with the manufacturer’s specifications and illustrated details. Daily written reports by the manufacturer shall be turned over to the Architect, on each Monday following the inspection.
         2) The authorized material manufacturer’s field representative shall be responsible for:

a) Keeping the Architect informed after periodic inspections as to the progress and quality of the work observed.
b) Calling to the attention of Contractor those matters observed that are considered to be in violation of the contract requirements.
c) Reporting to the Architect, in writing, any failure or refusal of Contractor to correct unacceptable practices called to his attention.
d) Confirming, after completion of the work and based on his observation and test, that he has observed no application procedures in conflict with these specifications. Final payment will not be released until the Architect has received all specified warranties.

2. Any failure by the Owner's, Architect's, or manufacturer's representatives to detect, pinpoint, or object to any defect or noncompliance of these specifications of work in progress or completed work shall not relieve Contractor, or reduce, or in any way limit, his responsibility of full performance of work required of him under these specifications.
3. Architect may require tests and inspections as necessary to verify quality of roofing materials and workmanship. Laboratory tests will be performed in accordance with ASTM standard procedures.

C. Existing Conditions:
1. Examine existing building and new construction to determine existing physical conditions that affect installation of new roofing. Examine substrates, areas, and conditions, with installer present, for compliance with requirements and other conditions affecting performance of the Work:
a. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
b. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
c. Verify that minimum drying period recommended by roofing system manufacturer has passed.
d. Verify all roof surfaces are smooth and free of dirt, debris, and incompatible materials.
e. Verify all roof surfaces shall be free of water.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

E. Protection:
1. Provide special protection and avoid traffic on completed areas of membrane installation.
2. Restore to original condition or replace work or materials damaged during handling of roof materials.
3. Take precautions as required to protect adjacent work and structures.

F. Emergency Equipment: Maintain onsite equipment necessary to apply emergency temporary edge seal in event of sudden storms or inclement weather.

G. Restrictions:
1. Comply with General Requirements on use of site.
2. Smoking is prohibited on all roof areas or in existing buildings.
3. Maintain facility and all utility services in a functional condition.
4. Provide sanitary facilities for employees.

H. Examine and verify that receiving substrate surfaces of the structure have no defects or errors, which would result in poor or potentially defective application or cause latent defects in workmanship:

1. Examine substrate to which roofing material is to be applied to ensure that its condition is satisfactory for roofing application. Do not permit voids greater than 1/4-inch wide in the substrate. Substrates for roofing materials shall be dry and free of oil, dirt, grease, sharp edges, and debris. Inspect substrates and correct defects before application of thermoplastic sheets.

3.2 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.

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.

3.3 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Base Flashing: Fully adhere base flashings to the substrate in manufacturer provided bonding adhesive. Install termination bar and sealant at the top of base flashing.

D. Install roofing and auxiliary materials to tie into existing roofing where applicable to maintain weather-tightness of transition and to not void warranty for existing roofing system.

3.4 SUBSTRATE PREPARATION

A. Steel Deck
The roof deck shall conform and be installed to current local building code or insurance requirements.

B. Wood Deck
The roof deck shall be minimum 1-1/2” (38 mm) thick lumber or 15/32” (12 mm) thick plywood. Deck shall be installed according to local code requirements.

3.5 WOOD NAILER INSTALLATION

A. Install continuous code compliant wood nailers at the perimeter of the entire roof and around roof projections and penetrations as shown on the Detail Drawings.

B. Wood nailers or wood blocking for penetrations, curbs, or snow protection systems shall be installed prior to the installation of the roof membrane whenever possible.

3.6 VAPOR RETARTER INSTALLATION

Refer to vapor retarder Product Data Sheets (PDS) and *Vapor Retarder Installation* section of Sika Sarnafil Roofing Applicator Handbook for detailed installation instructions.

A. Vapor Retarder PE 10

Overlap loose laid sheets 4” (10.2 cm) and extend up the perimeter and deck penetrations. Seams and penetrations shall be sealed with SikaLastomer-65 tape.

3.7 INSULATION / COVER BOARD/ ROOF BOARD INSTALLATION

A. General Criteria:
1. Boards shall be installed according to local building code, insurance requirements, and manufacturer's instructions.
2. Boards shall be neatly cut to fit around penetrations and projections.
3. Install tapered insulation in accordance with insulation manufacturer's shop drawings.
4. Do not install more board than can be covered with membrane by the end of the day or the onset of inclement weather.
5. When two or more layers of insulation and/or roof boards are used, stagger joints at least 12” (30.5 cm) in both directions between layers.
6. Refer to individual Product Data Sheets (PDS) and *Insulation or Roof Board Installation* section of Sika Sarnafil Roofing Applicator Handbook for detailed installation instructions. Install tapered insulation under area of roofing to provide positive drainage.
7. Install insulation under area of roofing to achieve designed thickness:
8. Where overall insulation thickness is three inches (3”) or greater, install two (2) or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of six inches (150 mm) in each direction.
9. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
10. 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 (6 mm) with insulation. Install cover board over the insulation, staggering joints a minimum of 12 inches in all directions. Mechanically attach to the deck a minimum of eight (8) fasteners per board. Manufacturer's instructions: In regard to attachment, the manufacturer's instructions or specifications shall determine the suitability for an application.
11. Precautions: The surface of the insulation must not be ruptured or damaged prior to installation of the roof membrane. Replace damaged boards.
12. Thermal insulation boards shall be laid on the substrate in parallel rows with end joints staggered and butted as close as possible. All joints shall be tight and at the roof perimeter and roof penetrations; insulation shall be cut neatly and fitted to reduce openings to a minimum. All openings 1/4 inch or larger shall be filled with insulation.
13. Insulation shall be tapered or feathered at drains and scuppers to provide proper drainage (if applicable).
14. No more insulation shall be installed than can be covered by the completed roof system by the end of the day or the onset of inclement weather.
15. Tapered insulation and crickets, when specified, shall be placed in accordance with the drawings and/or as required by NRCA standards.

B. Attachment with Board Adhesives
1. Boards shall be adhered to the deck with approved adhesives according to the wind uplift rating requirements and associated ribbon spacing patterns. The maximum board size with board adhesives is 4 ft x 4 ft (1.2 m x 1.2 m) for insulation boards and 4 ft x 8 ft (1.2 m x 2.4 m) for roof boards.

C. Mechanical Attachment
1. Boards shall be mechanically fastened to the deck with approved fasteners and plates according to the wind uplift rating requirements and associated fastening patterns.

3.8 SARNAFIL G 410 MEMBRANE INSTALLATION

The surface of the insulation, roof board, or substrate shall be inspected prior to installation of the Sarnafil roof membrane. The substrate shall be clean, dry, and free from debris and smooth with no surface roughness or contamination. Broken, delaminated, wet or damaged boards shall be removed and replaced. Tack welding of Sarnafil G 410 membrane field sheets for purposes of temporary restraint during installation is not permitted and may result in voiding of Sika Corporation warranty.

A. Sarnacol AD Feltback Membrane Adhesive or Sarnacol OM Feltback Membrane Adhesive:

1. Application rates vary depending on surface roughness, absorption rate of the substrate, and wind speed approvals.

2. Refer to individual Product Data Sheets (PDS) and *Adhered Systems: Urethane Adhesive Installation Using Feltback Membrane* section of Sika Sarnafil Roofing Applicator's Handbook for detailed installation instructions.

3.9 HOT-AIR WELDING OF MEMBRANE OVERLAPS

A. All membrane overlaps shall be hot-air welded. The membrane shall be clean and dry prior to hot-air welding.

B. Field membrane overlaps for automatic machine-welding will vary in width depending on the plate and fastener combination used. A minimum of 4" (10.2 cm) wide overlap is required when hand-welding details.

C. 1" (25 mm) wide cross-section samples of welded seams shall be taken at least two times a day, once in the morning and once in the afternoon.

D. Refer to *Welding* section of Sika Sarnafil Roofing Applicator Handbook for detailed installation instructions.

3.10 MEMBRANE FLASHING INSTALLATION

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sika Corporation. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense. Flashing shall be adhered to compatible, dry, and smooth surfaces free of dirt, dust, and debris. Use caution to ensure adhesive fumes are not drawn into the building.

A. All flashings should extend a minimum of 8" (20.3 cm) above finished roofing level. Submit requests for exceptions in writing to the Owner's Representative and Sika Corporation Technical Department for signed approval.

B. No bitumen shall be in contact with any Sarnafil membranes except Sarnafil G 459.

C. All flashing membranes shall be mechanically fastened along the counter-flashed top edge with Sarnastop or approved Sarnadisc at 6 - 12" (15.2 – 30.5 cm) on center.

D. Sarnafil flashings shall be terminated according to Sika Corporation recommended details.

E. All adhered flashings that exceed 45" (1.14 m) in height shall receive additional securement, unless applying Sarnafil G 410 SA membrane to plywood, DensDeck Prime, concrete block, or concrete with a CSP of 1 – 4 according to ICRI Technical Guideline No. 310.2R-2013.

F. Refer to *Typical Flashing Procedures* section of Sika Sarnafil Roofing Applicator Handbook for detailed installation instructions. Install sheet flashings and performed flashing accessories and adhere to substrate according to roofing system manufacturer's written instructions.

G. Apply bonding adhesive to substrate and underside of flashing sheet at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

H. Flash penetrations and field-formed inside and outside corners with sheet flashing as recommended by manufacturer.

I. Clean seam areas, overlap seams, and firmly roll flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

J. Test lap edges with probe to verify seam weld continuity. Apply lap sealant if required by roofing manufacturer, and seal exposed edges of sheet flashing terminations per manufacturer's requirements.

K. Terminate and seal top sheet flashings and mechanically anchor to substrate through termination bars.

3.11 LIQUID APPLIED FLASHING INSTALLATION

A. Application Guidelines
Liquid applied flashing resins and primer have a strong odor. Precautions should be taken to prevent odors and/or vapors from entering the building/structure, including but not limited to turning off and sealing air intake vents and other means of ingress for odors and/or vapors into the building/structure during product application and cure. Refer to individual Product Data Sheets (PDS), Sika Sarnafil Technical Bulletins 19-02 and 23-02, and the *Liquid Flashing Procedures* section of Sika Sarnafil Roofing Applicator Handbook for detailed installation instructions.

B. Installation Notes
1. Prepare the surface to be flashed by cleaning the area to like-new condition.
2. Pre-cut vertical and horizontal liquid flashing reinforcement to fit around the penetration and onto the roof membrane surface allowing for the required overlaps.
3. Once the edges of the reinforcement are determined, mark a line ¼" – ½" (6 mm – 13 mm) beyond the edge of the reinforcement and apply painter's tape to provide a clean edge
4. Prime the surface if required at the recommended rate. Pull the painter's tape while wet to achieve a clean edge. Allow the primer to cure and re-mask the area before applying resin.
5. Thoroughly mix the resin if required and apply to the surface at the required thickness.
6. Embed the reinforcement into the wet resin. Apply additional resin to completely saturate the reinforcement as required. Pull painter's tape while wet to achieve a clean edge.

C. Inspection and Quality Control
Refer to Sika Sarnafil Technical Bulletins 19-02 and 23-02 for detailed inspection procedures.

3.12 SARNACLAD METAL BASE FLASHINGS / EDGE METAL INSTALLATION

A. All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's

Representative and Sika Corporation. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

B. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:
   1. ANSI SPRI ES-1 (latest issue).
   2. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - latest issue.

C. Pre-formed metal flashing shall be installed according to metal manufacturer’s guidelines.

D. Metal, other than that provided by Sika Corporation, is not covered under the Sika Corporation warranty.

E. Sarnaclad and other metal flashings shall be formed and installed per the Detail Drawings. Refer to individual Product Data Sheets (PDS) and *Metal Flashings* section of Sika Sarnafil Roofing Applicator Handbook for detailed installation instructions.

3.13 WALKWAY INSTALLATION

A. Sarnatred-V

B. Probe all existing deck membrane seams which are to be covered by Sarnatred-V. Install walkway in straight lines by either adhering and welding or just welding to the field membrane. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate according to roofing system manufacturer's written instructions. Leave three inches (3”) of space between adjacent walkway.

C. Install around mechanical units and roof top units.

3.14 PERIMETER WARNING INSTALLATION

Application areas must be cleaned to a like-new condition. For detailed installation instructions, refer to individual Product Data Sheets (PDS).

A. Tape: Perimeter Warning Tape is applied with hand pressure to the top of PVC roofing membrane in the areas required.

B. Membrane: Perimeter Warning Membrane is hot-air welded to the top of PVC roofing membrane in the areas required.

3.15 TEMPORARY CUT-OFF

A. All flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses. All temporary cut-offs shall be constructed to provide a watertight seal. The new membrane shall be carried into the temporary cut-off. Temporary cut-off shall be sealed to the deck or substrate so that water will not be allowed to travel under the new or existing roofing. When work resumes, the contaminated membrane shall be cut out.

B. If inclement weather occurs while a temporary cut-off is in place, the Applicator shall provide the labor necessary to monitor the situation to maintain a watertight condition.

C. If any water is allowed to enter under the newly-completed roofing, the affected area shall be

removed and replaced at the Applicator's expense.

D. Refer to *Overnight Tie-In* section of Sika Sarnafil Roofing Applicator Handbook for detailed instructions.

3.16 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Immediately remove all spots, smears, stains, residues, adhesives, etc., from the work of this Section and/or upon adjacent areas or surfaces, which result from the work of this Section.

C. Upon completion of the work of this Section, dispose of, away from the site, all debris, trash, containers, residue, roofing remnants, and scraps resulting from the work of this Section.

D. Correct deficiencies in or remove roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair sheet flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

E. All warranties, as required for the Project by this specification, shall be submitted for approval prior to final payment.

F. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.17 FIELD QUALITY CONTROL

A. Owner’s Inspector of Record to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and furnish reports to Architect prior to install of finished roof materials. If conditions are not met, Contractor to repair and request re-inspection for verification.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

E. Manufacturer’s Quality Control Inspection: The manufacturer’s technical representative shall review the on-going work on a minimum of one (1) time every ten (10) working days. All defects noted noncompliance with the specifications or the recommendations of the thermoplastic manufacturer should be itemized in a punch list. These items must be corrected immediately by Contractor to the satisfaction of the Owner's representative and the thermoplastic manufacturer.

3.18 COMPLETION

A. Prior to demobilization from the site, the work shall be reviewed by the Owner's

Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of Sika Corporation shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner's Representative and Sika Corporation prior to demobilization.

B. All Warranties referenced in this Specification shall have been submitted and have been accepted by the owner or owner’s representative at time of contract award.

3.19 ACCEPTANCE

A. Prior to demobilization from the site, the Owner/project manager, Architect, and installer shall review the work. All defects noted noncompliance with the specifications or the recommendations of the thermoplastic manufacturer should be itemized in a punch list. These items must be corrected immediately by Contractor prior to demobilization to the satisfaction of the Owner/project manager and the thermoplastic manufacturer.

B. Notify Architect and Owner 48 hours in advance of the date and time of inspection.

END OF SECTION - 07 54 19

SECTION 07 62 00 | SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

It is the intent of this Section that the work shall:
Conform to all applicable DSA and building code requirements.
Include all shop and field formed sheet metal work shown on Drawings, specified, or required, including, but not limited to:

a. Roof penetration sleeves, collars, hood, and umbrella counterflashing.
b. Metal counterflashing.
c. Expansion joint.
d. Metal perimeter edge.
e. Gutters, downspouts, splash blocks and splash pans.
f. One-way roof moisture relief vents.
g. Metal gravity vents.
h. Metal heat exhaust vents.
i. Sanitary vent pipes.
j. Pipe box.
k. Copings, trim, and miscellaneous sheet metal accessories.

Related Sections:
Section 05 50 00: Metal Fabrications.
Section 07 72 00: Roof Accessories.
Section 07 92 00: Joint Sealants.
Division 22: Plumbing.
Division 23: Heating, Ventilating & Air Conditioning (HVAC).

Reference Standards:
ASTM International (ASTM):

a. A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
b. B32 Standard Specification for Solder Metal.
c. C1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

National Association of Architectural Metal Manufacturers (NAAMM).
National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.
Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Architectural Sheet Metal Manual.

1.3 SUBMITTALS

Product Data:
Manufacturer’s specifications and other data needed to prove compliance with specified requirements.

Manufacturer’s installation instructions.

Shop Drawings: Indicating sizes, configurations, and details of attachment to related and adjacent work, materials, and finishes.

Samples:
Full range of finish colors for Architect's selection.
12-inch long sample of each specified item with approved finish.
Provide full size mockup of all shop built assemblies.

1.4 QUALITY ASSURANCE

Single Source Responsibility: Fabricator and installer of roof related flashing and accessories shall be the same as the membrane roof installer.

Comply with governing codes and regulations of authorities having jurisdiction.

Installation Conference:
Refer to Section 01 31 00: Project Management and Coordination.

1.5 WARRANTY

Manufacturer's Product Warranty:
Manufacturer's standard 20-year Kynar 500 or Hylar 5000 finish warranty signed by the manufacturer, with guarantee covering any failure of the fluoropolymer finish during the warranty period.
Failure is defined to include, but is not limited to, deterioration of finish, such as fading, discoloring, peeling, cracking, corroding, etc.
Correction may include repair or replacement of failed product.

Roofing Contractor’s Warranty:
Contractor shall warrant the sheet metal work and related work to be free from defects in workmanship and materials, and that the metal flashings will be and remain watertight, for a period of five (5) years from date of Substantial Completion.
Defects shall include, but not be limited to:

a. Leaking water or bitumen within building or construction.
b. Becoming loose from substrate.
c. Loose or missing parts.
d. Finish failure as defined above.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver, handle, and store materials in accordance with manufacturer's instructions.

Handle and store materials and equipment in such a manner as to avoid damage.

No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form. Do not place materials or equipment in such a manner as to overload structure.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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.

Roofing sheet metal system shall have been tested in conjunction with roofing membrane system as an assembly and have the same approval and rating as the roofing membrane system, the latest edition of the NRCA Roofing and Waterproofing Manual (volumes 1-4) and the latest edition of SMACNA.

Fascia and cleats thicknesses shall conform to “Table 1 – Recommended Minimum Gauge for Fascia and Cleats” for each applicable roofing type as referenced in the latest edition of the NRCA Roofing and Waterproofing Manual, Volume 4.

Perimeter drip edge thicknesses shall conform to figure 2-24 of the latest edition of the NRCA Roofing and Waterproofing Manual, Volume 2.

Coping thickness and joints shall conform to Coping Design Table of the latest of the SMACNA Architectural Sheet Metal Manual (Table 3-1 of the 5th edition) table.

Gutter thicknesses shall conform to figure 2.11 of the latest edition of the NRCA Roofing and Waterproofing Manual, Volume 2.

Prefinished Aluminum Sheet:
Precoated type, aluminum conforming to Fed. Spec. QQ-A-250, ASTM B209.
Finish: Kynar 500, color as selected by Architect from manufacturer's standard colors.
Thickness: Minimum 0.040 inch, except as otherwise indicated.

Sheet Lead: Four (4) pound minimum for use at roof drains and soil stacks.

Stainless Steel: Type 302/304 Soft Temper, No. 2D finish. Minimum thickness 24 gauge, except as otherwise noted.

Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
Ambient Temperatures:

a. Record High: 113 deg F (45 deg C).
b. Record Low: 28.4 deg F (-2 deg C).

Manufacturers named within specification are approved for use on the Project providing:
Their products meet or exceed the specifications.
Company has a minimum of five (5) years’ experience manufacturing products of the type specified.
Products have been tested in conjunction with roofing membrane system as an assembly and as such has obtained the same approval and rating as the roofing membrane system.
Products are approved for use by the roofing membrane manufacturer.

Substitutions shall be in accordance with Division 01 requirements regarding substitutions.

2.2 SHEET METAL MATERIALS

General: Protect mechanical and other finishes on exposed surfaces from damage by applying

strippable, temporary protective film before shipping.

Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
Exposed Coil-Coated Finish:
Three-Coat Fluoropolymer: AAMA 620. 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.
Color: As selected by Architect from manufacturer's full range.

Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 2D (dull, cold rolled) finish.

Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation.
Surface: Mill phosphatized for field painting.
Color: As selected by Architect, see Division 9, Painting and Coatings section.
At single ply roofing locations G90 galvanized steel with PVC coating on one side for heat weldability.

2.3 UNDERLAYMENT MATERIALS

For sheet metal flashing and trim applied directly over metal deck, solid sheathing, dissimilar metals, or corrosive substrates:
Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) 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.

a. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
b. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.

Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.

2.4 SEALANTS AND PITCH POCKET FILLERS

See specific roofing assembly roofing specification.

2.5 MISCELLANEOUS MATERIALS

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 or manufactured item unless otherwise indicated.

FASTENERS
Fasteners shall comply with the manufacturer’s recommendations, engineering reports, the latest edition of the NRCA Roofing and Waterproofing Manual, Volume 2, Section 2.1.3, Volume 3, Appendix 8, Mechanical Fasteners, and Architectural Metal Section, Volume 4.
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.
d. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
e. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
f. Fasteners for Zinc-Coated (Galvanized) Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
g. Same metal as flashing/sheet metal or other noncorrosive metal or as noted below.
h. Exposed fasteners shall be self-sealing and gasketed for weathertight installation (ZAC type).
i. Match finish of exposed heads with material being fastened.
j. Mechanical Fasteners:

Nails: Stainless steel ring shank, minimum 1-1/2 inch in length with 1/2-inch diameter head.
Washers: Steel washers with bonded rubber sealing gasket.
Screws: Self-tapping sheet metal type of stainless steel or compatible with material being fastened, with hooded integral EPDM washers (ZAC type).
Rivets: Stainless steel and cadmium plated material, closed end type of sizes recommended by sheet metal manufacturer to suit application.
Clips: Continuous cleat (coping/fascia). Minimum 20-gauge, G-90 galvanized, stainless steel, or aluminum. Match material of coping/fascia and provide one (1) gauge heavier.

SOLDER:
For Stainless Steel:

a. ASTM B32, ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

For Zinc-Coated (Galvanized) Steel:

b. ASTM B 32, 60 percent tin and 40 percent lead.

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 (13 mm) wide and 1/8 inch (3 mm) thick.

ELASTOMERIC SEALANT: ASTM C 920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

BUTYL SEALANT: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

SEALANT:
Type A:

a. Type: One-part, non-sag, moisture-curing polyurethane sealant.
b. Approved products/manufacturers:

Chem-Calk 900, manufactured by Bostik Construction Products Division.
Vulkem 921, manufactured by Mameco International, Inc.
Dynatrol I, manufactured by Pecora Corporation.
NP 1, manufactured by Sonneborn Building Products.
Approved equal.
Type B:

a. Type: One-part, neutral-curing, medium-modulus silicone sealant for sealing metal to metal surfaces, i.e. metal edge, cover plates, etc.
b. Approved products/manufacturers:

Chem-Calk 1200, manufactured by Bostik Construction Products Division.

795 Silicone Building Sealant, manufactured by Dow Corning Corporation.
895 Silicone, manufactured by Pecora Corporation.
Omniseal, manufactured by Sonneborn Building Products
Spectrem 2, manufactured by Tremco Incorporated.
Approved equal.

EPOXY SEAM SEALER: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

BITUMINOUS COATING: Cold-applied asphalt emulsion according to ASTM D 1187.

ASPHALT ROOFING CEMENT: ASTM D 4586, asbestos free, of consistency required for application.

ADHESIVES: Type recommended by flashing sheet manufacturer seaming and adhesive application of flashing sheet to ensure adhesion and watertightness.

METAL ACCESSORIES: Sheet metal clips, straps, anchoring devices, clamps, and similar accessories required for the complete installation of work, matching or compatible with material being installed, non-corrosive, and size and gauge recommended by installer to suit application and performance.

TERMINATION BAR:
Material: Extruded aluminum bar with flat profile.
Size: 1/8-inch thick by one-inch (1”) wide with factory punched 1/4-inch by 3/8-inch oval holes spaced six inches (6”) on center.
Approved product/manufacturer:

a. TB 125, manufactured by TruFast Corp.
b. Approved equal.

PIPE HANGERS AND SUPPORTS: Refer to Section 07 72 00: Roof Accessories.

ONE-WAY MOISTURE RELIEF VENTS: Shall be fabricated from spun aluminum as recommended by roofing manufacturer.

COLUMN COLLAR SYSTEM: Acceptable Manufacturer: Fry Reglet

1) Characteristics:

a. Description: Three-piece collar shall provide a trim creating reveal at column/ceiling joint.

b. Material: Aluminum molding, plastic spacer and adjustable stainless-steel band.

c. Diameter: 10”, As indicated on drawings.

d. Finish: Clear Anodized

2.6 FABRICATION

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.

Obtain field measurements for accurate fit before shop fabrication.
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.
Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

Except as otherwise indicated, fabricate work in accordance with SMACNA Architectural Sheet Metal Manual and other recognized industry practices and reviewed shop drawings. Form all flashings, receivers, and counterflashings in accordance with standards set forth in the NRCA roofing manual and SMACNA.

Comply with manufacturer's installation instructions and recommendations.

Unless noted otherwise, fabricate perimeter edge/fascia, scuppers, gutters, downspouts, copings, counterflashings, wind clips, and trim from pre-finished aluminum sheet steel.

Shop fabricate work to greatest extent possible. Fabricate inside and outside corners for metal edges, counterflashing, and coping caps of equal length – minimum two-foot (2') lengths.

Fabricate items to size and dimensions as indicated on the Drawings. Limit single-piece lengths to ten feet (10').

Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work sufficient to permanently prevent leakage, damage, or deterioration of the work.

Integrate flashing in a manner consistent with detailing. Form work to fit substrates.

Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.

Fabricate items with straight lines, sharp angles, smooth curves, and true levels. Avoid tool marks, buckling, and oil canning.

Fold back edges on concealed side of exposed edge to form hem.

Unless noted otherwise, lap joints minimum one inch (1"). Rivet and solder joints on parts that are to be permanently and rigidly assembled.

Seams:
Wherever possible, fabricate non-moving seams in sheet metal with flat-lock seams and end joints.
Pre-finished galvanized steel: Seal pre-finished metal seams with rivets and silicone sealant.
Metal other than aluminum: Tin edges to be seamed, form seams, and solder.

On Kynar 500 or Hylar 5000 pre-finished metal, surface sand metal flanges prior to applying any primers.
Prime all metal in contact with bituminous material.

Back-paint all concealed metal surfaces with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals.

Expansion Provisions: Where lapped or bayonet type expansion provisions in work cannot be used or would not be sufficiently waterproof or weatherproof, form expansion joints of intermeshing hooked flanges, not less than one-inch (1") deep filled with mastic sealant concealed within joints.

2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

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- (2400-mm-) long sections. Fabricate expansion joints and accessories from same metal as gutters unless otherwise indicated.
Accessories: Continuous, removable stainless steel 1/4-inch diamond wire pre-finished (match gutter color) leaf screen with sheet metal pre-finished frame.
Fabricate from the Following Materials:

a. Stainless Steel: 0.016 inch (0.40 mm)] thick.

Expansion joints shall be provided per The NRCA Roofing and Waterproofing Manual and Volume 4, Figure SM-25 Gutter Joinery Options, item 4 – Gutter With Splice Plate as required by Volume 2, Section 2.3.3 Gutter Expansion for additional information.

DOWNSPOUTS: Fabricate as shown on plans & details (round and rectangular) downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from as shown on the drawings when not shown specifically, use same material as downspouts and anchors. Shop fabricate elbows.
Hanger Style: See drawings and details. When not shown specifically, use Type 3 for round downspouts and Type 4 for rectangular downspouts as shown in Volume 2 of the latest edition of the NRCA Architectural Sheet Metal and Metal Roofing Manual.
Fabricate from the following materials that sleeve into steel downspouts as shown on drawings and details from the same material as the gutter above:

a. Galvanized Steel: 0.022 inch (0.56 mm) thick.
b. Stainless Steel: 0.016 inch (0.40 mm)] thick.
c. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.

Downspout straps unless otherwise noted shall comply with section the Downspout Hanger section (2.3.4.2) of Volume 2 of the latest edition of the NRCA Architectural Sheet Metal Roofing Manual.
Minimum 0.040-inch thick pre-finished (match color) aluminum. Hem both sides.
Collector heads: Minimum 0.040-inch thick pre-finished (match color) aluminum. As outlined in SMACNA; Refer to Figure 1-25F and Figure 1-28 with alternate Section A-A.

SPLASH BLOCKS: Concrete type, of size and profiles indicated; minimum 3,000 psi compressive strength at 28 days, with minimum five percent (5%) air entrainment. Use at locations where roof drainage dumps on ground.

SPLASH PANS: 22-gauge stainless steel, of size and profiles indicated. Use at locations where roof drainage discharges over adjoining, lower roof level(s).

ROOF EDGE FLASHING:
Formed in maximum ten-foot (10') lengths, with six-inch (6") wide cover plates of same profile, four-inch (4") flange. Fabricate from the following materials:

a. Stainless Steel: 24 gauge (0.024) thick.
b. Galvanized Steel: 24 gauge (0.025-inch) thick.
c. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
d. At single ply roofing locations G90 galvanized steel with PVC coating on one side for heat weldability.

Provide expansion slip joints at maximum 20 feet on center. See The NRCA Roofing and Waterproofing Manual, Volume 4, figure SM-7 "L" Type Edge Metal with Overlap.
Shop fabricate all interior and exterior corners. Fabricate exterior corners with 18-inch minimum to four-foot (4') maximum legs. Lap, rivet, and seal prior to delivery to jobsite.
Fabricate to sizes and dimensions as indicated on Drawings with a minimum one-inch (1") coverage past top of wall. Refer to SMACNA Fig. 2-5A.
Provide mock-up for Architect's approval prior to fabrication.

BASE METAL FLASHINGS AND COUNTERFLASHING (24-guage and minimum ten-foot [10'] lengths): Through wall receiver tray: Minimum 24-gauge stainless steel, through wall receivers shall not extend past the face of the exterior veneer more than 3/4 inch.

CONTINUOUS CLEATS: Continuous strips, same material and profile, minimum one (1) gauge heavier of item to which cleats attach.

VENT HOODS, SLEEVES, PENETRATION FLASHINGS, AND ACCESSORIES: Minimum 24-gauge stainless steel, or as shown or directed otherwise.

ANGLE TERMINATION BAR: Aluminum pressure bar 1/8 inch by one inch (1").

VENT PIPE FLASHING: Four (4) pound lead. Provide proper size to fold down inside of pipe a minimum of one inch (1").

ROOF DRAIN FLASHING: Four (4) pound lead, minimum 30 inches by 30 inches.

COPING:
Painted galvanized sheet metal.
Coping thickness shall conform to Table 3-1, Coping Design of the latest edition of the Architectural Sheet Metal Manual.
Expansion joints shall comply with The NRCA Roofing & Waterproofing Manual, Volume 2, Section 2.2. and shall conform to Volume 4, SM-16 Coping Cap Options, Type B.
All coping corner flashing shall comply with Figure 2.8 of Volume 2 of The NRCA Roofing and Waterproofing Manual.
All non-expansion coping joints shall comply with Figure SM-18 Coping Cap Options, Coping Cap with Double Lock Standing Seam, Type E of Volume 4 of The NRCA Roofing and Waterproofing Manual.
Fabricate as outlined in SMACNA; Refer to Figure 3-4 A (The NRCA Roofing and Waterproofing Manual, Volume 2, Figure 2.6, Option C).
Provide tapered and/or sloped substrate to slope to one (1) side (roofing assembly side unless otherwise noted, and cover with waterproof membrane.
Install with continuous cleat one (1) side and fasten other side.
Wind Clips: Minimum 24-gauge stainless steel (or match material of counterflashing), one-inch (1") wide by length to engage counterflashing a minimum of 1/2 inch. To be installed at all wall flashings and at curb flashing lengths longer than five feet (5').

PIPE BOX COVER: 24-gauge stainless steel.

HEAT EXHAUST CURBS AND HOODS: 22-gauge stainless steel.

EXPANSION JOINT COVER: Minimum 24-gauge stainless steel (provide pre-finished metal at perimeter edge end termination.)

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.
Manufacturers: Subject to compliance with requirements, provide products by one of the following:
Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings comparable product by one of the following:

a. Fry Reglet Corporation.
b. Heckmann Building Products, Inc.
c. Hickman, W. P. Company.
d. Hohmann & Barnard, Inc.
e. Keystone Flashing Company, Inc.

f. National Sheet Metal Systems, Inc.
g. Sandell Manufacturing.
h. Material: Stainless steel, 0.019 inch (0.48 mm) thick, Aluminum, 0.024 inch (0.61 mm) thick, Galvanized steel, 0.022 inch (0.56 mm) thick.
a. Finish: Mill.

ROOF PENETRATIONS:
Umbrella counterflashing: Two-piece construction of minimum 24-gauge stainless steel, fabricated in accordance with Drawings or Project requirements.
Pitch pans:

a. 24-gauge stainless steel.
b. Fabricate to provide installed minimum clear inside perimeter dimension of two inches (2") on each side of penetrating element.
c. Fabricate pans to at least six inches (6") above the finished roof membrane and with 1/4-inch hem at top edge and with four-inch (4") flanges. Round all corners of flange.

Fabricate metal bonnets for all pans, no exceptions. Fabricate bonnets with metal compatible with metal to which bonnet is to be attached. On beams and other steel, weld in place bonnets fabricated from 1/4-inch steel plate. Draw band bonnets fabricated from 22-gauge stainless steel may be used on circular projections. Grout - Pitch Pans:

a. Type: Quick-setting, non-shrink, non-metallic, high strength formula complying with ASTM C1107.
b. Approved products/manufacturers:
Sure Grip High Performance Grout, manufactured by Dayton Superior Corporation.
Premier Quick-Trim, manufactured by L & M Construction Chemicals, Inc.
Masterflow, manufactured by Master Builders, Inc.
Sonnogrout 10K, manufactured by Sonneborn Building Products.
Approved equal.
c. Pitch Pan Filler:
1. Type: Pourable polyurethane sealer, approved by roofing system manufacturer.
Approved products/manufacturers:
Quick Pitch Sealer, manufactured by U.S. Intec.
SPM Pourable Sealer, manufactured by Johns Manville.
Approved equal.

WALL SHEET METAL FABRICATIONS:
Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings; and form with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:

a. Stainless Steel: 0.016 inch (0.40 mm) thick.

Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:

a. Stainless Steel: 0.016 inch (0.40 mm) thick.
b. Galvanized Steel: 0.022 inch (0.56 mm) thick.
c. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.

Wall Expansion-Joint Cover: Fabricate from the following materials:

a. Aluminum: 0.040 inch (1.02 mm) thick.
b. Stainless Steel: 0.019 inch (0.48 mm) thick.
c. Galvanized Steel: 0.028 inch (0.71 mm) thick.
d. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

Verify substrates are smooth and clean to extent required to perform sheet metal work.

Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set in place.

Verify that reglets, nailers, cants, and blocking to receive sheet metal are in place and free of concrete and soil.

Do not start work until conditions are satisfactory.

3.2 PREPARATION

Field measure site conditions prior to fabrication work.

Install starter and edge strips and cleats before starting installation.

3.3 INSTALLATION

UNDERLAYMENT INSTALLATION
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 (50 mm).
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.
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 (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.

INSTALLATION, GENERAL
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.

a. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
b. 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.
c. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
d. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
e. Torch cutting of sheet metal flashing and trim is not permitted.

ROOF FLASHING INSTALLATION
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.
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.
COPINGS: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.
PIPE OR POST COUNTERFLASHING: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
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 (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm).
ROOF-PENETRATION FLASHING: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl (based on roofing manufactures requirements) sealant and clamp flashing to pipes that penetrate roof.

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.
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.
Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

SEPARATIONS: Provide for separation of metal from dissimilar metal or corrosive substrates by coating concealed surfaces with zinc chromate, bituminous coating, or other permanent separation at locations of contact as recommended by manufacturer or fabricator. Do not use materials that are incompatible with roofing system.

Install sheet metal with lines, arises, and angles sharp and true, and plane surfaces free from objectionable wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form 1/4-inch hem on concealed side from view. Finished work shall be free from water retention and leakage under all weather conditions. Pre-fabricated corners or transitions are required at changes in direction, elevation, or plane and at intersections. Locate field joints not less than 12 inches, nor more than three feet (3') from actual corner. Laps shall be one inch (1"), riveted and soldered at following locations:
Pre-fabricated corners.
Transitions.
Changes in direction, elevation, and plane.
At intersections.

Anchor units of work securely in place to prevent damage or distortion from wind or buckling. Provide for thermal expansion of metal units; conceal fasteners wherever possible; and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight and weatherproof.

Install fabricated sheet metal items in accordance with manufacturer's installation instructions and recommendations and with SMACNA Architectural Sheet Metal Manual.

CONTINUOUS CLEAT: At exposed edges of perimeter edge, fascias, cap flashings, and where required, attach continuous cleat at six inches (6") on center with appropriate fasteners.

GRAVEL GUARD/FASCIA:
Install with expansion joints ten feet (10') o.c., 1/2-inch expansion leeway, with cover plate.
Set in asphalt mastic and fasten into nailer at three inches (3") o.c. staggered.
Buff sand Kynar surface of flange and prime.

Strip in flange with specified stripping plies set in hot bitumen extending three inches (3") from outer edge of flange to at least three inches (3") inward towards gravel stop. Provide finish stripping ply of modified bitumen base ply in hot bitumen extending six inches (6") from the outer edge of the flange and butt base of gravel stop.

COUNTERFLASHING:
Do not use surface mount counterflashing except as noted in Drawings.
Set in through wall with receiver and spring lock counterflashing, as detailed in Drawings and to NRCA roofing manual, SMACNA standards.
Coordinate installation of through-wall flashing with the masonry contractor.
Seal through-wall in conjunction with masonry wall waterproofing.
Install wind clips 30 inches o.c. at all counterflashing over five feet (5') in length.

PITCH PANS, METAL FLANGES:
Apply mastic under pitch pan or metal flashing flange at least 1/2 pound per linear foot.
Prime all metal flanges with asphalt primer prior to flashing installation.
Clean all projections enclosed in pitch pans in any manner suitable and coated with a rust inhibitive coating as approved by the Architect. Coating shall be allowed to dry prior to pitch pan fill.
Fill base of pitch pans with grout or cementitious binder and allow to cure.
Top Finish Fill: Self-leveling, one-part urethane; at least two inches (2") to top of pitch pan sides.
Strip in pitch pan flanges with two (2) strips of specified stripping plies set in hot bitumen extending three inches (3") from the outer edge of the flange to at least three inches (3") inward toward base of pitch pan. Provide finish stripping ply of SBS modified bitumen membrane in hot bitumen extending six inches (6") from the outer edge of the flange and butt to base of pitch pan.

SANITARY VENT STACKS:
Prime top and bottom flanges of lead flashing sleeve. Set flange in uniform troweling of plastic roof cement. Prime top side of flange to receive strip-in membrane.
Fold lead sleeve down inside of pipe a minimum of one inch (1"). Apply a continuous bead of sealant on inside of pipe prior to folding lead sleeve.

ROOF DRAINS:
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.
After membrane installation, prime bottom of lead flashing sheet and set in uniform bed of plastic roof cement at specified locations.
Extend lead flashing into drain bowl or pipe a minimum of two inches (2") and over top of piping/bowl connection, if possible. Apply a continuous bead of specified Type A sealant, at intersection of pipe and drain bowl.
If drain bowl and pipe connection is contaminated with bituminous material, strip-in area with three-coursing of plastic roof cement and fabric.
Prime top of lead flashing sheet to receive strip-in membrane.

GUTTERS/DOWNSPOUTS:
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.
HANGING GUTTERS: Join sections with [riveted and soldered joints or joints sealed with sealant]. 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.

a. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet (15.24 m)] apart. Install expansion-joint caps.
b. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.

BUILT-IN GUTTERS: Join sections with riveted and soldered joints or joints sealed with sealant. Provide

for thermal expansion. Slope to downspouts. Provide end closures and seal watertight with sealant.

a. 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 (50 mm) over underlying course. Lap ends minimum of 4 inches (100 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with roofing nails. Install slip sheet over underlayment.
b. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet (15.24 m) apart. Install expansion-joint caps.

Install gutters as detailed.
Install downspouts plumb and level with 1-1/2 inch telescoping joints and attached to columns and/or wall with straps located at top and bottom of downspout and maximum five feet (5'-0") on center.
Install splash pad or block under discharge port of downspouts. Install splash pan over a protection (walkway) pad for downspouts located at roof level.
End caps, downspout outlets, gutter and downspout straps, support brackets, and joint fasteners to be manufactured to suit profile and dimension of gutter and downspout.
Install all anchoring devices as outlined in SMACNA.
Expansion joints: Lap or butt type per SMACNA, locate every 50 linear feet.

COPING:
Install wood nailers as shown on Drawings.
Install metal cleats with appropriate fasteners spaced six inches (6") on center.
Install underlayment over the wood substrate. Lap ends minimum of six inches (6") and secure membrane in place. Seal laps with appropriate adhesive.
Install metal coping allowing 1/2-inch spaces between segments. Lock coping onto cleat and install appropriate fasteners through the interior fascia spaced 24 inches on center in enlarged holes.
Install cover plate centered over coping joint in continuous beads of specified Type B sealant, placed approximately one inch (1") from cover edges. Refer to SMACNA for alternate joints as required by length.
Install appropriate fastener through neoprene washer and cover plate between coping segments.
Accommodate building wall expansion joints by terminating coping joints and cleats either side of expansion joint. Do not run coping or cleats continuous across joints. Install coping cover plate to span across joint and lap coping on each side of joint a minimum of four inches (4"). Fasten cover plate on one (1) side of joint only (provide wall flashing membrane up and over parapet wall in accordance with manufacturer's detail).

EXPANSION PROVISIONS: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
Use lapped expansion joints only where indicated on Drawings.

EXPANSION JOINT:
Construct wood curbs as shown on Drawings and as outlined in the NRCA and SMACNA manuals.
Install underlayment, form envelope, and secure underlayment to curb. Fill envelope with compressible insulation.
Securely fasten expansion joint cover to curb with grommetted fasteners spaced six inches (6") on center.
Taper expansion joint down at the metal edge.

FASTENERS: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

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.

Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Division 07 “Joint Sealants."

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 (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
Retain metals in first subparagraph below that are specified in Part 2; revise to suit Project. Soldering requires removal of painted, coated, or lacquered finishes. Although unusual, zinc-coated (galvanized) steel, a type of metallic-coated steel, may be soldered.
Do not solder metallic-coated steel and aluminum sheet.
Do not use torches for soldering.
Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
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.
COPPER SOLDERING: Tin edges of uncoated sheets, using solder for copper.

RIVETS: Rivet joints in uncoated aluminum where necessary for strength.

WALL FLASHING INSTALLATION
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.
THROUGH-WALL FLASHING: Installation of through-wall flashing is specified in Division 5, 7, 8, and 9.
Reglets: Installation of reglets is specified in Division 5, 7, 8, and 9.
Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

CLEANING AND PROTECTION

Remove flux and residual acid immediately by neutralizing with baking soda and washing with clean water. Leave work clean of stains.

Remove scraps and debris and leave work area clean.

Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes. Paint areas where finish is damaged on pre-finished metal by painting with a compatible paint in color to match undamaged finish.

Clean off excess sealants.

Prime soldered area of phosphatized metal after cleaning to prevent rusting.

Paint metal flashings that have been soiled with bitumen with aluminized paint.

Clean other work damaged or soiled by work of this Section.

Protect finished work from damage.

3.4 SCHEDULES

A. The Schedules are divided into "Architectural" Sheet Metal Items and "Utility" Sheet Metal Items:
   1. Architectural Sheet Metal Items: Those items visible from the interior occupied spaces and from all exterior viewing positions. Fabrication of all Architectural Items shall provide a fully finished appearance on all visible surfaces. Fabrication shall be soldered or welded joints and ground smooth. Solid flat head riveted joints may be used if necessary, but limited in use and must be indicated on the shop drawings by the fabricator, and accepted by the Architect. The use of sheet metal screws, pop rivets, or bolts are not be permitted. All joints between section shall be uniformly gapped with a maximum of 1/16" and splice backing shall be centered on the joint.
   2. Utility Sheet Metal Items: Those items not visible from the interior occupied spaces nor from exterior viewing positions. Fabrication of all Utility Items shall be in accordance with SMACNA Standards and shop practices.

B. Sheet Metal Schedules should be used as a guide only and it is not considered as a complete list. Refer to Drawings for locations of all conditions requiring sheet metal items.

C. Multiple types of material are specified for various items in the Schedules. Verify with roofing manufacturer as to which material shall be used to be compatible to the roofing material provided and to satisfy roofing warranty requirements.

D. Materials gages specified for Items in the Schedules are minimum and shall be provided unless otherwise noted on the Drawings.

E. Schedule's Remarks / SMACNA No., 6th Edition, and are references of the standards for fabrication. Refer to Drawings for configurations and other fabrication requirements of sheet metal items.

F. Architectural Sheet Metal Items

"ARCHITECTURAL" SHEET METAL ITEMS					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
Parapet Cap	Parapet Walls	Steel	20	Shop	Chapter 3, similar to Fig. 3-4A or Fig. 3-4G with E-1 and E-4 edge styles, as indicated on drawings. Provide J9 "Drive Cleat" joints, typical.
Cap Coping	Parapet Walls	Steel	20	Shop	Chapter 3, similar to Fig. 3-4G with E-4 edge style, as indicated on drawings. Provide J9 "Drive Cleat joints, typical.
Drip Flashing	Various Conditions	Steel	22	Shop	Chapter 4, minimum 4" under finish and minimum 4" cover. Provide J2 "Butt & Backup Plate joints with 1/16" gap. Fabricate Transition pieces and End Caps.
Counter Flashing	Various Conditions	Steel	22	Shop	Chapter 4, minimum 4" under finish and minimum 4" cover with 3/4"

"ARCHITECTURAL" SHEET METAL ITEMS					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
					hemmed drip. Provide J2 "Butt & Backup Plate joints with 1/16" gap. Fabricate Transition pieces and End Caps.
Opening Heads, Jambs & Sill Flashing	Metal Frames	Steel	22	Shop	Weld and Grind smooth all joints
Opening Heads, Jambs & Sill Flashing	Aluminum Windows	Alum	0.0253	Match Aluminum Window Finish.	Seal all joints.
Opening Heads, Jambs & Sill Flashing	Storefront	Alum	0.0253	Match Storefront Finish.	Seal all joints.
Opening Heads, Jambs & Sill Flashing	Curtain Wall	Alum	0.0253	Match Curtain Wall Finish.	Seal all joints.
Wall Penetration Flashing	Exterior Wall	Steel	22	Shop	Similar to Chapter 6, Figures 6-36, 37, 38 & 39.
Scuppers	Parapet Wall	Steel	22	Shop	Chapter 1, similar to Fig. 1-26A-B or 1-30A-B.
Gutters	Exterior	Steel	18	Shop	Chapter 1, Fig. 1-1. Provide expansion joints similar to Fig. 1-7. Solder overflow and downspout outlets.
Conductor Head	Exterior	Steel	18	Shop	Chapter 1, similar to Fig. 1-25. Solder downspout outlet.
Down Spouts	Exterior	Steel	18	Shop	Chapter 1, similar to Fig. 1-31, 1-32A or B. Provide Fig. 1-35B or J hangers.
Fascia Panels	Exterior	Steel	18	Shop	Weld and grind smooth all joints.
Color Band Panels	Exterior	Steel	18	Shop	Weld and grind smooth all joints.
Serving Counter	Serving Counter	S.S.	16	#4	Weld and Grind smooth all joints
Work Counter	Work Counter	Steel	16	Shop	Weld and Grind smooth all joints

"ARCHITECTURAL" SHEET METAL ITEMS					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
Fabricated Tilt Mirror	Student Restrooms	S.S.	16	#4	Weld and grind smooth all joints.

A. Utility Sheet Metal Items

"UTILITY" SHEET METAL ITEMS					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
Clips & Cleats	Various Conditions	Steel	22	Shop	
Parapet Boot Flashing	Parapet Cap & Cap Coping	Steel	18	Shop	Solder all joints. Minimum 4" under finish and min. 4" cover.
Counter Flashing	Various Conditions	Steel	22	Shop	Minimum 4" under finish and min. 4" cover with ¾" hemmed drip. Provide J2 "Butt & Backup Plate" joints with 1/16" gap. Fabricate Transition pieces and End Caps.
Reglet & Counter Flashing	Plaster Parapets	Steel	24	Shop	FRY Spring Lock Type "ST" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Reglet & Counter Flashing	Plaster Parapets	Steel	24	Shop	FRY Spring Lock Type "STX" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Reglet & Counter Flashing	Masonry Parapet	Steel	24	Shop	FRY Spring Lock Type "MA" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Reglet & Counter Flashing	Masonry Parapet	Steel	24	Shop	FRY Spring Lock Type "SM" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Structural Support Flashing	Roof Penetration	Steel	18	Shop	Chapter 4, Similar to Figures 16A or B or C if welded or soldered, and grind smooth.
Vent Pipe Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Fig. 4-15B.
Pipe or Conduit Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, similar to Figure 4-15C.
Multiple Pipe or Conduit Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop Or Shop	Chapter 4, similar to Figure 4-15A or 4-15B.
Insulated Pipe Flashing	Roof Penetration	Lead or	4#/sf or	Shop	Chapter 4, Similar to Fig. 4-15C. Refer to Plumbing.

"UTILITY" SHEET METAL ITEMS					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
		Steel	22		
Mechanical Flue Pipe Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Similar to Fig. 4-15C. Refer to Plumbing.
Manufactured Curb Flashing	Roof Penetration	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Hatch Flashing	Roof Penetration	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Ventilating Units Flashing	Roof Penetration	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Scuppers	Parapet Screens	Steel.	22	Shop	Chapter 1, similar to Fig. 1-26A-B or 1-30A-B.
Roof Splash Pans	Roof	Steel.	22	Shop	Chapter 1, Fig. 1-36, 2-rib corrugation section..
Valley Flashing	Metal Panel Roof	Steel.	22	Shop	Chapter 6, Similar to Fig. 6-6 or Fig. 1-21 or Fig. 1-23, Detail 10, or Fig. 6-9, Detail 7 and Chapter 4, Fig. 4-10.
Built-in Gutter	Metal Panel Roof	S.S.	16	Shop	Chapter 1, similar to Fig. 1-4 or Fig. 1-21 or Fig. 1-23. Provide expansion joint similar to Fig. 1-8. Weld and grind smooth all joints.
Louver Screens	Louvered Openings	Steel.	14	Shop	Chapter 7, Fig. 7-7A or B. Provide 12 gage (0.105) 3 x 3 welded wire mesh.
Plumbing Sheet Metal	Various Plumbing Conditions	Steel.	22	Shop	Refer to Plumbing Drawings and Specifications.
Mechanical Sheet Metal	Various Mechanical Conditions	Steel.	22	Shop	Refer to Mechanical Drawings and Specifications.
Electrical Sheet Metal	Various Electrical Conditions	Steel.	22	Shop	Refer to Electrical Drawings and Specifications.
Roof and Overflow Drain Pans	Roof	Lead	#4	Shop	See Details.
Mechanical, Large Flue Flashing	Roof Penetration	Steel	22	Shop	Chapter 4, Detail 4-14A.

END OF SECTION - 07 62 00

SECTION 07 65 00 | FLEXIBLE FLASHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Flexible sheet flashing for windows, doors, parapets, and other openings and where indicated on Drawings.

B. Related Sections:
   1. Division 07: Metal Roof Panels.
   2. Division 07: Metal Soffit Panels.
   3. Division 07: Sheet Metal Flashing and Trim.
   4. Division 07: Roof Accessories.
   5. Division 07: Joint Sealants.

C. Reference Standards:
   1. Part 1 2025 California Building Standards Administrative Code, Title 24 C.C.R.
   2. Part 2 2025 California Building Standards Administrative Code, Title 24 C.C.R.
   3. Part 3 2025 California Electrical Code, Title 24 C.C.R.
   4. Part 4 2025 California Mechanical Code, Title 24 C.C.R.
   5. Part 5 2025 California Plumbing Code, Title 24 C.C.R.
   6. Part 6 2025 California Energy Code, Title 24 C.C.R.
   7. Part 8 2025 California Historical Code, Title 24 C.C.R.
   8. Part 9 2025 California Fire Code, Title 24 C.C.R.
   9. Part 10 2025 California Existing Building Code, Title 24 C.C.R.
   10. Part 11 2025 California Green Building Standards Code (CALGreen Code), Title 24 C.C.R.
   11. Part 12 2025 California Referenced Standards Code, Title 24 C.C.R.
   12. NFPA 13 Automatic Sprinkler Systems (California Amended), Current Edition.
   13. NFPA 14 Standpipe Systems (California Amended), Current Edition.
   14. NFPA 17 Dry Chemical Extinguishing Systems, Current Edition.
   15. NFPA 20 Stationary Pumps, Current Edition.
   16. NFPA 24 Private Fire Service Mains (California Amended), Current Edition.
   17. NFPA 72 National Fire Alarm and Signaling Code (California Amended) Current Edition (Note: See UL Standard 1971 for “Visual Devices.”
   18. NFPA 80 Fire Door and Other Opening Protectives, Current Edition.
   19. NFPA 253 Critical Radiant Flux of Flooring Covering Systems, Current Edition.
   20. NFPA 2001 Clean Agent Fire Extinguishing Systems (California Amended), Current Edition.
   21. Americans with Disabilities Act (ADA), Title II, and 2025 CBC Section 11B.

1.3 SUBMITTALS

A. Concurrent Review Requirements: Submit submittals of this Section with doors and windows Sections.

B. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and testing physical and performance properties of flexible sheet flashing.

C. Shop Drawings: Show locations and extent of flexible sheet flashing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

D. Samples - For the Following Products:
   1. 12-by-12-inch square of flexible sheet flashing.

E. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

F. Qualification Data: For installer.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for flexible sheet flashing.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that is acceptable to flexible sheet flashing manufacturer for installation of flexible sheet flashing required for this Project.

B. Source Limitations: Obtain flexible sheet flashing materials through one (1) source from a single manufacturer.

C. Mockups:
   1. Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
      a. Build mockup with doors and windows.

D. Pre-Installation Conference:
   1. Conduct conference at Project site. Review methods and procedures related to flexible sheet flashing including, but not limited to the following:
      a. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
      b. Review and discuss the flashing to be coordinated with the finishing of doors and windows.
      c. Review, discuss, and coordinate the interrelationship of flexible flashing with other exterior wall components. Include provisions for sealants and fasteners.
      d. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
      e. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.5 WARRANTY

A. Special Warranty:
   1. Manufacturer's standard form in which manufacturer agrees to repair or replace components of flexible sheet flashing that fails in materials or workmanship within specified warranty period:
      a. Warranty period: Two (2) years.

B. Installer's Warranty: One (1) year.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by flexible sheet flashing manufacturer.

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Store rolls according to manufacturer's written instructions.

E. Protect stored materials from direct sunlight.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Flexible Sheet Flashing:
   1. Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified:
      a. WR Grace (basis of design).
      b. FortiFlash by Fortifiber.
      c. FlexWrap and StraightFlash by DuPont.
      d. Or equal.

2.2 FLEXIBLE SHEET FLASHING

A. Product - Vycor Plus by WR Grace or Equal:
   1. Self-Adhered, cross-laminated high-density polyethylene (HDPE) sheet, backed by aggressive pressure-sensitive rubberized asphalt adhesive.
   2. Thickness: 25 mil minimum per ASTM D3767, Method A.
   3. Low temperature flexibility: Unaffected at minus 45 degrees F per ASTM D1970.
   4. Elongation, ultimate failure of rubberized asphalt: 200 percent minimum per ASTM D412.
   5. Cracked cycling 100 cycles: Unaffected at minus 25 degrees F per ASTM C836.
   6. Lap adhesion at minimum application temperature: 60 plf width per ASTM D1876 modified.
   7. Adhesion to concrete at minimum application temperature: 60 plf width per ASTM D903.
   8. Recommended exposure limit: 30 days.
   9. Perm-A-Barrier by Grace is not acceptable.

2.3 AUXILIARY MATERIALS

A. Mastic, Joint Sealant, Adhesives, and Tape:
   1. Liquid mastic and adhesives, and adhesive tapes recommended by flexible sheet flashing manufacturer:
      a. Caulking, sealants, and adhesives applied on the interior of the building envelope shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements and other conditions affecting performance:
   1. Verify that concrete has cured and aged for minimum time period recommended by flexible sheet flashing manufacturer.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install flexible sheet flashing in accordance with the manufacturer's written instructions, AAMA Publication 2400, and the applicable code.

END OF SECTION - 07 65 00

SECTION 07 72 00 | ROOF ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 REFERENCES

A. AA – Aluminum Association.

B. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

D. OSHA 1910.27 – Fixed Ladders.

1.3 SUMMARY

A. This Section includes the following:
   1. Roof curbs.
   2. Equipment supports.
   3. Roof hatches.
   4. Caged fixed ladder.
   5. Ladder rail extension
   6. Roof hatch railing with swing gate.

B. Related Sections:
   1. Division 05: Metal Fabrications.
   2. Division 06: Rough Carpentry.
   3. Division 07: Roof and Deck Insulation.
   4. Division 07: Modified Bitumen Membrane Roofing.
   5. Division 07: PVC Thermoplastic Membrane Roofing.
   6. Division 07: Sheet Metal Flashing and Trim.
   7. Division 07: Joint Sealants.

1.4 SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for roof accessories. Show layouts of roof accessories including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.

C. Coordination Drawings:
   1. Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items.

Show the following:

a. Size and location of roof accessories specified in this Section.
b. Method of attaching roof accessories to roof or building structure.
c. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

D. Warranty: Provide manufacturer's standard warranty.

1.5 QUALITY ASSURANCE

A. Sheet Metal Standard: Comply with SMACNA's Architectural Sheet Metal Manual details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

B. Mockups: Refer to Section 07 62 00: Sheet Metal Flashing and Trim.

C. All work must conform to California Building Code.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

1.7 WARRANTY

A. Warranty the Work specified herein for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:
1. Noticeable deterioration of finish
2. Leakage of water into the building or within the construction.

C. Rooftop supports – 5 year limited warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed in other Part 2 articles.

2.2 METAL MATERIALS

A. Galvanized (Zinc-Coated) Steel Sheet: ASTM A653/A653M, G90 (Z275) coated.
1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
3. Exposed Coil-Coated Finish: Two-coat fluoropolymer finish; AAMA 621; system consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
4. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film

thickness of 1 mil (0.025 mm) for topcoat.

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, AZ50 (AZM150) coated.
   1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
   2. Exposed Coil-Coated Finish: Two-coat fluoropolymer finish; AAMA 621; system consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight
   3. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat.

C. Aluminum Sheet: ASTM B209, alloy and temper recommended by manufacturer for type of use and mill finish.
   1. Mill Finish: As manufactured.
   2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
   3. Clear Anodic Finish: AAMA 611, Class II, 0.010 mm or thicker.
   4. Color Anodic Finish: AAMA 611, Class II, 0.010 mm or thicker.
   5. Exposed Coil-Coated Finish: Two-coat fluoropolymer finish; AAMA 620; system consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
   6. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm).

D. Aluminum Extrusions and Tubes: ASTM B221, alloy and temper recommended by manufacturer for type of use, mill finished.

E. Stainless-Steel Shapes or Sheet: ASTM A240/A240M or ASTM A666, Type 304 or Type 316, No. 2D finish.

F. Steel Shapes: See Division 05 – Metals, and Division 09 – Painting and Coating.

G. Steel Tube: See Division 05 – Metals, and Division 09 – Painting and Coating.

H. Galvanized Steel Tube: ASTM A500, round tube, hot-dip galvanized to comply with ASTM A123/A123M.

I. Galvanized Steel Pipe: ASTM A53/A53M.

2.3 MISCELLANEOUS MATERIALS

A. GENERAL: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. GLASS-FIBER BOARD INSULATION: ASTM C726, one inch (25 mm) thick.

C. WOOD NAILERS: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches (38 mm) thick.

D. FASTENERS: Same metal as metals being fastened, or nonmagnetic stainless steel or other

noncorrosive metal as recommended by roof accessory manufacturer. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.

E. GASKETS: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.

F. SEALANTS: as recommended by roof accessory manufacturer for installation indicated. See Division 07, for additional information.

2.4 ROOF CURBS

A. Roof Curbs:
1. Provide metal roof curbs, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Fabricate with welded or sealed mechanical corner joints, with an integral formed mounting flange at perimeter bottom. Coordinate with structural drawings and/or specifications for connections, Division 23, MECHANICAL for curb information, and contractor is to provide dimensions with rough-in information or shop drawings of equipment to be supported:
   d. Material: Galvanized or aluminum-zinc alloy-coated steel sheet, 0.052 inch (1.32 mm) thick.
   e. Liner: Same material as curb, of manufacturer's standard thickness and finish.
   f. Factory install wood nailers at tops of curbs.
   g. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
   h. Factory insulate curbs with manufacturer’s standard rigid or semi-rigid insulation:
      1) Curb height may be determined by adding thickness of roof insulation and minimum base flashing height recommended by roofing membrane manufacturer. Fabricate units to minimum height of 16 inches (400 mm), unless otherwise indicated.
      2) Sloping roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

2.5 EQUIPMENT SUPPORTS

A. Equipment Supports:
1. Provide metal equipment supports, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported. Fabricate with welded or sealed mechanical corner joints, with an integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or shop drawings of equipment to be supported:
   a. Manufacturers:
      1) Colony Custom Curbs.
      2) Commodity Products Company, Inc.
      3) Conn-Fab Sales, Inc.
      4) Curbs Plus Inc.
      5) Custom Curb, Inc.
      6) LM Curbs.
      7) Loren Cook Company.
      8) Metallic Products Corporation.

9) Pate Company (The).
10) Roof Products & Systems Corporation.
11) Roof Products, Inc.
12) Thaler Metal Industries Ltd.
13) ThyCurb; Div. of Thybar Corporation.
14) Uni-Curb, Inc.
15) Vent Products Company, Inc.

b. Indicate load requirements on Drawings or insert below.
c. Material: Galvanized or aluminum-zinc alloy-coated steel sheet, 0.052 inch (1.32 mm) thick.
d. Factory install continuous wood nailers 3-1/2 inches (90 mm) wide at tops of equipment supports.
e. Metal counterflashing: Manufacturer's standard removable counterflashing, fabricated of same metal and finish as equipment support.
f. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
g. Equipment support height may be determined by adding thickness of roof insulation and minimum base flashing height recommended by roofing membrane manufacturer.
h. Fabricate units to minimum height of 12 inches (300 mm), unless otherwise indicated.
i. Sloping roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

2.6 ROOF HATCH

A. Basis-of-Design Manufacturer: O'Keeffe's, Inc.; 100 N Hill Drive, Suite 12, Brisbane, CA 94005.Toll Free Tel: (888) 653-3333. Tel: (415) 824-4900. Fax: (415) 824-5900. Email: info@okeeffes.com. Web: http://www.okeeffes.com.
1. The Bilco Company
2. Bristolite Skylights.
3. Hi Pro International, Inc.
4. J. L. Industries, Inc.
5. Metallic Products Corp.
6. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.

B. Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, and integrally formed deck-mounting flange at perimeter bottom.

C. Furnish and install where indicated on plans metal 36" wide x 30" length aluminum roof hatch/ladder assembly from the same manufacturer for all the components, unless approved otherwise:
1. Performance characteristics:
a. FINISHES:
1) Clear Anodic Finish: AA-M10C22A41 Mechanical finish as fabricated. Architectural Class I, clear coating 0.018 mm or thicker.
b. MATERIALS:
2) Aluminum Sheet: Alloy 5005-H34 to comply with ASTM B209.
3) Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.

c. ROOF HATCH LID:
1) Single-leaf, reinforced to support a minimum live load of 40 psf (195kg/m^2) with a maximum deflection of 1/150th of the span and a

maximum design pressure of +/- 100 PSF (488 kg/m^2) with a design factor of 2.

2) Aluminum opaque.
3) Double walled with manufacturer's standard metal liner of same material and finish as outer metal lid.
4) Insulated with1 inch thick minimum glass-fiber insulation board fully covered with protected liner.
5) 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.
6) Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
7) Operation of the cover shall not be affected by temperature.

d. ROOF HATCH LID 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" (25mm) diameter red vinyl grip handle to permit easy release for closing.
   6) All hardware shall be zinc plated and chromate sealed. [For installation in highly corrosive environments or when prolonged exposure to hot water or steam is anticipated, specify Type 316 stainless steel hardware].
   7) Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space. 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.

e. ROOF HATCH CURB:
   1) Reinforced to support a minimum live load of 40 psf (195kg/m^2) from with a maximum deflection of 1/150th of the span and a maximum design pressure of +/- 100 PSF (488 kg/m^2) with a design factor of 2.
   2) Curb liner shall be manufacture's standard, of same material and finish as metal curb.
   3) Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
   4) Curb: Shall be 8" minimum higher than top of top of adjacent roofing. The curb shall be equipped with an integral metal cap flashing of the same gauge and material as the curb, fully welded at the corners, including stamped tabs, 6" on center, to be bent inward to hold Built-Up Roofing or Single Ply Roofing (see roof plan for roofing type) membrane securely in place.

f. LADDER INFORMATION
   1) Wall and floor supported Model 501 heavy duty tubular rail aluminum cage ladder (low parapet access to roof hatch with rail extensions) when roof access is less than 20'-0" above the finish floor), aluminum mill finish roof hatch rail extension, and mill finished aluminum railing with swing gate (all shall be from one single manufacturer). Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-

assembled from the manufacturer. Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following.

2) Wall and floor supported Model 531 heavy duty tubular rail aluminum cage ladder (low parapet access to roof hatch with rail extensions) when roof access is greater than 20'-0" above the finish floor). Aluminum mill finish roof hatch rail extension, and mill finished aluminum railing with swing gate (all shall be from one single manufacturer). Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.
3) Rungs: Not less than 1-1/4 inches (32 mm) in section and 18–3/8 inches (467mm) long, formed from tubular aluminum extrusions. Squared and deeply serrated on all sides.
4) Rungs shall withstand a 1,500 pound (454 kg) load without deformation or failure.
5) Channel Side Rails: Not less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide.
6) Heavy Duty Tubular Side Rails: Assembled from two interlocking aluminum extrusions no less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.
7) Walk-Through Rail and Roof Rail Extension: Not less than 3 feet 6 inches (1067 mm) above the landing and shall be fitted with deeply serrated, square, tubular grab rails.

g. SAFETY CAGE INFORMATION (when required)
1) Fabricate ladder safety cages to comply with authority having jurisdiction. Assemble by welding. Spacing of primary hoops, secondary hoops and vertical bars shall not exceed that required by code.
2) Safety cage hoops and vertical bars: 3/16 inch (5 mm) by 2 inches (51 mm) aluminum bar.

h. ROOF HATCH SAFETY RAILING & SWING GATE INFORMATION
1) Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

i. LADDER SAFETY POST
1) Furnish and install where indicated on plans ladder safety post. The ladder safety post shall be pre-assembled from the manufacturer.
2) Performance characteristics:
a) Tubular post shall lock automatically when fully extended.
b) Safety post shall have controlled upward and downward movement.
c) Release lever shall disengage the post to allow it to be returned to its lowered position.
d) Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14" (356mm) on center and clamp brackets to accommodate ladder rungs up to 1-3/4" (44mm) in diameter.
e) Post: Shall be manufactured of high strength square tubing. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.
f) Material of construction: Aluminum.
g) Balancing spring: A stainless steel spring balancing mechanism shall be provided to provide smooth, easy, controlled operation

when raising and lowering the safety post.

h) Hardware: All mounting hardware shall be Type 316 stainless steel.

i) Finishes: Mill finish**.**

3) HATCH RAIL SYSTEM

a) Furnish and install where indicated on plans hatch rail system; The aluminum hatch rail system shall be field assembled and installed (by others) per the manufacturer's instructions.

b) Performance characteristics:

1) High visibility safety yellow powder coat paint finish.
2) Hatch rail system shall attach to the capflashing of the roof hatch and shall not penetrate any roofing material.
3) Hatch rail system shall satisfy the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a factor of safety of two.
4) Corrosion resistant construction with a five-year warranty.
5) Hinged gate shall ensure continuous barrier around the roof hatch.
6) Self-closing gate hinge and positive latching system provided with hatch rail system.
7) Posts and Rails: 1-1/4" (32mm) 6061 T6 schedule 40 aluminum pipe.
8) Hardware: Mounting brackets shall be 3/8" (9mm) thick extruded aluminum. Pivoting post guides with compression fittings and latching mechanism shall be cast aluminum. Self-closing hinges and all fasteners shall be type 316 stainless steel.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Field Measurements: Verify required openings for each type of roof accessory by field measurements before fabrication and indicate measurements on shop drawings.

3.2 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

3.3 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, to verify actual locations, dimensions, and other conditions affecting performance of work:

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, is securely anchored, and is ready to receive roof accessories.
2. Verify dimensions of roof openings for roof accessories.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Install roof accessories to fit substrates and to result in watertight performance.

C. Metal Protection:
   1. Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer:
      a. Coat concealed side of uncoated aluminum and stainless steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
      b. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
      c. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.

D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.

E. Roof Curb Installation: Set roof curb so top surface of roof curb is level.

F. Equipment Support Installation: Set equipment support so top surface of equipment support is level.

G. Seal joints with elastomeric sealant as required by manufacturer of roof accessories.

3.5 TOUCH UP

A. Touch up factory-primed surfaces with compatible primer ready for field painting in accordance with Section 09 90 00: Painting and Coating.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

3.6 CLEANING

A. Clean exposed surfaces according to manufacturer's written instructions.

END OF SECTION - 07 72 00

SECTION 07 92 00 | JOINT SEALANTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Control and expansion joints on exposed interior and exterior surfaces.
   2. Perimeter joints between wall surfaces and frames of interior and exterior doors and openings.
   3. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   4. Joints indicated or as necessary.
   5. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 03 30 00: Cast-In-Place Concrete
   2. Section 05 50 00: Metal Fabrications.
   3. Section 07 84 00: Firestopping.
   4. Section 08 11 13: Hollow Metal Doors and Frames.
   5. Section 08 80 00: Glazing.
   6. Section 09 90 00: Painting and Coating.

1.3 SUBMITTALS

A. Product Data:
   1. Technical data for each joint sealant product. Data to indicate elasticity and durability of each joint sealant product. Submit written certification from manufacturers of sealants attesting products are suitable for use indicated, verified through in-house testing laboratory:
      a. Written certification from manufacturers of joint sealants attesting that products comply with specification requirements and suitable for use indicated verified through manufacturers testing laboratory within the past 36 months or since most recent reformulation, whichever is most recent:
         1) Complete instructions for handling, storage, mixing, priming, installation, curing, and protection of each type of sealant.
         2) Manufacturer's letter, clearly indicating proposed lot numbers of each sealant supplied and expiration date sequence.
   2. Recycled Content:
      a. Indicate recycled content; indicate percentage of pre-consumer and postconsumer recycled content per unit of product.
      b. Indicate relative dollar value of recycled content product to total dollar value of product included in Project.
      c. If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
      d. If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
   3. Local/regional materials:
      a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the Project site.

b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the Project site.
c. Product value: Indicate dollar value of product containing local/regional materials; include materials cost only.
d. Product component(s) value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.

4. VOC data: Submit manufacturer's product data for sealants. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.
5. Submit environmental data in accordance with Table 1 of ASTM E2129 for products provided under work of this Section.

B. Samples:
1. Provide color samples from full manufacturer's full range for each type of sealant specified for Architect's review.

C. Certificates and Reports:
1. Product Certificates: Manufacturer's product certificate for each kind of joint sealant and accessory.
2. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
3. Product test reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
4. Preconstruction compatibility and adhesion test reports:
a. From sealant manufacturer, indicating the following:
1) Materials forming joint substrates and sealant backings have been tested for compatibility and adhesion with sealants.
2) Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
5. Preconstruction field adhesion test reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified.
6. Field adhesion test reports: For each sealant application tested.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:
1. Firm having minimum five (5) years' documented experience and specializes in the installation of sealants:
a. Exposed sealant work (sealants used for air and weatherseals external at perimeter, metal panel to panel joints) shall be performed by a single (i.e. one) firm specializing in the installation of sealants who has successfully produced work comparable to Project.
b. Concealed sealant work (sealants that are internal to skylights and providing an air seal) shall be the responsibility of the subcontractor providing erection of the respective system.

B. Source Limitations: Obtain each type of joint sealant from a single manufacturer.

C. Product Testing:
1. Test joint sealants using a qualified testing agency:
a. Testing agency qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
b. Test according to SWRI Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion

under cyclic movement, adhesion in peel, and indentation hardness.

D. Environmental Requirements:
   1. Toxicity/IEQ:
      a. Comply with applicable regulations regarding toxic and hazardous materials:
         1) VOC content of interior sealants - sealants and sealant primers complying with limits for VOC content for SCAQMD when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
            a) Sealants: 250 g/L.
            b) Sealant primers for nonporous substrates: 250 g/L.
            c) Sealant primers for porous substrates: 775 g/L.
      b. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds, are not permitted.

1.5 WARRANTY

A. Written warranty, signed by installer agreeing to repair or replace elastomeric joint sealant work that has failed to provide a weathertight system within specified warranty period:
   1. Warranty period: Five (5) years from date of Substantial Completion.

B. Written warranties (weatherseal and stain resistance), signed by sealant manufacturer agreeing to furnish joint sealants to repair or replace those that fail to provide airtight and watertight joints, or fail in adhesion, cohesion, abrasion resistance, stain resistance, weather resistance, durability, or appear to deteriorate in manner not specified in the manufacturer's data as an inherent quality of the material within specified warranty period:
   1. Warranty period: Five (5) years from date of Substantial Completion.

C. Warranties specified exclude deterioration or failure of sealants from:
   1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
   2. Disintegration of joint substrates from natural causes exceeding design specifications.
   3. Mechanical damage caused by individuals, tools, or outside agents.
   4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer’s written instructions to prevent deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

PART 2 PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backings, and related materials compatible with one another and with joint substrates under conditions of service and application, as stated by sealant manufacturer’s published data, and as substantiated by the manufacturer for each application through testing.

B. Liquid Applied Sealants: Comply with ASTM C920 and requirements indicated for each liquid applied sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain Test Response Characteristics: For sealants in contact with porous substrates, provide nonstaining products that have undergone testing according to ASTM C1248 and do not stain porous joint substrates.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

E. Colors: For fully concealed joints, provide standard color of sealant that has the best overall performance characteristics for the application shown. For exposed joints, submit color samples to Architect for approval, from manufacturer's full line of standard colors.

F. Manufacturer's Representative: Use sealant produced by manufacturer who agrees to send a qualified technical representative to site upon request for the purpose of rendering advice concerning the recommended installation of manufacturer's materials.

G. Sealants: Self-leveling compounds for horizontal joints in pavements and non-sag compounds elsewhere except as shown or specified.

H. Silicone Sealant:
   1. Comply with ASTM C920, Type M, Grade NS, Class 25; use NT, M, A and O:
      a. Use: Typical joints between masonry, metals, glass, and plastics (two-part silicone sealants).
      b. Properties:
         1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates. The minimum pli value after seven (7) day immersion shall not be less than 13 when tested in strict accordance with ASTM C794 Adhesion and Peel.
         2) Cure system and oil content: Neutral cure system specifically manufactured with controlled oil content to eliminate oil migration into sealed substrates and residue rundown over and onto adjacent substrates.
      c. Product and manufacturer: Dow Corning; 756 Silicone Building Sealant - HP with Additive.

I. Silicone Sealant:
   1. ASTM C920, Type S, Grade NS, Class 50, for Use NT:
      a. Use: Typical joints between masonry, metals, glass, and plastics (single component sealants).
      b. Properties:
         1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates.
         2) Cure system and oil content: Neutral cure system specifically manufactured with controlled oil content to eliminate oil migration into sealed substrates and residue rundown over and onto adjacent substrates.
      c. Product and manufacturer:
         1) BASF Building Systems; Omniseal 50.
         2) Dow Corning Corporation; 756 SMS, 791, 795, 995 as applicable.
         3) GE Advanced Materials, Silicones; SilGlaze II SCS2800, SilPruf NB SCS9000, SilPruf SCS2000, or UltraPruf II SCS2900 as applicable.
         4) Pecora Corporation, as applicable.
         5) Sika Corporation, Construction Products Division; SikaSil-C995.
         6) Tremco, as applicable.

7) Comparable product.

J. Polyurethane Sealants:
1. ASTM C920, Type M, Grade NS, Class 25; use NT, M, A and O:
   a. Use: Typical Wall and floor joints (two-part polyurethane sealants). Use at concrete joints.
   b. Properties:
      1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates.
   c. Products and manufacturers:
      1) BASF Building Systems; Sonolastic NP-2.
      2) Pecora Corporation; Dynatred.
      3) Sika Corporation, Construction Products Division; Sikaflex 2c NS or Sikaflex 2c NS TG as applicable.
      4) Tremco, as applicable.
      5) Comparable product.

K. Two-Part Polyurethane Sealants:
1. ASTM C920, Type M, Grade NS, Class 50; use NT, M, A and O:
   a. Use: Typical Wall and floor joints (two-part polyurethane sealants).
   b. Properties:
      1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates. The minimum pli value after seven (7) day immersion shall not be less than 13 when tested in strict accordance with ASTM C794 Adhesion in Peel.
   c. Products and manufacturers:
      1) BASF Construction Chemicals; NP 2.
      2) Pecora Corporation, as applicable.
      3) Schnee-Morehead, Inc.; Permathane SM 7200.
      4) Sika Corporation, Inc.; Sikaflex - 2c NS TG.
      5) Tremco, as applicable.
      6) Comparable product.

L. Mildew Resistant Silicone Sealant:
1. ASTM C920, Type S, Grade NS, Class 25, Use NT, Substrate uses G, A, and O; and containing fungicide for mildew resistance; acid curing:
   a. Use: One-part mildew-resistant silicone, formulated with fungicide for sealing interior joints of nonporous substrates around ceramic tile, plumbing fixtures, and showers.
   b. Products - provide one of the following:
      1) BASF Building Systems; Omniplus.
      2) Dow Corning; 786 Mildew Resistant Silicone Sealant.
      3) GE Silicones; Sanitary SCS 1700.
      4) Pecora Corporation, as applicable.
      5) Sika Corporation, Inc., as applicable.
      6) Tremco, as applicable.
      7) Comparable product.

M. Latex Sealant:
1. Non-elastomeric, one-part, non-sag, paintable latex sealant that is recommended for exposed applications on the interior. Complying with ASTM C834, Type OP (opaque sealants):
   a. Products are subject to compliance with requirements; provide one of the following:
      1) BASF; Sonolastic Sonolac.
      2) Pecora Corporation; AC-20 + Silicone.
      3) Sika Corporation, Inc., as applicable.

4) Tremco, as applicable.
5) Comparable product.

N. Acoustical Joint Sealant:
1. Non-sag, paintable, non-staining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90:
   a. Products are subject to compliance with requirements; provide one of the following:
      1) BASF, as applicable.
      2) Pecora Corporation; AC-20 FTR or AIS-919.
      3) Sika Corporation, Inc., as applicable.
      4) Tremco, as applicable.
      5) USG Corporation; SHEETROCK Acoustical Sealant.
      6) Comparable product.

O. Sealant Backing:
1. Provide sealant backings that are non-staining, compatible with joint substrates, sealants, primers, and joint fillers, and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing:
   a. Cylindrical sealant backings: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding backings of flexible plastic foam complying with ASTM C1330, and of type indicated below. Select shape and density of cylindrical sealant backings in consultation with the manufacturer for proper performance in specific condition of use in each case.
   b. Type C - closed cell polyethylene foam material with surface skin, nonabsorbent to liquid water and gas, non-outgassing in unruptured state; provide one of the following:
      1) BASF, as applicable.
      2) HBR Closed Cell Backer Rod; Nomaco, Inc.
      3) Pecora Corporation, as applicable.
      4) Sonolastic Closed-Cell Backer-Rod; BASF Construction Chemicals.
      5) Tremco, as applicable.
      6) Comparable product.

P. Window Glazing:
1. Product Description: Ready to use glazing compound that may be used for face glazing wood or metal sash on existing windows. It is a knife-grade consistency allows for smooth, easy applications. Stick tightly to glass and sash and resists sagging, shrinking and cracking. Follow manufacturers suggested uses.
2. This product is NOT to be used on plastic windowpanes, porcelainized steel insulating panels or any insulated glass units with organic seals, stained or leaded glass. Any window pain over 48 inches in any direction.
3. Listed manufacturer:
   a. Dap 33 Glazing compound.
   b. Approved equal.

Q. Miscellaneous Materials:
1. Primer: Material recommended, as verified through compatibility and adhesion testing, by joint sealant manufacturer for the substrates indicated to be sealed.
2. Cleaners for nonporous surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants with joint substrates.
3. Masking tape: Non-staining, non-absorbent material compatible with joint sealants and that will not stain nor mar the finish of surface adjacent to joints to which it is applied.

4. Cork joint filler: Resilient and non-extruding, ASTM D1752, Type II.
5. Bond breaker tape: Polyethylene, TFE fluorocarbon, or plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations:
   1. Do not proceed with installation of joint sealants under the following conditions:
      a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 degrees F (4.4 degrees C).
      b. When joint substrates are wet. Should joints or backing materials become wet, remove and replace backing material with new.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

3.2 EXAMINATION

A. Examine joints indicated to receive joint sealants for compliance with requirements for joint configuration, installation tolerances, and conditions affecting sealant performance. Proceed with installation after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning of Joints:
   1. Clean out joints immediately before installing joint sealants to comply with the recommendations of joint sealant manufacturer and requirements:
      a. Remove foreign material from joint substrates interfering with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), existing joint sealants, oil, grease, water, surface dirt, and frost.
      b. Clean concrete, masonry, unglazed surfaces of tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil free compressed air.
      c. Remove laitance and form-release agents from concrete.
      d. Clean metal, glass, porcelain enamel, glazed surfaces of tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming (Elastomeric Sealants Only): Prime joint substrates where recommended in writing by joint sealant manufacturer, based on prior testing and experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with

adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.4 INSTALLATION

A. Silicone Glazing Sealants: Refer to Section 08 80 00: Glazing.

B. Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

C. Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants applicable to materials, applications, and conditions indicated.

D. Sealant Backings:
   1. Install sealant backings to support sealants during application and at position necessary to produce cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability:
      a. Do not leave gaps between ends of sealant backings. Trim for tight fit around obstructions or elements penetrating the joint.
      b. Do not stretch, twist, puncture, or tear sealant backings.
      c. Remove absorbent sealant backings that become wet before sealant application and replace with dry sealant backings.
      d. Install bond breaker tape behind sealants where backings are not used between sealants and back of joints.

E. Weeps and Vents: Install weeps and vents into joints at the same time sealants are being installed. Locate weeps and vents spaced recommended by sealant manufacturer and the window and curtain wall fabricator and erector. Do not install weeps and vents at outside building corners. Do not install vents at horizontal joints immediately below shelf angles, sills, and through wall flashings.

F. Sealants:
   1. Install sealants by proven techniques resulting in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at same time sealant backings are installed:
      a. Apply sealants in depth in accordance with manufacturer's recommendations and recommended general proportions and limitations.
      b. Apply elastomeric sealants, in joints not subject to traffic or abrasion, to a depth equal to 50 percent of the joint width, but not less than 1/4 inch (6 mm) and not more than 1/2 inch (13 mm).
      c. Apply non-elastomeric sealants to a depth approximately equal to the joint width.

G. Tooling of Non-Sag Sealants:
   1. Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform, beads to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces. Tool exposed surfaces of sealants to the profile shown, or if none is shown, tool slightly concave:
      a. Use masking tape to protect adjacent surfaces of recessed tooled joints.
      b. Provide a slight wash on horizontal joints where horizontal and vertical surfaces meet.
      c. Against rough surfaces or in joints of uneven widths avoid the appearance of

excess sealant or compound by locating the compound or sealant well back into joint wherever possible.

H. Installation of Preformed Silicone Sealant System:
1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch (10 mm). Hold edge of sealant bead 1/4 inch (6 mm) inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

I. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

J. Acoustical Sealant Installation: At sound rated assemblies and elsewhere as indicated, 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 C919 and with manufacturer written recommendations.

3.5 FIELD QUALITY CONTROL

A. Field Adhesion Testing:
1. Field test exterior wall joint sealant adhesion to joint substrates:
   a. Extent of testing - test completed and cured sealant joints:
      1) Perform ten (10) tests for the first 1,000 feet (300 m) of joint length for each kind of sealant and joint substrate.
      2) Perform one (1) test for each 1,000 feet (300 m) of joint length thereafter or one (1) test per each floor per elevation.
2. Test method: Test joint sealants according to Method A, Field Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
3. Inspect tested joints and report on the following:
   a. Whether sealants filled joint cavities and are free of voids.
   b. Whether sealant dimensions and configurations comply with specified requirements.
   c. Whether sealants in joints connected to pulled out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer field adhesion hand pull test criteria.
4. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure original sealant surfaces are clean

and new sealant contacts original sealant.

B. Evaluation of Field Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.6 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality: Provide temporary ventilation during work. Coordinate interior application of sealants with interior finishes schedule.

3.7 CLEANING AND PROTECTION

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

B. Protect joint sealants during and after curing from contact with contaminating substances and from damage so sealants are without deterioration or damage at time of Substantial Completion. If, despite protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION - 07 92 00

SECTION 08 11 13 | HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Provide items shown on the Drawings and specified, including, but not limited to the following:
   1. Standard and fire rated steel doors.
   2. Steel frames for doors, sidelites, transoms, and windows.
   3. Louvers and vision lites in steel doors, if shown or required.
   4. Sound rated steel doors.
   5. Thermally rated steel doors.

B. Related Sections:
   1. Section 07 92 00: Joint Sealants.
   2. Section 08 80 00: Glazing.
   3. Section 09 24 00: Cement Plastering.
   4. Section 09 90 00: Painting and Coating.

C. Reference Standards:
   1. ASTM International (ASTM):
      a. A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
      b. A924 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
      c. A1008 Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
      d. A1011 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
      e. C1363 Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
      f. E283 Standard Test Method for Determining the rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
      g. E413 Standard Classification for Rating Sound Insulation.
   2. Hollow Metal Manufacturers Association (HMMA):
      a. HMMA 802 Manufacturing of Hollow Metal Doors and Frames.
      b. HMMA 810 Hollow Metal Doors.
      c. HMMA 830 Hardware Preparation and Locations for Hollow Metal Doors and Frames.
      d. HMMA 840 Installation and Storage of Hollow Metal Doors and Frames.
      e. HMMA 850 Fire Rated Hollow Metal Doors & Frames.
      f. HMMA 890 Technical Summary of Hollow Metal by HMMA.
   3. National Fire Protection Association (NFPA):
      a. 80 Fire Doors and Fire Windows.
      b. 252 Fire Tests of Door Assemblies.
   4. Steel Door Institute – Current Standards: Technical Data Series.
   5. Underwriters Laboratories Inc. (UL):

a. Building Materials Directory.
b. Listing and Labeling.
c. 10B and 10C Fire Tests of Door Assemblies.
d. 1784 Air Leakage Tests of Door Assemblies.

6. Intertek Testing, Services (Warnock Hersey, Inc. (WHI): Listing and Labeling.

1.3 SUBMITTALS

A. Product Data:
1. Manufacturer's standard details and catalog data demonstrating compliance with specifications and referenced standards.
2. Manufacturer's installation instructions.

B. Shop Drawings:
1. Indicate complete schedule in detail for each steel door and frame using the same reference number for details and openings as those on the contract Drawings. If any door is not by the steel door manufacturer, only the door opening number should be shown along with the type of door (wood, plastic laminate faced, etc.):
a. Show details of construction, installation, connections, anchors, hardware reinforcement, hardware preparation, louvers, and floor and threshold clearances.

C. Samples are required from non-Steel Door Institute members:
1. 12-inch by 12-inch sample of a fire-rated and non-rated door, cut from corner of door, showing door construction.
2. 12-inch by 12-inch sample of each type of door louver specified or required, showing louver construction.
3. Six-inch (6”) long sample of a fire-rated, non-rated frame, and each type of glass stop specified or required, showing corner and construction.

D. Certificates: Manufacturer’s certification that oversized openings are in compliance with specifications.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: If other than a manufacturer listed under Paragraph 2.1 is proposed for use on the Project, it shall be a company specializing in the manufacturer of steel doors and frames of the type specified for this Project with a minimum of five (5) years’ experience.

B. All steel doors and frames shall be by a single manufacturer, shop drawings to be submitted with manufacturer’s insignia, which is being supplied.

C. Furnish steel doors and frames to meet current ANSI/Steel Door Standards.

D. ANSI A250.13 Testing and Rating of Sever Windstorm Resistant Components for Swing Door Assemblies.

E. ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

F. Comply with ASTM E283 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

G. Regulatory Requirements:

1. Fire-Rated Assemblies:
   a. Fire-rated door, panel, frame, and fire window construction shall conform to NFPA 252, or UL 10B, as applicable, and acceptable to the code of authorities having jurisdiction.
   b. Fire-rated door construction:
      1) Notwithstanding any other requirements of this Section, provide gauge of metal, method of construction, hardware preparation, reinforcement, and placement, glass opening size, and other specifics required to obtain the specified or required label. The label shall contain the fire resistance rating (20-minute, 45-minute, 1-hour, 1-1/2-hour, 3-hour, etc.) and the designation (A, B, C, D, or E); doors with B Label shall be 1-1/2 hour.
      2) Fire-rated doors used in a stairway enclosure, shall be so constructed so that the maximum transmitted temperature shall not exceed 450 degrees F above ambient temperature at the end of 30 minutes of the Standard Fire Exposure Test and shall be so noted on the label.
   c. Fire-rated openings:
      1) Conform to NFPA 80 for fire-rated class shown or required by code of authorities having jurisdiction:
         a) Units shall be identical to assemblies whose fire resistance characteristics have been determined in accordance with requirements specified above, and shall be labeled and listed by UL, WHI, or other inspection and testing agency acceptable to the code of authorities having jurisdiction.
         b) Fire-rated steel doors, panels, frames, and fire windows shall bear permanent labels attesting to fire resistance. At stairway enclosures, provide units listed for 450 degree F maximum temperature rise rating for 30 minutes of exposure.
         c) Oversized openings shall be constructed in accordance with all applicable requirements for labeled door construction.
         d) Fire rated door assemblies with gaps in excess of 1/8 inch between door and frame will not comply with NFPA 80.
         e) Locate label on hinge side of doors and frames so that when door is closed, label is not visible.
         f) Caution shall be taken to ensure that labels are not removed, damaged, or painted over.
         g) Glass panes shall not exceed sizes allowed whether indicated or not on the Drawings.

H. Wind Loads: Provide hollow metal and door hardware assemblies approved by DSA, including anchorage, capable of withstanding wind load design pressures that are calculated for this Project by a registered Architect or Engineer and is part of the construction documents per CBC.

I. Hurricane-Resistance Test Performance:
   1. Provide hollow metal and door hardware approved assemblies that pass large missile-impact tests, as required by authorities having jurisdiction:
      a. Impact resistance: Hollow metal with approved door hardware assemblies must satisfy Division of the State Architect and CBC for protection from windborne debris. The assemblies must have passed the large missile impact test, which equates to Missile Level D specified in ASTM E1996. The assemblies may be installed at any height on the structure as long as the design pressure rating for the assemblies is not exceeded. These assemblies will and do not need to be protected with an impact protective system when installed in areas where windborne debris protection is required.

J. Accessibility Requirements:

1. Comply with applicable requirements:
   a. Americans with Disability Act of 1990, as amended: 2010 ADA Standards.
   b. CBC 2025 California Building Code. CCR Title 24, Part 2, as adopted and amended by DSA.

K. Pre-Installation Conference: Refer to Section 01 31 00: Project Management and Coordination.

1.5 WARRANTY

A. Warrant the work specified herein for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials and workmanship.

B. Defects shall include, but not be limited to:
1. Use of incorrect materials in opening.
2. Incorrect labeled components installed within opening.
3. Noisy, rough, or difficult operation.
4. Failure to meet specified quality assurance requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in accordance with manufacturer’s instructions, and as follows:
1. In manufacturer's original, clearly labeled, undamaged containers or wrappers.
2. Containers or wrappers shall list the name of the manufacturer and product.

B. Deliver materials to allow for minimum storage time at the Project site. Coordinate delivery with the scheduled time of installation.

C. Protect products from moisture, construction traffic, and damage:
1. Store under cover in a clean, dry place, protected from weather and abuse.
2. Store in a manner that will prevent rust or damage.
3. Store doors in a vertical position, spaced with blocking to permit air circulation.
4. Do not use non-vented plastic or canvas shelters.
5. Should containers or wrappers become wet, remove immediately.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Manufacturers listed below whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must comply with Manufacturer Qualifications, must manufacture equivalent products to those specified, and comply with requirements of Section 01 25 00: Substitution Procedures and Form, regarding substitutions to be considered:
1. CECO Door Products, Brentwood, TN; (615) 661-5030.
2. Curries Company, Mason City, IA; (515) 423-1334.
3. Pioneer Industries, Inc., Kewanee, IL; (309) 856-6000.
4. Republic Builders Products Company, McKenzie, TN; (800) 733-3667.
5. Steelcraft Mfg. Co., Cincinnati, OH; (513) 745-6400.
6. Approved equal.

2.2 MATERIALS, GENERAL

B. Steel requirements, all frames to be manufactured of commercial quality, stretcher leveled

B. flatness, cold rolled steel per ASTM A1008 general requirements. Internal reinforcing may
B. be manufactured of hot rolled pickled and oiled steel per ASTM A1011. Exterior frames and interior frames where shown on Drawings or required in damp, moist, humid, and wet areas, i.e., toilets, locker rooms, showers, etc., to be manufactured of commercial quality, stretcher leveled flatness, cold rolled steel and galvannealed to A-60 minimum coating weight standard per ASTM A653 and A924, with coating weight of not less than 0.60 ounce per square foot (0.30 ounce per square foot per side).

2.3 FRAME FABRICATION

A. Minimum Gauges:
   1. Interior openings:
      a. Less than four feet (4') width: 16 gauge.
      b. Four feet (4') in width and greater: 14 gauge.
   2. Exterior openings: 14 gauge

B. Design and Construction:
   1. Frames shall be custom made, welded units with integral trim of sizes and shapes shown on approved shop drawings. Hinge jambs that butt adjacent 90-degree walls shall have at least four-inch (4") wide frame face to assure the door trim will not strike the wall prior to the door opening at least 90 degrees. Frame profile shall match wall thickness where practical, i.e., 4-3/4-inch at four-inch (4") CMU, 6-3/4-inch at six-inch (6") CMU, and 8-3/4-inch at eight-inch (8") CMU. At masonry wall openings, fabricate frames to suite masonry opening with two-inch (2") head member.
   2. Frames shall be strong and rigid, neat in appearance, square, true, and free of defects, warp, and buckle. Molded members shall be clean cut, straight, and of uniform profile throughout their length.
   3. Jamb depths, trim, profile, and backbends shall be as shown on approved shop drawings.
   4. Corner joints, including face and inside corners, shall have contact edges closed tight, with trim faces mitered and continuously welded, and stops butted. The use of gussets shall not be permitted. Face of frame shall be ground smooth. Knockdown (KD) frames are not permitted.
   5. Minimum depth of stops shall be 5/8 inch, except at fire windows where minimum depth of stops shall be 3/4 inch.
   6. Frames for multiple openings shall have mullion and rail members that are closed tubular shapes having no visible seams or joints. Joints between faces of abutting members shall be securely welded and finished smooth. Mullions shall be key locked removable type. Keys shall be master keyed to Owner's Best system.
   7. High frequency hinge reinforcement: Provide high frequency hinge reinforcements at door openings 48-inch and wider with mortise/butt type hinges only at top hinge location to deter against hinge reinforcement sag.
   8. Continuous hinge reinforcement: Provide welded continuous 12-gage strap for continuous hinges specified in hardware sets in Division 08 Openings.
   9. Provide countersunk flat or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops; provide security head screws at exterior locations.
   10. Provide A60 galvannealed coating at frames in restrooms and locker rooms with showers/Jacuzzi, clean areas such as kitchen rooms.
   11. Electrical knock out boxes:
      a. Factory weld 18-gage electrical knock out boxes to frame for electrical hardware preps; included but not limited to electric thru wire hinges, electrical raceways, door position switches, electric strikes, jamb mount card readers, and magnetic licks as noted in door hardware sets in Division 08 Openings:
         1) Electrical knock out boxes are required at door position switches, electric strikes, card readers, and middle hinge locations.

2) Provide electrical knock out boxes with 3/4-inch knockouts.
3) Conduit to be coordinated and installed in field from middle hinge box and strike box to door position box.
4) Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Openings.
5) Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.
6) Provide field installed conduit per Division 28: Electronic Safety & Security Section for standardized plug connectors to accommodate up to twelve (12) wires as required for electrified door hardware specified in hardware sets in Division 08 Openings. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Wire nut connections are not acceptable.

12. Hardware reinforcements:
    a. Frames shall be mortised, reinforced, drilled, and tapped at factory for fully template mortised hardware in accordance with approved hardware schedule and templates provided by Section 08 71 00: Door Hardware. Where surface-mounted hardware is to be applied, frames shall have reinforcing plates only.
    b. Minimum thickness of hardware reinforcing plates shall be as follows:
        1) Hinge and pivot reinforcements (1-1/4-inch x 10-inch minimum size): Seven (7) gauge.
        2) Strike reinforcements: 12-gauge stiffeners.
        3) Flush bolt reinforcements: 12-gauge.
        4) Closer reinforcements: 12-gauge.
        5) Reinforcements for surface-mounted hardware, hold-open arms, and surface panic devices: 12-gauge.
13. Floor anchors: Minimum 14-gauge, securely welded inside each jamb, with holes for floor anchorage.
14. Jamb anchors:
    a. Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the T-strap type. Anchors shall be not less than 16-gauge steel. The number of anchors provided at each jamb shall be as follows:
        1) Frames up to seven-feet-six-inches (7’-6”) in height: Three (3) anchors.
        2) Frames seven-feet-six-inches (7’-6”) to eight feet (8’) in height: Four (4) anchors.
        3) Frames over eight feet (8’) in height: One (1) anchor for each two feet (2’) or fraction thereof in height.
    b. Frames for installation in wood or metal stud partitions shall be provided with steel anchors of suitable approved design, not less than 16-gauge thickness, securely welded inside each jamb as follows:
        1) Frames up to seven feet six inches (7’-6”) in height: Four (4) anchors.
        2) Frames seven feet six inches (7’-6”) to eight feet (8’) in height: Five (5) anchors.
        3) Frames over eight feet (8’) in height: Four (4) anchors plus one (1) additional for each two feet (2’) or fraction thereof over eight feet (8’).
    c. Frames to be anchored to previously placed concrete, masonry, or structural steel shall be provided with anchors of suitable design as shown on approved shop drawings.
15. Dust cover boxes: Shall be of not less than 26-gauge steel and shall be provided at all mortised hardware items. Eight-inch (8”) CMU walls with face brick shall have dual offset jamb anchors.
16. Steel spreader: Shall be provided on all frames, temporarily attached to bottoms of both jambs for bracing during shipping and handling.
17. Loose glazing stops: Shall be of cold rolled steel, not less than 20 gauge, butted at corner joints and secured to the frame with countersunk cadmium or zinc-plated

screws. Loose stops at exterior frames shall be placed on the interior side of the frames.

18. At sound rated door openings and at masonry openings, coat inside of frame profile with corrosion resistant coating to minimum thickness of 1/16 inch.

C. Frame Color: Field painted under Section 09 90 00: Painting and Coating to match face of door.

2.4 DOOR FABRICATION

A. Minimum Gauges:
   2. Interior doors: 0.047 inch or 18 gauge (16 gauge for high frequency doors).
   4. Exterior doors: 0.059 inch or 16 gauge (14 gauge for windstorm rated doors).

B. Design and Construction:
   3. Types: Doors shall be custom fabricated, of types and sizes shown on approved shop
   3. drawings, and shall be seamless face construction with no visible seams or joints on
   3. vertical edges with fully welded seams free from blemishes and defects. Thickness shall be 1-3/4 inch, unless specifically noted or shown otherwise.
   4. Exterior doors: Provide doors with 22-gage steel z-channels placed at six inches (6”) apart with foamed in place polyurethane core, with a thermal insulation calculated R factor of 11.01 per ASTM C518 Standards.
   5. Fabrication:
      a. Doors shall be strong, rigid, and neat in appearance, free from warpage and buckle.
      b. Corner bends shall be true and straight and of minimum radius for gage of metal used.
      c. Provide stiffeners with polystyrene core spaced maximum six inches (6”) on center and extending full height of door.
      d. Fill interior with noncombustible fiberglass insulation. Use mineral board filler as required for labeled doors.
      e. Faces shall be joined at vertical edges of door by a continuous weld extending full height of door. Welds shall be ground, filled, and dressed smooth to provide a smooth flush surface.
      f. Top and bottom edges of doors shall be closed with a continuous recessed steel channel not less than 16 gauge, extending full width of door and spot weld to both faces. Exterior doors shall have an additional flush closing channel at top and bottom edges. Openings shall be provided in the bottom closure channel at top and bottom edges. Openings shall be provided in the bottom closure of exterior doors to permit the escape of entrapped moisture.
      g. Continuous hinge reinforcement: Provide welded continuous 12-gage strap for continuous hinges specified in hardware sets in Division 08: Openings.
      h. Electrical raceways: Provide raceways for standardized plug connectors to accommodate up to 12 wires as required for electrified door hardware specified in hardware sets in Division 08: Openings. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Wire nut connections are not acceptable.
      i. Doors in wet or humid areas shall have a top cap and solid foam interior core to prevent internal moisture accumulation and galvannealed.
      j. Edge profile shall be provided on both vertical edges of door as follows:
         1) Single-acting swing doors: Beveled 1/8 inch in two inches (2”).
      k. Hardware reinforcements:
         1) Doors shall be mortised, reinforced, drilled, and tapped at factory for fully template hardware, in accordance with the approved hardware schedule and templates provided by Section 08 71 00: Door Hardware. Where surface-mounted hardware is to be applied, doors shall have reinforcing plates only.

2) Minimum gauges for hardware reinforcing plates shall be as follows:
   a) Hinge and pivot reinforcements: Seven (7) gauge.
   b) Reinforcements for lock face, flush bolts, concealed holders, concealed or surface-mounted closers: 12 gauge.

6. Glass moldings and stops: Loose stops shall be not less than 20-gauge steel, with butt corner joints, secured to frame opening by countersunk screws. Snap-on attachments will not be acceptable.
7. Louvers: Shall be inverted "V" blade, sight-proof type, unless noted otherwise.
8. Edge clearances:
   a. Between door and frame at head and jambs: 1/8 inch.
   b. At doorsills with no threshold: 5/8-inch to 3/4-inch above finished floor.
   c. At doorsills with threshold: As required to suit threshold.
   d. Between meeting edges of double doors: 1/8 inch.

C. Finish:
1. Shop paint steel (whether galvanized or ungalvanized) stops and accessories as follows:
   a. Clean surfaces free of mill scale, rust, oil, grease, dirt, and other foreign matter.
   b. Chemically treat surfaces and apply one (1) coat of an approved baked-on rust-inhibitive primer paint to provide a minimum 0.5 mil dry film thickness.
2. Field painted under Section 09 90 00: Painting and Coating.

D. Sound Rated Door: STC of 32, measured in accordance with ASTM E413.

E. Thermal Insulated Door: Total insulation R-Value of 44 measured in accordance with ASTM C1363, unless otherwise noted on Drawings.

2.5 LABELED DOORS AND FRAMES

A. Labeled doors and frames shall be provided for openings requiring fire protection ratings as scheduled and to comply with NFPA 80. Such doors and frames shall be constructed as tested and approved by UL, WHI, or other nationally recognized testing agency having a factory inspection service and approved by code authorities having jurisdiction and shall bear the appropriate permanent label.

B. If any door or frame scheduled to be fire-rated cannot qualify for appropriate labeling because of its size, design, hardware, or other reason, the Architect shall be so advised before fabrication work on that item is started. Indicate and highlight on shop drawing.

PART 3 EXECUTION

3.1 COORDINATION

A. Coordinate the work of this Section.

B. Coordinate hardware installation with opening construction. Finish hardware is specified in Section 08 71 00: Door Hardware.

C. Coordinate doors, frames, and windows with glazing specified in Section 08 80 00: Glazing.

D. Coordinate doors and frames with painting specified in Section 09 90 00: Painting and Coating.

3.2 INSTALLATION

A. Separate dissimilar metals. Protect against galvanic action.

B. Frames:
   1. Anchorage and connections: Secure to adjacent construction. Where practical, interior door frames shall be flush with the pull side wall to minimize or eliminate the reveal and allow full 180-degree door swing.
   2. Install frames in accordance with manufacturer’s instructions and install labeled frames in accordance with NFPA 80.
   3. Frame spreader bars: Leave intact until frames are set perfectly square and plumb and anchors are securely attached.
   4. Remove hardware, with the exception of prime-coated items, tag box, and reinstall after finish paint work is completed. Do not remove or paint over labels on labeled frames.

C. Doors:
   1. Install hardware in accordance with hardware manufacturer's templates and instructions.
   2. Install doors in accordance with manufacturer’s instructions and install labeled doors in accordance with NFPA 80.
   3. Adjust operable parts for correct function.
   4. Remove hardware, with the exception of prime-coated items, tag, box, and reinstall after finish paint Work is completed. Do not remove or paint over labels on labeled doors.

3.3 ADJUST AND CLEAN

A. Adjust doors for proper operation, free from binding or other defects.

B. Clean and restore soiled surfaces.

C. Remove scraps and debris, and leave site in clean condition.

END OF SECTION - 08 11 13

SECTION 08 31 13 CEILING ACCESS PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes access doors in gypsum board, masonry partitions, and plaster/stucco soffits, where shown or required.

B. Related Sections:
1. Section 05 50 00: Metal Fabrications.
2. Section 06 10 00: Rough Carpentry.
3. Section 06 83 16: Fiberglass Reinforced Paneling.
4. Section 07 42 13: Metal Composite Material Wall Panels.
5. Section 08 11 13: Hollow Metal Doors and Frames.
6. Section 09 21 16: Gypsum Board Assemblies.
7. Section 09 30 00: Tiling.
8. Section 09 51 00: Acoustical Ceiling Panels.

1.3 SUBMITTALS

A. Product Data:
1. Manufacturer’s literature, including schedules, charts, installation instructions, and illustrations to indicate the performance, fabrication, procedures, product variations, and accessories.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years’ experience manufacturing access doors meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions in order to be considered:
1. The Bilco Company, New Haven, CT.
2. Babcock-Davis, San Lorenzo, CA.
3. Approved equal.

2.2 PRODUCTS

A. Ceiling Access Door:
1. Listing: Not required.
2. Size: 20” x 30”
3. Hinges: Heavy-duty Type 316 stainless steel butt hinge.
4. Finish: 20-gauge galvanized finish with gray primer on exterior frame; field painting per Section 09 90 00: Painting and Coating.
5. Frames: Extruded aluminum. Anchor to wood floor.
6. Doors: Single leaf.
7. Lock: Knurled knob/key operated latch bolt.

8. Hold open door.

PART 3 EXECUTION

3.1 INSTALLATION

A. Locate and provide access doors in walls (and floors) to construct the wall as indicated on Drawings and provide access doors and panels to fit the wall condition. Maintain designated wall types as indicated on Drawings.

3.2 LOCATIONS

A. Provide where required by code and where needed to service and maintain equipment.

B. If not shown on the Drawings, consult the Architect before locating in finished spaces.

END OF SECTION 08 31 13

SECTION 08 51 33 ALUMINUM SERVING WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes aluminum serving windows for various locations.

1.2 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.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.4 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

2.1 MANUFACTURERS

A. Retain "Manufacturers" Paragraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

B. Retain "Basis-of-Design Product" Paragraph and list of manufacturers below to identify a specific product or a comparable product from manufacturers listed. Retain option and delete insert note if manufacturer's name and model number are indicated on Drawings.

C. Basis-of-Design Product: Subject to compliance with requirements, provide Nissen sliding serving windows or comparable product by one of the following:

1. QuikServ 3030

2.2 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 Lobby to Addendance/Finance: 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. Interlayer Color: Clear unless otherwise indicated.

D. Glass at Attendance/Finance to 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. IInnerlayer Color: Clear unless otherwise indicated.

E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

F. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

G. 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.

2.3 ACCESSORIES

A. Key Locks

B. 410 Speak Hole

C. Operable door handle to be 48” max from interior finish floor to center of device, field verify.

2.4 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.

2.5 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.

2.6 ALUMINUM FINISHES

A. Anodic Finish: Class I complying with AAMA 611.

1. Color: As selected by Architect.

PART 3 - EXECUTION

3.1 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 – 08 51 33

SECTION 08 71 00 | DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. Related Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.
   1. Division 08: Section - Hollow Metal Doors and Frames.
   2. Division 08: Section - Flush Wood Doors.
   3. Division 08: Section - Aluminum-Framed Storefronts.

1.3 REFERENCES

A. 2025 California Building Code, CCR Title 24, Part 2

B. BHMA - Builders' Hardware Manufacturers Association

C. DHI - Door and Hardware Institute

D. NFPA - National Fire Protection Association.
   1. NFPA 80 - Fire Doors and Other Opening Protectives
   2. NFPA 105 - Smoke and Draft Control Door Assemblies

E. UL - Underwriters Laboratories.
   1. UL 10C - Fire Tests of Door Assemblies
   2. UL 305 - Panic Hardware

F. WHI - Warnock Hersey Incorporated

G. SDI - Steel Door Institute

1.4 SUBMITTALS & SUBSTITUTIONS

A. General: Submit in accordance with Conditions of the Contract and Division 01 Specification sections.

B. Submit product data (catalog cuts) including manufacturers' technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

C. Submit electronic PDF copies of schedule organized vertically into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:

1. Include a Cover Sheet with:
   a. Job Name, location, telephone number.
   b. Architects name, location and telephone number.
   c. Contractors name, location, telephone number and job number.
   d. Suppliers name, location, telephone number and job number.
   e. Hardware consultant's name, location and telephone number.
2. Job Index information included:
   a. Numerical door number index including; door number, hardware heading number and page number.
   b. Complete keying information (referred to DHI hand-book "Keying Systems and Nomenclature"). Provision should be made in the schedule to provide keying information when available; if it is not available at the time the preliminary schedule is submitted.
   c. Manufacturers' names and abbreviations for all materials.
   d. Explanation of abbreviations, symbols, and codes used in the schedule.
   e. Mounting locations for hardware.
   f. Clarification statements or questions.
   g. Catalog cuts and manufacturer’s technical data and instructions.
3. Vertical schedule format sample:

Heading Number 1 (Hardware group or set number - HW Group #1)				
(a) 1 Single - Door #101 - Corridor 101 to Exterior			(b) 90°	(c) RH
(d) 3'-0" x 7'-0" x 1-3/4" - Wood Door x Hollow Metal Frame - 20 Minute				
(e) 1.	(f) 3 ea	(g) Hinges - (h) 5BB1 4.5 x 4.5 NRP (i) 1/2 TMS	(j) 630	(k) IVE
2.	1 ea	Lockset - ND80P6D x RHO x RH x 10-025 x JTMS	626	SCH
3.	1 ea	Closer - 4040XP x EDA x TBSRT	689	LCN

(a) Single or pair of doors with opening number and location.
(b) Degree of opening.
(c) Hand of door(s).
(d) Door/frame dimensions and material; Label requirements, if any.
(e) Hardware item line # (Optional).
(f) Quantity.
(g) Product description.
(h) Product part number.
(i) Fastenings and other pertinent information.
(j) Hardware finish codes per ANSI/BHMA A156.18.
(k) Manufacturer abbreviation.

D. Make substitution requests in accordance with Division 01. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution.

E. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

F. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

G. Furnish as-built/as-installed schedule with close-out documents, including keying schedule and transcript, wiring/riser diagrams, manufacturers' installation and adjustment and maintenance information.

H. Fire Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Authority Having Jurisdiction (AHJ) for future building inspections.

I. LEED Certification Points: Submit information and certifications necessary to achieve maximum points for LEED certification; coordinate and cooperate with Owner and Architect in providing information necessary for required LEED rating.

1.5 QUALITY ASSURANCE

A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
   1. Responsible for detailing, scheduling and ordering of finish hardware.
   2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing.
   3. Stock parts for products supplied and are capable of repairing and replacing hardware items found defective within warranty periods.

C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.

D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.
   1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".

E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

F. Product packaging to be labelled in compliance with CA Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986.

1.6 DELIVERY, STORAGE AND HANDLING

A. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.

B. Hardware items shall be individually packaged in manufacturers' original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.

C. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.

D. Contractor to inventory door hardware jointly with representatives of hardware supplier and hardware installer until each all are satisfied that count is correct.

1.7 WARRANTY

A. Provide warranties of respective manufacturers' regular terms of sale from day of final acceptance as follows:
   1. Locksets: Ten (10) years.
   2. Exit devices: Three (3) years.
   3. Closers: Thirty (30) years.
   4. All other hardware: Two (2) years.

1.8 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.9 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference at least one week prior to beginning work of this section.

B. Attendance: Architect, Construction Manager, Contractor, Security Contractor, Hardware Supplier, Installer, Key Owner's Personnel, and Project Inspector.

C. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review Owner's keying standards.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Item	Manufacturer	Acceptable Substitutes
Hinges	Ives	Hager, Stanley, McKinney
Locks, Latches & Cylinders	Schlage	None – District Standard
Exit Devices	Von Duprin	None – District Standard
Closers	LCN	None – District Standard
Push, Pulls & Protection Plates	Ives	Trimco, BBW, DCI
Flush Bolts	Ives	Trimco, BBW, DCI
Coordinators	Ives	Trimco, BBW, DCI
Door Stops	Ives	Trimco, BBW, DCI
Overhead Stops	Glynn-Johnson	Or Approved Equal
Thresholds	Zero	Pemko, National Guard
Seals & Bottoms	Zero	Pemko, National Guard

2.2 MATERIALS

A. Hinges:
   1. Provide hinges conforming to ANSI/BHMA A156.1.
   2. Hinges shall be sized in accordance with the following:
      a. Height:
         1) Doors up to 42" wide: 4-1/2 inches.
         2) Doors 43" to 48" wide: 5 inches.
      b. Width: Sufficient to clear frame and trim when door swings 180 degrees.

c. Number of Hinges: Provide 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.

3. Exterior out-swinging hinges shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins.
4. Furnish non-removable pins (NRP) at all exterior out-swing doors and interior key lock doors with reverse bevels.

B. Continuous Hinges:
1. Provide aluminum geared continuous hinges fabricated from 6063-T6 aluminum conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
3. Provide continuous hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
4. Provide continuous hinges 1” shorter in length than nominal height of door, unless otherwise noted, with symmetrical hole pattern.
5. Install continuous hinges with fasteners supplied by manufacturer.

C. Heavy Duty Cylindrical Locks and Latches: Schlage "ND" Series as scheduled with "Rhodes" lever design.
1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3 hour fire doors.
2. Provide cylindrical locksets exceeding the ANSI/BHMA A156.2 Grade 1 performance standards for strength, security, and durability in the categories below:
a. Abusive locked lever torque – minimum 3,100 inch-pounds without gaining access.
b. Offset lever pull – minimum 1,600 foot pounds without gaining access.
c. Vertical lever impact – minimum 100 impacts without gaining access.
d. Cycle Test – tested to minimum 16 million cycles with no visible lever sag; without the use of performance aids such as set screws or spacers.
3. Cylinders: Refer to “KEYING” article, herein.
4. Provide locks with standard 2-3/4” backset, unless noted otherwise, with 1/2” latch throw. Provide proper latch throw for UL listing at pairs.
5. Provide locksets with separate solid steel anti-rotation thru-bolts, and no exposed screws.
6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
9. Provide levers with vandal resistant technology as scheduled for use at abusive applications.

D. Exit devices: Von Duprin as scheduled.
1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 standards.
3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Provide exit devices cut to door width and height. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
6. Provide flush end caps for exit devices.
7. Exit devices shall comply with CBC Section 11B-404.2.7 and shall be mounted between 34" and 44" above the finished floor surface.
8. Provide exit devices UL certified to meet 5 lbs. maximum unlatching force requirements according to the CBC Section 11B-309.4.

9. Cylinders: Refer to “KEYING” article, herein.
10. Provide cylinder dogging as specified at non fire-rated openings. Provide cylinder dogging indicators (CDSI) for visible indication of dogging status as specified.
11. Removable Mullions: Provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
13. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
14. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
15. Provide exit devices with manufacturer’s approved strikes.
16. Panic hardware shall not be provided with “Night Latch” (NL) function for any accessible doors or gates unless the following conditions are met per DSA Interpretation 10-08 DSA/AC. Such conditions must be clearly demonstrated and indicated in the specification:
    a. Panic hardware contains a “dogging” feature and during the time the facility is open the panic hardware shall be “dogged”.
    b. The act of “dogging” a door in the open position shall only be performed by employees as a part of their job function (non-public use).

E. Closers: LCN as scheduled.
1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Provide certificate by independent testing laboratory that door closers have completed over 10,000,000 cycles and can still meet ANSI/BHMA A156.4 standards.
4. Cylinder Body: 1-1/2” diameter with 3/4” diameter double heat-treated pinion journal.
5. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120° F to -30° F.
6. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
7. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
8. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
9. Pressure Relief Valve (PRV) Technology: Not permitted.
10. Provide door closers powder coated to match balance of door hardware. Powder coating finish shall be certified to exceed 100 hours salt spray testing as described in ANSI/BHMA A156.4 and ASTM B117.
11. Provide special rust inhibitor (SRI) in highly corrosive areas, and where noted in hardware sets.
12. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

F. Flush Bolts & Dust Proof Strikes:
1. Automatic flush bolts shall be of the low operating force design.
2. Provide top bolt only model for interior doors where applicable and as permitted by testing procedures.
3. Provide dust proof strikes at openings using bottom bolts.
4. Manual flush bolts shall only be permitted on storage or mechanical openings, as scheduled.

G. Door Stops:
   1. Unless otherwise noted in hardware sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
   2. Do not install floor stops more than four (4) inches from the face of the wall or partition (CBC Section 11B-307).
   3. Provide backing plate at wall framing behind wall type.
   4. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions. Stop-only function shall be provided at fire-rated openings.

H. Protection Plates:
   1. Provide kick, mop, and/or armor plates minimum of 0.050” thick, with four beveled edges. Furnish with sheet metal or wood screws, finished to match plates.
   2. Kick plates shall be sized 10" high and 2" less door width (LDW) at single doors and 10” high and 1” LDW at pairs or doors.
   3. Provide mop and armor plates with sizes as scheduled in hardware sets.

I. Thresholds: As scheduled and per details.
   1. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope. Thresholds shall comply with CBC Section 11B-404.2.5.
   2. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 07 “Thermal and Moisture Protection”.
   3. Use 1/4” fasteners, red-head flat-head sleeve anchors (SS/FHSL).

J. Seals: Provide silicone gasket at all rated and exterior doors.
   1. Smoke & Draft Control Doors: Provide UL10C Classified gasketing that complies with NFPA 80 & NFPA 252 for use on “S” labeled Positive Pressure door assemblies.

K. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

2.3 KEYING

A. Furnish a Proprietary Schlage masterkey system as directed by Parlier Unified School District lock shop. Key system to be designated and combinated by the Schlage Master Key Department even if pinned by the Authorized Key Center, Authorized Security Center or a local authorized commercial dealer.

B. A detailed keying schedule is to be prepared by the District lock shop in consultation with a representative of Allegion or an Authorized Key Center or Authorized Security Center. Each keyed cylinder on every keyed lock is to be listed separately showing the door #, key group (in BHMA terminology), cylinder type, finish and location on the door.

C. Furnish all cylinders in the Schlage Primus Full Size Interchangeable Core (FSIC) format. Pack change keys independently (PKI). Confirm keyway with Parlier Unified School District lock shop.

D. Furnish construction keying for doors requiring locking during construction.

E. Furnish all keys with visual key control.
   1. Stamp key “Do Not Duplicate”.
   2. Stamp (BHMA) key symbol on key.
   3. Stamp unique owner identifier from the key bow.

F. Furnish all cylinders with visual key control.

1. Stamp (BHMA) key symbol on side of cylinder (CKC).

G. Furnish mechanical keys as follows:
1. Furnish 2 cut change keys for each different change key code.
2. Furnish 1 uncut key blank for each change key code.
3. Furnish 6 cut masterkeys for each different masterkey set.
4. Furnish 3 uncut key blanks for each masterkey set.
5. Furnish 2 cut control keys cut to the top masterkey for permanent I/C cylinders.
6. Furnish 1 cut control key cut to each SKD combination.

H. Furnish Schlage Padlocks and the cylinders to tie them into the masterkey system for gates, storage boxes, utility valve security, roof hatches and roll-up doors keyed as directed in the keying schedule.
1. Furnish KS43F3200 padlock for use with FSIC Schlage cylinders. Furnish 20-740 Primus core with above.

I. Furnish one Schlage cabinet lock for each cabinet door or drawer so designated on the drawings or keying schedule to match the masterkey system.
1. Furnish CL777R for use with FSIC Schlage cylinders.

2.4 FINISHES

A. Generally to be satin chrome US26D (626 on bronze and 652 on steel) unless otherwise noted.

B. Furnish push plates, pull plates and kick or armor plates in satin stainless steel US32D (630) unless otherwise noted.

C. Door closers shall be powder-coated to match other hardware, unless otherwise noted.

D. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

2.5 FASTENERS

A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.

B. Screws for butt hinges shall be flathead, countersunk, full-thread type.

C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.

D. Provide expansion anchors for attaching hardware items to concrete or masonry.

E. All exposed fasteners shall have a phillips head.

F. Finish of exposed screws to match surface finish of hardware or other adjacent work.

G. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and requirements of DHI.

B. Use the templates provided by hardware item manufacturer.

C. Mounting heights for hardware shall be as recommended by DHI. Operating hardware shall be located between 34" and 44" above finish floor to comply with CBC Section 11B-404.2.7.

D. Door Closers:
1. Place door closers inside building, stairs, rooms, etc. Closers shall be installed to permit doors to swing 180 degrees or maximum allowable by conditions.
2. Maximum effort to operate closers shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors.
3. When fire doors are required, the maximum effort to operate the closer may be increased but shall not exceed 15 lbs. when specifically approved by fire marshal.
4. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.
5. Compensating devices or automatic door operators may be utilized to meet the above standards.
6. Per CBC Section 11B-404.2.8.1, doors shall take minimum of 5 seconds to move from an open position of 90 degrees to 12 degrees to the latch jamb.

E. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

G. Set thresholds for exterior doors in full bed of butyl-rubber sealant.

H. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.

3.3 ADJUST AND CLEAN

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Clean adjacent surface soiled by hardware installation.

C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy, return to that work area and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper

function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.

E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.4 HARDWARE LOCATIONS

A. Conform to CCR, Title 24, Part 2; and ADAAG; and the drawings for access-compliant positioning requirements for the disabled.

3.5 FIELD QUALITY CONTROL

A. Contractor is responsible for providing the services of an Architectural Hardware Consultant (AHC) or a proprietary product technician to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturers' instructions and as specified herein.

3.6 HARDWARE SCHEDULE

A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.

B. While the hardware schedule is intended to cover all doors, and other movable parts of the building, and establish type and standard of quality, the contractor is responsible for examining the Plans and Specifications and furnishing proper hardware for all openings whether listed or not. If there are any omissions in hardware groups in regard to regular doors they shall be called to the attention of the Architect prior to bid opening for instruction; otherwise, list will be considered Complete. No extras will be allowed for omissions.

C. The Door Schedule on the Drawings indicates which hardware set is used with each door.

MANUFACTURERS ABBREVIATIONS

IVE	=	Ives	Hinges, Door Stops, Kick Plates & Silencers
LCN	=	LCN	Door Closers
SCH	=	Schlage Lock	Locks, Latches & Cylinders
VON	=	Von Duprin	Exit Devices
ZER	=	Zero International	Thresholds, Gasketing & Weather-stripping

HW GROUP NO. 01

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224XY	628	IVE
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-NL	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	26-091 ICX XQ11-948	626	SCH
2	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR STOP	PER DETAIL		
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

HW GROUP NO. 02

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	CLASSROOM SECURITY	ND75JD RHO XN12-035	626	SCH
2	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR STOP	PER DETAIL		
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER
1	EA	ANCHOR PLATE	PER DETAIL		

HW GROUP NO. 03

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224XY	628	IVE
1	EA	CLASSROOM LOCK	ND70JD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4040XP TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR STOP	PER DETAIL		
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER
1	EA	ANCHOR PLATE	PER DETAIL		

HW GROUP NO. 04

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96JD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA TBSRT	689	LCN
1	EA	DOOR STOP	PER DETAIL		
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER
1	EA	ANCHOR PLATE	PER DETAIL		

HW GROUP NO. 05

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70JD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	DOOR STOP	PER DETAIL		
1	EA	GASKETING	188SBK PSA	BK	ZER

HW GROUP NO. 06

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	CONST LATCHING BOLT	FB51T	630	IVE
1	EA	ADA STOREROOM LOCK	ND81JD RHO	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
2	EA	OH STOP & HOLDER	90H	689	GLY
2	EA	SILENCER	SR64	GRY	IVE

END OF SECTION - 08 71 00

SECTION 08 80 00 | GLAZING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
1. Float glass.
2. Tempered glass.
3. Reflective glass.
4. Spandrel coated glass.
5. Insulated glass.
6. Laminate glass.
7. Fire resistive glazing.
8. Spandrel glazing.
9. Glazing sealants.
10. Glass film overlay.
11. Insulated metal panel.
12. Accessories necessary for a complete installation.

1.3 DEFINITIONS

A. Glass Thickness: Indicated by thickness designations in millimeters according to ASTM C1036.

B. Interspace: Space between lites of an insulating glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glass panels including comprehensive engineering analysis by a qualified professional engineer lawfully licensed in the State of California, using performance requirements and design criteria indicated.

B. Installed Glazing: Design glazing systems to withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

C. Structural Performance:
1. Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the CBC and ASTM E1300:
   a. Design Wind Pressures: Indicated on Structural Drawings.
   b. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE 7, based on heights above grade indicated on Drawings:
      1) Wind Design Data: As indicated on Drawings.
      2) Basic Wind Speed: 115 mph.
      3) Importance Factor: 1.0.
2. Exposure Category: D.

3. Design Snow Loads: Indicated on Drawings.
4. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
5. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
6. Maximum Lateral Deflection: For glass supported on all four edges, limit center of glass deflection at design wind pressure to not more than 1/50 times the short side length or 1 inch (25 mm), whichever is less.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

E. Thermal and Optical Performance Properties:
1. Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
   a. For monolithic glass lites, properties are based on units with lites 6 mm thick.
   b. For laminated glass lites, properties are based on products of construction indicated.
   c. For insulating glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   d. U-Factors: Center of glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
   e. Solar Heat Gain Coefficient and Visible Transmittance: Center of glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
   f. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

1.5 SUBMITTALS

A. Product Data: Technical data for each type of product including recommended installation and cleaning procedures.

B. Glass Samples: For each type of glass required. Prepare samples from same material to be used for Work.

C. Glazing Schedule: List glass types and thickness for each size opening and location. Use same designations indicated on Drawings.

D. Delegated Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Product Certificates:
1. Submit glass product certificates required by Code:
   a. Glass Manufacturer Certificate: The glass manufacturer shall submit a letter certifying it has reviewed the glazing details proposed for the project, including the use of gaskets and sealants, and that each product furnished is recommended for the application shown and compliance with the Code.

F. Thermal Stress and Wind Load Analyses:
1. Submit the following from the glass manufacturer:
   a. Thermal stress analysis for each exterior glass unit type, each building elevation. The analysis shall clearly indicate the expected service temperature ranges and the effects of partial and full shading on the glass:
      1) Attach to the thermal stress analysis a statement from the glass

manufacturer that based upon this analysis that the resulting thermal stresses will not reduce the specified statistical probability of breakage.

2. Wind load analysis for each glass unit type, each building elevation. The analysis shall indicate the statistical probability of breakage at the design wind pressure does not exceed the specified statistical probability of breakage.

G. Product Test Reports:
   1. Submit test reports for insulating glass and glazing sealants, for tests performed by a qualified testing agency:
      a. Glazing Sealants: Provide test reports based on testing current sealant formulations within previous 36 month period.
      b. Glazing Sealants: Preconstruction adhesion and compatibility test report.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Comply with applicable requirements of the CBC for glazing.
   2. Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies:
      a. As a minimum provide Category II materials complying with testing requirements in 16 CFR 1201 (Consumer Product Safety Commission *Safety Standard for Architectural Glazing Materials*, published in the Code of Federal Regulations) and ANSI Z97.1.
      b. Permanently mark safety glass with certification label of Safety Glazing Certification Council.
   3. Insulating Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
   4. Comply with published recommendations of glass product organizations:
      a. GANA: Glazing Manual.
      b. IGMA: SIGMA TM-3000 Vertical Glazing Guidelines.
      c. GANA: Laminated Glazing Reference Manual.
      d. AAMA: AAMA GDSG-1 Glass Design for Sloped Glazing.
      e. AAMA: TIR A7 Sloped Glazing Guidelines.
      f. IGMA for Sloped Glazing: IGMA TB-3001 Guidelines for Sloped Glazing.
      g. IGMA for Insulating Glass: SIGMA TM-3000 North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use.
   5. Fire Rated Door Assemblies: Assemblies complying with NFPA 80 listed and labeled by UL for fire ratings indicated, based on testing according to NFPA 252.
   6. Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated:
      a. Minimum Glass Thickness for Exterior Lites: 1/4 inch (6 mm).
      b. Thickness of Tinted Glass: Provide same thickness for each tint color indicated.
   7. Where annealed float glass is indicated, provide annealed float glass, heat strengthened float glass, or fully tempered float glass necessary to comply with performance requirements:
      a. Where heat strengthened float glass is indicated, provide heat strengthened float glass or fully tempered float glass necessary to comply with performance requirements.
      b. Where fully tempered float glass is indicated, provide fully tempered float glass.

B. Manufacturer Qualifications for Insulating Glass Units with Sputter Coated, Low E Coatings: Insulating glass manufacturer who is approved and certified by coated glass manufacturer.

C. Installer Qualifications, Glazer: Experience entity having minimum 5 years documented

experience and who employs glass installers certified under the National Glass Association's Certified Glass Installer Program.

D. Installer Qualifications, Decorative Film: Experience entity having minimum 5 years documented experience in the installation of glass films.

E. Source Limitations for Glass and Glass Accessories: Obtain each type of glass and glass accessories from a single source.

F. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

G. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

H. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

I. Install glazing in mockups specified to match glazing systems required for Project, including glazing methods:
   1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

J. Preconstruction Adhesion and Compatibility Testing:
   1. Test each glass product, tape sealant, gasket, glazing accessory, and glass framing member for adhesion to and compatibility with elastomeric glazing sealants:
      a. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
      b. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
      c. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
      d. Schedule enough time for testing and analyzing results to prevent delaying the Work.
      e. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

K. Pre-installation Conference: Conduct conference at site.

1.7 WARRANTY

A. Written warrant, executed by glass manufacturer agreeing to repair or replace **glass** units that fail in materials and workmanship or deteriorate within warranty period. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to decorative glass manufacturer's published instructions:
   1. Warranty Period: Five (5) years from date of Substantial Completion.

B. Written warranty signed by manufacturer in which glass manufacturer agrees to replace **coated glass** units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating:

1. Warranty Period: Ten (10) years from date of Substantial Completion.

C. Written warranty signed by manufacturer in which manufacturer agrees to replace **laminated glass** units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard:
   1. Warranty Period: Ten (10) years from date of Substantial Completion.

D. Written warranty signed by manufacturer in which manufacturer agrees to replace **insulating glass** units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass:
   1. Warranty Period: Ten (10) years from date of Substantial Completion.

E. Written warranty signed by **glass film** manufacturer and installer in which manufacturer and installer agree to replace glass film that crack, peel, delaminate, discolor, change appearance, or failure to meet solar criteria within specified warranty period:
   1. Warranty Period: Five (5) years from date of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by manufacturer.

D. Exercise exceptional care to prevent edge damage to glass, and damage/deterioration to coating on glass.

E. Comply with insulating glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   1. Glass:
      a. Vitro Architectural Glass (Basis of Design).
      b. AGC Glass Company North America, Inc.
      c. Cardinal Glass Industries.
      d. Guardian Industries Corp.;
      e. Pilkington North America.
      f. Viracon.

2. Fire Protection Rated Glazing:
   a. AGC Glass Company North America, Inc.
   b. Pilkington North America.
   c. SAFTI FIRST Fire Rated Glazing Solutions.
   d. Schott North America, Inc.
   e. Technical Glass Products.
3. Glass Film:
   a. 3M Construction Markets Division. http://www.3m.com
   b. Bekaert Specialty Films. http://www.solargard.com
   c. Madico.http://www.madico.com

B. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

C. Ultraclear Float Glass: ASTM C1036, Type I, Class I (clear), Quality-Q3.

D. Tinted Annealed Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.

E. Fully Tempered Float Glass:
1. ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3:
   a. Fabrication Process: By horizontal (roller hearth) process with roll wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

F. Heat Strengthened Float Glass:
1. ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3:
   a. Fabrication Process: By horizontal (roller hearth) process with roll wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

G. Pyrolytic Coated, Low Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.

H. Ceramic Coated Vision Glass: ASTM C1048, Condition C, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in GANA *Engineering Standards Manual*.

I. Adhered Backing:
1. Adhered scrim backing to ceramic coated surface; provide backed units identical to materials which, while possibly developing cracks and fissures, show no shear nor develop any openings large enough for the unobstructed penetration of 3 inch diameter sphere when tested by approved independent testing laboratory:
   a. Mount test specimens consisting of 3 glass assemblies, 34" x 76" (plus zero or minus 3/16 inch), for testing as specified in ANSI Z-97.1.
   b. Expose specimens to 100 cycles of the following conditions:
      1) 1 hour at 0 degrees F, ambient humidity.
      2) 3 hours increase from 0 degrees F to 140 degrees F, 95 to 100 percent relative humidity.
      3) 1 hour at 140 degrees F, 95 to 100 percent relative humidity.
      4) 3 hours decrease from 140 degrees F to 0 degrees F, ambient humidity.
   c. Break glass by springloaded prick punch at midpoint of either vertical edge.
   d. After breaking glass, subject it to pressure of 4 lbf per sq. ft. for 5 minutes to simulate wind load.
   e. Inorganic Opacifier: Provide polyethylene opacifier where no insulation and other backing material is applied directly to spandrel glass. Use polyester where direct attachment does occur.

f. Fallout Resistance: Provide spandrel units identical to those passing fallout resistance test for spandrel glass specified in ASTM C1048.

J. Silicone Coated Spandrel Glass: ASTM C1048, Type I, Condition C, Quality-Q3.

K. Reflective Coated Spandrel Glass: ASTM C1376, Kind CS.

L. Glass Film Overlay: Translucent, dimensionally stable, cast PVC film, 2 mil (0.05 mm) minimum thickness, with pressure sensitive, clear adhesive back for adhering to glass and releasable protective backing.

2.2 LAMINATED GLASS

A. ASTM C1172. 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 cast in place and cured transparent resin interlayer to comply with interlayer manufacturer's written instructions.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Thickness: 0.090 inch (2.29 mm).
4. Interlayer Color: Clear unless otherwise indicated.

B. Windborne Debris Impact Resistant Laminated Glass: Comply with requirements for laminated glass except laminate glass with ionomeric polymer interlayer to comply with interlayer manufacturer's written instructions:

2.3 INSULATING GLASS

A. Factory assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190.

B. Performance Properties:
1. Basis of Design Product: Vitro Architectural Glass: Tint Color **Solargray**
2. Overall Unit Thickness: 1 inch (25 mm).
3. Minimum Thickness of Each Glass Lite: 1/4 inch (6 mm).
4. Outdoor Lite: Fully tempered float glass.
5. Interspace Content: Air.
6. Indoor Lite: Fully tempered float glass.
7. Safety glazing required.

C. Sealing System:
1. Dual seal, with polyisobutylene and silicone primary and secondary sealants:
a. Spacer: Aluminum with black, color anodic finish. Thermally broken aluminum.
b. Manufacturers: Subject to compliance with requirements, provide products by Technoform Glass Insulation NA, Inc.
c. Desiccant: Molecular sieve or silica gel, or a blend of both.

D. Fire Protection Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire protection ratings indicated, based on positive pressure testing according to NFPA 257 or UL 9, including the hose stream test, and complying with NFPA 80. For ratings 60 minutes or greater, glazing shall meet the test requirements of ASTM E119 or UL 263.

E. Fire Protection Rated Glazing Labeling: Permanently mark fire protection rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction indicating

manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 degrees F (250 degrees C) temperature rise limitation; and the fire resistance rating in minutes.

F. Film Faced Ceramic Glazing: Clear, ceramic flat glass; 5 mm thickness; faced on one surface with a clear glazing film; and complying with 16 CFR 1201, Category II.

2.4 GLASS FILM

A. Performance Requirements:
   1. Scratch resistant coating that, after fully cured, facilitates cleaning without damaging or scratching film.
   2. Optical Distortion: When viewed from a distance of 10 feet at angles up to 45 degrees from either side of the glass, there is no discernable distortion.
   3. Edges: Seal edges except when the film is applied with a lacquer that prevents moisture or free water from penetrating between the film and the glass.

B. Provide coating with uniform finish, without noticeable pin holes, streaks, thin spots, scratches, or banding:
   1. Light Transmission:
      a. Maximum Variation across Width and Length: Not to exceed 1 percent.
      b. Variation in Transmission across Width and Length: Not to exceed 2 percent.

C. Rate of Change of Total Transmission across Width and Length: Not to exceed 1 percent in 4 inches.

2.5 GLAZING ACCESSORIES

A. Compatibility: Provide glazing sealants compatible with one another and with other materials in contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of service and application, demonstrated by sealant manufacturer based on testing and field experience.

B. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

C. Colors of Exposed Glazing Sealants: Selected by Architect.

D. Glazing Sealant - Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 100/50, Use NT:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. Dow Corning Corporation.
      b. GE Construction Sealants; Momentive Performance Materials Inc.
      c. May National Associates, Inc.; a subsidiary of Sika Corporation.
      d. Pecora Corporation.
      e. Sika Corporation.

E. Glazing Sealant - Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. BASF Corporation; Construction Systems.

b. Dow Corning Corporation.
c. GE Construction Sealants; Momentive Performance Materials Inc.
d. May National Associates, Inc.; a subsidiary of Sika Corporation.
e. Pecora Corporation.
f. Polymeric Systems, Inc.
g. Sika Corporation.

F. Glazing Sealant - Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
a. Bostik, Inc.
b. Dow Corning Corporation.
c. GE Construction Sealants; Momentive Performance Materials Inc.
d. May National Associates, Inc.; a subsidiary of Sika Corporation.
e. Polymeric Systems, Inc.
f. Schnee-Morehead, Inc., an ITW company.
g. Sika Corporation.

G. Glazing Sealant - Acid curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
a. BASF Corporation; Construction Systems.
b. Bostik, Inc.
c. Dow Corning Corporation.
d. GE Construction Sealants; Momentive Performance Materials Inc.
e. May National Associates, Inc.; a subsidiary of Sika Corporation.
f. Pecora Corporation.
g. Polymeric Systems, Inc.
h. Schnee-Morehead, Inc., an ITW company.
i. Sika Corporation.

H. Glazing Sealants for Fire rated Glazing Products - Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
a. Dow Corning Corporation.
b. GE Construction Sealants; Momentive Performance Materials Inc.
2. Colors of Exposed Glazing Sealants: Selected by Architect.

I. Back Bedding Mastic Glazing Tapes:
1. Preformed, butyl based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
a. Tape, where indicated.
b. Tape, for glazing applications in which tape is subject to continuous pressure.
c. Tape, for glazing applications in which tape is not subject to continuous pressure.

J. Expanded Cellular Glazing Tapes:
1. Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
a. Type 1, for glazing applications in which tape acts as the primary sealant.

b. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

K. Miscellaneous Glazing Accessories:
1. Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with proven record of compatibility with surfaces contacted in installation:
a. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
b. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
c. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
d. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
e. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
f. Perimeter Insulation for Fire Resistive Glazing: Product approved by testing agency listed and labeled fire resistant glazing product with which it is used for application and fire protection rating indicated.

2.6 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements:
1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components:
a. Temperature Change: 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.
2. Edge and Surface Conditions: Comply with the recommendations of AAMA *Structural Properties of Glass* for clean cut edges, except comply with manufacturer's recommendations.
3. Exposed Glass Edges and Surface Condition: Finish edges flat with an arrissed edge profile (small bevel of uniform width not exceeding 1.5 mm at an angle of approximately 45 degrees to the surface of the glass) with polished (surface is reflective in appearance similar to the major surface of the glass) surface.

B. Cutting: Wheel cut or sawed edges and seamed at manufacturer's option. For site cut glass, provide glass 2 inches (50.8 mm) larger than required in both dimensions to facilitate cutting of clean cut edges without the necessity of seaming or nipping. Do not cut, seam, nip or abrade heat treated glass.

C. Butt Glazing: Clean cut or flat grind vertical edges of butt glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

D. Edges: Grind smooth and polish exposed glass edges and corners.

2.7 INSULATED METAL INFILL PANELS – SP1

A. Metal Composite Material Wall Panel System:
1. Basis of Design:
a. Product/Manufacturer: **8200 System as manufactured by NOW Specialties Inc.,**

Carrollton, Texas 75006:

1) Other manufacturers listed below are to provide factory-formed and assembled, metal composite material panels fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation with existing aluminum storefront system and new aluminum storefront system. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.
2) Manufacturers are subject to compliance with requirements; provide products by one of the following:
    a) Alucobond, manufactured by 3A Composites USA, Inc., Benton, KY 42025.
    b) Alpolic, Mitsubishi Plastics Composites America, Inc., Chesapeake, VA 23320
    c) Reynobond, Alcoa Architectural Products, Eastman GA 31023.

B. Composite Panels:
1. Aluminum-faced panel with thermoplastic core:
    a. Overall Panel thickness: 1 inch.
    b. Aluminum-Face: 0.0197 inches, with strippable protective film. Protective film: heavy and opaque if required to indicate finish grain direction.
    c. Aluminum Backer Sheet thickness: 0.0197 inches.
    d. Aluminum Alloy: ASTM B209 3003 at coated finish.

C. Composition:
1. Two sheets of aluminum sandwiching core of extruded thermoplastic material formed in continuous process with no glues or adhesives between dissimilar materials. Products laminated sheet by sheet or in batch process using glues or adhesives between materials shall not be acceptable:
    a. Fire-Retardant Core (where required by CBC): Complies with NFPA 285, with the following surface-burning characteristics as determined by testing identical products per ASTM E84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
        1) Flame-Spread Index: 15 or less.
        2) Smoke-Developed Index: 105 or less.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Environmental Limitations:
1. Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes:
    a. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 degrees F (4.4 degrees C).

B. Field Measurements: Verify actual dimensions of openings and construction contiguous with decorative glass by field measurements before fabrication.

3.2 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

3.3 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
   1. Manufacturing and installation tolerances, including size, squareness, and offsets at corners.
   2. Presence and functioning of weep systems.
   3. Minimum required face and edge clearances.
   4. Effective sealing between joints of glass-framing members.

B. Proceed with installation after correcting unsatisfactory conditions.

3.4 PREPARATION

A. Clean glazing channels and framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates:
   1. Comply with manufacturer instructions for wiping of surfaces immediately before application of primers.
   2. Wipe metal surfaces with IPA (isopropyl alcohol) unless otherwise required by compatibility and adhesion testing results.

B. Inspect each piece of glass immediately before installation. Do not install pieces improperly sized or with damaged edges, scratches, abrasion, or evidence damage. Remove labels from glass immediately after installation.

C. Examine glazing units to locate exterior and interior surfaces. Label or mark units so exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

D. Seal vent (breather or capillary) tubes in insulating glass units in accordance with insulating glass manufacturer written recommendations.

E. Glass Film Preparation:
   1. Remove particulate matter on the glass surface using a scraping blade.
   2. Place an absorbent towel on window sill or sash to absorb moisture generated by the film application.

3.5 GLAZING

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm):
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8 inch (3 mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement:
   1. Square cut wedge shaped gaskets at corners and install gaskets as recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

K. Tape Glazing:
   1. Position tapes on fixed stops so that, when compressed by glass, the exposed edges are flush with or protrude slightly above sightline of stops:
      a. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make tapes fit opening.
      b. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
      c. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
      d. Do not remove release paper from tape until right before each glazing unit is installed.
      e. Apply heel bead of elastomeric sealant.
      f. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
      g. Apply cap bead of elastomeric sealant over exposed edge of tape.

L. Gasket Glazing (Dry):
   1. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation:
      a. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
      b. Installation with Drive in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing

bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

c. Installation with Pressure Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

d. Install gaskets to protrude past face of glazing stops.

M. Sealant Glazing (Wet):

1. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance:
   a. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
   b. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

N. Erection Tolerances:

1. Maximum Deviation from Vertical: 1/8 inch in any story and 1/4 inch in any 45 foot run.
2. Maximum Deviation from Horizontal: 1/8 inch in any 30 foot run.
3. Maximum Deviation from True Alignment: 1/32 inch for any two (2) abutting units. Allow no edge projections.
4. Maximum Joint Gap: 1/32 inch.

O. Insulating-Glass Unit(s)

1. Double Glazed Tinted Solar Control Insulating Glass Unit [Solarban® 60 on Solargray® 6mm (2) | Air 1/2" (12.7mm) | Clear 6mm:
   a. Conformance: ASTM E2190.
   b. Outdoor Lite: Solargray® Tinted Float Glass as manufactured by Vitro Architectural Glass:
      1) Conformance: ASTM C1036, Type 1, Class 2, Quality q3.
      2) Glass Thickness: 6mm (1/4")
      3) Magnetic Sputter Vacuum Deposition Coating (MSVD): ASTM C1376.
      4) Coating: Solarban® 60 on Surface # 2
      5) Heat-Treatment: [None] [Heat-strengthened, ASTM C1048, Kind HS] [Tempered; ASTM C1048, Kind FT; Safety Glazing meets ANSI Z97.1 and CPSC 16CFR-1201] Specifier Notes: Specify the method of heat treatment. Vitro recommends that heat strengthened glass be specified and used, except where tempered glass is mandated for safety or other purposes by code.
   c. Interspace Content: Air 1/2" (12.7mm)
   d. Indoor Lite:
      1) Clear float glass as manufactured by Vitro Architectural Glass:
         a) Conformance: ASTM C1036, Type 1, Class 1, Quality q3.
         b) Heat-Treatment: [None] [Heat-strengthened, ASTM C1048, Kind HS] [Tempered; ASTM C1048, Kind FT; Safety Glazing meets ANSI Z97.1 and CPSC 16CFR-1201] Specifier Notes: Specify the method of heat treatment. Vitro recommends that heat strengthened glass be specified and used, except where tempered glass is mandated for safety or other purposes by code.
         c) Glass Thickness: 6mm (1/4")

   e. Performance Requirements:

1) Visible Light Transmittance: 35 percent minimum.
2) Winter Nighttime U-Factor: 0.29 (Btu/hr*ft2*°F) maximum.
3) Summer daytime U-Factor: 0.27 (Btu/hr*ft2*°F) maximum.
4) Shading Coefficient: 0.29 maximum.
5) Solar Heat Gain Coefficient: 0.25 maximum.
6) Outdoor Visible Light Reflectance: 9 percent maximum.

3.6 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains:
   1. If contaminating substances come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

PART 4 SCHEDULE

4.1 GLAZING SCHEDULE (REMOVE UNSELECTED GROUPS FROM SECTION)

A. G-1 Insulated Glass: 1 inch (25 mm) sealed insulated unit consisting of an exterior lite of 1/4 inch (6 mm) low-e tinted tempered float glass, 1/2 inch gas filled air space, and 1/4 inch (6 mm) clear tempered float glass interior lite.

B. G-1.2 Insulated Glass: 1 inch (25 mm) sealed insulated unit consisting of an exterior lite of 1/4 inch (6 mm) low-e tinted non-tempered float glass, 1/2 inch gas filled air space, and 1/4 inch (6 mm) clear non-tempered float glass interior lite.

C. G-2 Tinted Tempered Glass: (N/A) 1/4 inch (6 mm) tinted tempered glass.

D. G-3 Clear Tempered Glass: 1/4 inch (6 mm) clear tempered float glass.

E. G-3.2 Clear Non-Tempered Glass: 1/4 inch (6 mm) clear non-tempered float glass.

END OF SECTION - 08 80 00

SECTION 09 24 00 | CEMENT PLASTERING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Exterior plasterwork.
   2. Metal framing and accessories.
   3. Metal lath and furring.
   4. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 05 50 00: Metal Fabrications.
   2. Section 06 10 00: Rough Carpentry.
   3. Section 07 92 00: Joint Sealants.
   4. Section 09 90 00: Painting and Coating.

1.3 SUBMITTALS

A. Product Data: Submit technical data for product and accessory, including construction details and material descriptions.

B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code:
      a. Comply with applicable provisions of the CBC 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA):
         1) CBC 2025, 2507.3 Attachment requirements.
   2. Fire Resistance Ratings: Where indicated, provide cement plaster assemblies identical to those of assemblies tested for fire resistance according to ASTM E119 by a qualified testing agency.

B. Pre-installation Conference: Conduct conference at site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver cementitious materials in original packages, containers, or bundles, labeled with manufacturer's name, product brand name, and lot number.

B. Store materials inside under cover and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers are subject to compliance with requirements; provide products of one of the following:
   1. Metal Lath and Accessories:
      a. Alabama Metal Industries.
      b. CEMCO.
      c. ClarkDietrich Building Systems.
      d. Marino/WARE.
      e. Phillips Manufacturing.
   2. Wire Fabric Lath:
      a. Davis Wire.
      b. Jaenson Wire Company.
      c. Keystone Steel and Wire Co.
      d. K-Lath.
   3. Plastic Accessories:
      a. Alabama Metal Industries.
      b. Phillips manufacturing.
      c. Plastic Components.
      d. Vinyl Corp.
   4. Ready Mixed Finish Coat Plaster:
      a. Omega Products International.
      b. California Stucco Product.
      c. El Rey Solutions.
      d. Florida Stucco.
      e. Quikrete.
      f. Shamrock Stucco.
   5. Acrylic Based Finish Coat:
      a. California Stucco Product.
      b. Dryvit Systems.
      c. El Rey Solutions.
      d. Finestone, BASF Corp.
      e. Omega Products International.
      f. Senergy, BASF Corp.
      g. Sto Corp.

B. Cold Formed Steel Framing: Refer to Sections 05 50 00 for steel Fabrications.

C. Soffit Framing: Refer to Section 06 10 00.

D. Metal Lath:
   1. Expanded Metal Lath:
      a. ASTM C847, cold rolled carbon steel sheet with ASTM A653/A653M, G60 (Z180), hot dip galvanized zinc coating:
         1) Diamond Mesh Lath: Self furring, 3.4 lb/sq. yd. (1.8 kg/sq. m).
         2) Comply with DSA IR 25-4 for the installation of Self-Furring Metal Lath.
   2. Paper Backing:
      a. FS UU-B-790a, Type I, Grade D, Style 1a vapor retardant paper:
         1) Provide paper backed lath at exterior locations.
   3. Building Wrap:
      a. Spun-bounded high density polyethylene fibers. No binders or fillers. As manufactured by: Dupont Tyvek Commercial Type D Building Wrap or approved equal. Install per manufacturer’s instructions (Installation to meet CBC 2510.6).

E. Accessories:
1. Comply with ASTM C1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required:
   a. Metal Accessories:
      1) Foundation Weep Screed: Fabricated from hot dip galvanized steel sheet, ASTM A653/A653M, G60 (Z180) zinc coating.
      2) Cornerite: Fabricated from metal lath with ASTM A653/A653M, G60 (Z180), hot dip galvanized-zinc coating.
      3) Outside Corner Reinforcement: Fabricated from metal lath with ASTM A653/A653M, G60 (Z180), hot dip galvanized zinc coating.
      4) Cornerbeads - Fabricated from zinc or zinc coated (galvanized) steel:
         a) Smallnose cornerbead with expanded flanges; use unless otherwise indicated.
         b) Smallnose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.
      5) Casing Beads: Fabricated from zinc or zinc coated (galvanized) steel; square edged style; with expanded flanges.
      6) Control Joints: Fabricated from zinc or 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 or zinc coated (galvanized) steel; folded pair of unperforated screeds in M shaped configuration; with expanded flanges.
      8) Two Piece Expansion Joints: Fabricated from zinc or zinc coated (galvanized) steel; formed to produce slip joint and square edged reveal adjustable from 1/4 to 5/8-inch (6 to 16 mm) wide; with perforated flanges.
   b. Plastic Accessories - Manufactured from high impact PVC:
      1) Cornerbeads - With perforated flanges:
         a) Smallnose cornerbead; use unless otherwise indicated.
         b) Bullnose cornerbead, radius 3/4 inch (19 mm) minimum; use at locations indicated on Drawings.
      2) Casing Beads - With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated:
         a) Square edge style, unless otherwise indicated.
         b) Bullnose style, radius 3/4 inch (19 mm) minimum; use at locations indicated on Drawings.
      3) 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.
      4) Expansion Joints: Two piece type, formed to produce slip joint and square edged 1/2 inch (13 mm) wide reveal; with perforated concealed flanges, unless otherwise detailed or noted in Section 07 95 00: Expansion Control.
   c. Aluminum Reveals and Moldings, where applicable:
      1) Manufacturer: Fry Reglet
      2) Width: 2 inch
      3) Material: Extruded 6063 T5 Aluminum
      4) Finish: Kynar - Silver Satin.
      5) Provide all required accessories, moldings, and prefabricated intersection/corner transition pieces for a complete installation.
   d. Aluminum Soffit Vents:
      1) Manufacturer: Fry Reglet
      2) Width: 3 inch
      3) Material: Extruded 6063 T5 Aluminum
      4) Finish: Kynar - Silver Satin
      5) Provide all required accessories, moldings, and prefabricated

intersection/corner transition pieces for a complete installation.

F. Miscellaneous Materials:
1. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
2. Fiber for Base Coat: Alkaline resistant glass or polypropylene fibers, 1/2-inch (13 mm) long, free of contaminants, manufactured for use in cement plaster.
3. Bonding Compound: ASTM C932.
4. Fasteners for Attaching Metal Lath to Substrates: ASTM C1063.
5. Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21 mm) diameter unless otherwise indicated.
6. Building Wrap: Spun-bounded high density polyethylene fibers. No binders or fillers. As manufactured by: Dupont Tyvek Commercial Type D Building Wrap or approved equal. Install per manufacturer's instructions.
7. Sound Attenuation Blankets:
   a. ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool:
      1) Fire Resistance Rated Assemblies: Comply with mineral-fiber requirements of assembly.

G. Plaster Materials:
1. Portland Cement - ASTM C150/C150M, Type I or II:
   a. Color for Finish Coats: Match existing.
2. Colorants for Job Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color selected by Architect.
3. Lime: ASTM C206, Type S; or ASTM C207, Type S.
4. Sand Aggregate - ASTM C897:
   a. Color for Job Mixed Finish Coats: White.
5. Exposed Aggregates for Finish Coats: Match existing.
6. Ready Mixed Finish Coat Plaster:
   a. Mill mixed portland cement, aggregates, coloring agents, and proprietary ingredients.
      1) Color: Selected by Architect.
7. Acrylic Based Finish Coatings:
   a. Factory mixed acrylic emulsion coating systems formulated with colorfast mineral pigments and fine aggregates; for use over cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic based finishes:
      1) Color: Selected by Architect.

2.2 PLASTER MIXES

A. Comply with ASTM C926 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. (0.6 kg of fiber/cu. m) of cementitious materials.

B. Base Coat Mixes for Use over Metal Lath:
1. Scratch and brown coats for three coat plasterwork:
   a. Portland Cement Mix:
      1) Scratch Coat: For cementitious material, mix 1-part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
      2) Brown Coat: For cementitious material, mix 1-part portland cement and 3/4 to

1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

C. Job Mixed Finish Coat Mixes:
   1. Portland Cement Mix: For cementitious materials, mix 1-part portland cement and 3/4 to 1-1/2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.

D. Factory Prepared Finish Coat Mixes: For ready mixed finish coat plasters or acrylic based finish coatings, comply with manufacturer's written instructions.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Comply with applicable requirements of ASTM C926.

B. Environmental Requirements: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after plaster application.

C. Cold Weather Requirements: Provide heat and protection, temporary or permanent, as required to protect each coat of plaster from freezing for at least 24 hours after application. Distribute heat uniformly to prevent concentration of heat on plaster near heat sources; provide deflection or protective screens.

D. Warm Weather Requirements: Protect plaster against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial. Apply and cure plaster as required by climatic and job conditions to prevent dry out during cure period. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combinations of these, as required.

E. Ventilation: Provide natural or mechanical means of ventilation to properly dry interior spaces after portland cement plaster has cured.

F. Exterior Plasterwork:
   1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
   2. Apply plaster when ambient temperature is greater than 40 degrees F (4.4 degrees C).
   3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

G. Protect contiguous Work from soiling and moisture deterioration caused by plastering. Provide temporary covering and take precautions necessary to minimize spattering of plaster on adjacent Work.

H. Factory Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Proceed with installation after correcting unsatisfactory conditions.

3.3 PREPARATION

A. Protect adjacent Work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare smooth, solid substrates for plaster according to ASTM C926.

3.4 INSTALLATION

A. Metal Lath:
   1. Install according to ASTM C1063:
      a. Partition Framing and Vertical Furring: Flat diamond mesh lath.
      b. Horizontal Framing: Flat diamond mesh lath.

B. Accessories:
   1. Install according to ASTM C1063 and at locations indicated on Drawings:
      a. Reinforcement for External (Outside) Corners:
         1) Install lath type, external corner reinforcement cornerbead at exterior locations.
         2) Install cornerbead at interior locations.
      b. Control Joints - Locate as approved by Architect for visual effect:
         1) As required to delineate plasterwork into areas (panels) of the following maximum sizes:
            a) Vertical Surfaces: 144 sq. ft. (13.4 sq. m).
            b) Horizontal and Other Nonvertical Surfaces: 100 sq. ft. (9.3 sq. m).
         2) At distances between control joints of not greater than 18 feet (5.5 m) 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.

3.5 PLASTER APPLICATION

A. Comply with ASTM C926:
   1. Do not deviate more than plus or minus 1/4 inch in 10 feet (6 mm in 3 m) from a true plane in finished plaster surfaces when measured by a 10-foot (3-m) straightedge placed on surface.
   2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
   3. Provide plaster surfaces ready to receive field applied finishes indicated.

B. Flat Surface Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet (3 mm in 3 m) from a true plane in finished plaster surfaces, measured by a 10 foot (3m) straightedge placed at any location on surface.

C. Walls; Base Coat Mixes for Use over Metal Lath:
   1. At open framing and sheathing substrates, Vertical and Horizontal Surfaces: 7/8" nominal.
      a. Scratch Coat thickness: 3/8"
      b. Brown Coat thickness: 3/8"
      c. Finish Coat thickness: 1/8"

2. Scratch Coat Installation:
   a. Cover Lath totally and completely with Scratch Coat Mix
   b. Finish: Heavily scratched at right angles to framing members to provide strong mechanical key for Brown Coat
   c. Curing: Continuously moist cure a minimum of 48 hours immediately after installation and prior to application of Brown Coat
3. Brown Coat Installation:
   a. Apply Brown Coat Mix to slightly damp, and cured Scratch Coat
   b. Finish: Dry rod to a straight even plane
   c. Float to densify at 1/8 inch in 10 feet and leave rough for finish
      1) At exterior horizontal soffits with recessed light fixtures, provide a smooth and level brown coat finish around the perimeter of the light fixture housing
         a) After installation of the brown coat, knock down any ridges and provide a smooth trowel finish within a distance of 3 inches around the light fixture housing. This level of finish is required, so that the light fixture lens (with a compression gasket) can be installed with full contact against the plaster system
         b) Coordinate with the electrical contractor and obtain a sample fixture lens and conduct a pre-cement plaster installation meeting to discuss this topic
   d. Curing: Continuously moist cure a minimum of 48 hours immediately after installation and dry cure a minimum of 7 days, allow time for plaster to shrink prior to application of finish coats
4. Finish Coat Installation:
   a. Exterior Cement System:
      1) Provide Open Corner Reinforcement where cement plaster is not divided or separated at opening corners. Place diagonally at all corners of openings and apply with cement adhesive on cured Brown Coat.
      2) Apply 2 coats of Finish Coat Mix.
         a) First coat 1/16 inch minimum. Completely cover to create a bond with Brown Coat.
         b) Second coat 1/16 inch minimum. Apply immediately after first coat and when first coat is dry using a plaster mix of thinner consistency. Apply to create depth for texture and uniformity
         c) Use proportionately more atomizing air at the gun nozzle.
      3) Texture: "Light Dash" finish as indicated in the current "Plaster and Drywall Systems Manual"
         a) Texture to be "Medium Dash" finish when application of paint finish coats to be an "Elastomeric" Paint System
      4) Curing: Continuously moist cure a minimum of 48 hours immediately after installation and dry cure a minimum of 7 days to allow time for plaster to shrink prior to installation of paint finish coats

D. Plaster Finish Coats: Apply to provide dash finish.

E. Acrylic Based Finish Coatings (Contractor Option to Plaster Finish Coat): Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.

F. Concealed Exterior Plasterwork: Where plaster application is used as a base for adhered finishes, omit finish coat.

3.6 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.

B. Cut, patch, replace, repair, and point up plaster as necessary to accommodate other Work. Repair cracks and indented surfaces. Point up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace Work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.

3.7 TOLERANCES

A. Maximum Variation from True Lines and Levels: 1/8 inch in 10 feet (3mm in 3 m).

B. Maximum Variation from True Position: 1/8 inch (3mm).

3.8 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of Work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

B. Remove unused materials, containers, equipment, and plaster debris.

C. Protect plaster and maintain conditions ensuring finished plaster is without damage or deterioration at time of Substantial Completion.

END OF SECTION - 09 24 00

SECTION 09 24 00 | CEMENT PLASTERING (PATCH AND REPAIR)

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Exterior cement plaster repair.
   2. Metal lath and furring.
   3. Accessories necessary for a complete installation.

B. Related documents:
   1. Section 01 33 00; Submittal Procedures.
   2. Section 01 73 29; Cutting and Patching.
   3. Section 02 41 19; Selective Demolition.
   4. Section 06 10 00; Rough Carpentry.
   5. Section 07 13 26; Self-Adhering Waterproofing
   6. Section 07 62 00; Roof Related Flashing
   7. Section 07 92 00; Joint Sealants.
   8. Section 09 90 00; Painting and Coatings.

1.3 SUBMITTALS

A. Product Data: Submit technical data for product and accessory, including construction details and material descriptions.

B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code: Comply with applicable provisions of the CBC 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA).
   2. Fire Resistance Ratings: Where indicated, provide cement plaster assemblies identical to those of assemblies tested for fire resistance according to ASTM E 119 by a qualified testing agency.

B. Preinstallation Conference: Conduct conference at site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver cementitious materials in original packages, containers, or bundles, labeled with manufacturer's name, product brand name, and lot number.

B. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.6 PROJECT CONDITIONS

A. Comply with applicable requirements of ASTM C 926.

B. Environmental Requirements: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after plaster application.

C. Cold Weather Requirements: Provide heat and protection, temporary or permanent, as required to protect each coat of plaster from freezing for at least 24 hours after application. Distribute heat uniformly to prevent concentration of heat on plaster near heat sources; provide deflection or protective screens.

D. Warm Weather Requirements: Protect plaster against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial. Apply and cure plaster as required by climatic and job conditions to prevent dry out during cure period. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combinations of these, as required.

E. Exterior Plasterwork:
   1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
   2. Apply plaster when ambient temperature is greater than 40 degrees F (4.4 degrees C).
   3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

F. Protect contiguous work from soiling and moisture deterioration caused by plastering. Provide temporary covering and take precautions necessary to minimize spattering of plaster on adjacent work.

G. Factory Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
   1. Metal Lath and Accessories:
      a. Alabama Metal Industries (AMICO).
      b. CEMCO.
      c. ClarkDietrich Building Systems.
      d. Marino/WARE.
      e. Phillips Manufacturing.
   2. Plastic Accessories:
      a. Alabama Metal Industries (AMICO).
      b. Phillips manufacturing.
      c. Plastic Components.
      d. Vinyl Corp.
   3. Ready Mixed Finish Coat Plaster:
      a. California Stucco Product.
      b. El Rey Solutions.
      c. Omega Products International.

d. Quikrete.
e. Shamrock Stucco.

4. Acrylic Based Finish Coat:
   a. California Stucco Product.
   b. Dryvit Systems.
   c. El Rey Solutions.
   d. Finestone, BASF Corp.
   e. LaHabra, a brand of Parex USA, Inc.
   f. Omega Products International.
   g. Senergy, BASF Corp.
   h. Sto Corp.

B. Metal Lath:
   1. Expanded Metal Lath: ASTM C 847, cold rolled carbon steel sheet with ASTM A 653/A 653M, G60 (Z180), hot dip galvanized zinc coating.
      a. Diamond Mesh Lath: Self furring, 3.4 lb/sq. yd. (1.8 kg/sq. m).
      b. Comply with DSA IR 25-4 for the installation of Self-Furring Metal Lath.

C. Accessories: Comply with ASTM C 1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
   1. Metal Accessories:
      a. Foundation Weep Screed: Fabricated from hot dip galvanized steel sheet, ASTM A 653/A 653M, G60 (Z180) zinc coating.
      b. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot dip galvanized-zinc coating.
      c. Outside Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot dip galvanized zinc coating.
      d. Cornerbeads: Fabricated from zinc or zinc coated (galvanized) steel.
         1) Smallnose cornerbead with expanded flanges; use unless otherwise indicated.
         2) Smallnose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.
      e. Casing Beads: Fabricated from zinc or zinc coated (galvanized) steel; square edged style; with expanded flanges.
      f. Control Joints: Fabricated from zinc or 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.
      g. Expansion Joints: Fabricated from zinc or zinc coated (galvanized) steel; folded pair of unperforated screeds in M shaped configuration; with expanded flanges.
      h. Two Piece Expansion Joints: Fabricated from zinc or zinc coated (galvanized) steel; formed to produce slip joint and square edged reveal adjustable from 1/4 to 5/8 inch (6 to 16 mm) wide; with perforated flanges.
   2. Plastic Accessories: Manufactured from high impact PVC.
      a. Cornerbeads: With perforated flanges.
         1) Smallnose cornerbead; use unless otherwise indicated.
         2) Bullnose cornerbead, radius 3/4 inch (19 mm) minimum; use at locations indicated on Drawings.
      b. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.
         1) Square edge style; use unless otherwise indicated.
         2) Bullnose style, radius 3/4 inch (19 mm) minimum; use at locations indicated on Drawings.
      c. 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.

d. Expansion Joints: Two piece type, formed to produce slip joint and square edged 1 inch (25 mm) wide reveal; with perforated concealed flanges.

3. Aluminum Reveals and Moldings: Where applicable.
   a. Manufacturer: Fry Reglet
   b. Width: 2 inch
   c. Material: Extruded 6063 T5 Aluminum
   d. Finish: Kynar - Silver Satin.
   e. Provide all required accessories, moldings, and prefabricated intersection/corner transition pieces for a complete installation.
4. Aluminum Soffit Vents: Where applicable.
   a. Manufacturer: Fry Reglet
   b. Width: 3 inch
   c. Material: Extruded 6063 T5 Aluminum
   d. Finish: Kynar - Silver Satin
   e. Provide all required accessories, moldings, and prefabricated intersection/corner transition pieces for a complete installation.

D. Miscellaneous Materials:
1. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
2. Fiber for Base Coat: Alkaline resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminants, manufactured for use in cement plaster.
3. Bonding Compound: ASTM C 932.
4. Fasteners for Attaching Metal Lath to Substrates: ASTM C 1063.
5. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475 inch 1.21 mm diameter unless otherwise indicated.
6. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   a. Fire Resistance Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Plaster Materials:
1. Portland Cement: ASTM C 150/C 150M, Type II.
   a. Color for Finish Coats: Integral color plaster shall match exterior paint color as indicated, provide sample/mock-up for approval by Architect.
2. Colorants for Job Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color selected by Architect.
3. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
4. Sand Aggregate: ASTM C 897.
   a. Color for Job Mixed Finish Coats: White**.**
5. Exposed Aggregates for Finish Coats: Match existing.
6. Ready Mixed Finish Coat Plaster: Mill mixed portland cement, aggregates, coloring agents, and proprietary ingredients.
   a. Color: Integral color plaster shall match exterior paint color as indicated, provide sample/mock-up for approval by Architect.
7. Acrylic Based Finish Coatings: Factory mixed acrylic emulsion coating systems formulated with colorfast mineral pigments and fine aggregates; for use over cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic based finishes.
   a. Color: Integral color plaster shall match exterior paint color as indicated, provide sample/mock-up for approval by Architect.

2.2 PLASTER MIXES

A. 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. (0.6 kg of fiber/cu. m) of cementitious materials.

B. Base Coat Mixes for Use over Metal Lath: Scratch and brown coats for three coat plasterwork:
   1. Portland Cement Mix:
      a. Scratch Coat: For cementitious material, mix 1 part portland cement and **3/4 to 1-1/2** 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 **3/4 to 1-1/2** parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

C. Job Mixed Finish Coat Mixes:
   1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and **3/4 to 1-1/2** parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.

D. Factory Prepared Finish Coat Mixes: For ready mixed finish coat plasters or acrylic based finish coatings, comply with manufacturer's written instructions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the work. Proceed with installation after correcting unsatisfactory conditions.

3.2 PREPARATION

A. Remove plaster to nearest joint where possible. Saw cut joint for patch at location agreed upon with Architect prior to work.

B. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

C. Prepare smooth, solid substrates for plaster according to ASTM C 926.

3.3 INSTALLATION

A. Metal Lath: Install according to ASTM C 1063.
   1. Partition Framing and Vertical Furring: Flat diamond mesh lath.
   2. Horizontal Framing: Flat diamond mesh lath.

B. Accessories: Install according to ASTM C 1063 and at locations indicated on Drawings.
   1. Reinforcement for External (Outside) Corners:
      a. Install cornerbead at exterior corner locations.
      b. Install cornerbead at interior corner locations.
   2. Control Joints: Locate as approved by Architect for visual effect where not illustrated on drawings.
      a. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
         1) Vertical Surfaces: 144 sq. ft. (13.4 sq. m).

2) Horizontal and Other Nonvertical Surfaces: 100 sq. ft. (9.3 sq. m).

b. At distances between control joints of not greater than 12 feet o.c.
c. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
d. Where control joints occur in surface of construction directly behind plaster.
e. 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.
f. Where plasterwork repair involves any of the above referenced conditions.

3.4 PLASTER APPLICATION

A. Comply with ASTM C 926.
1. Do not deviate more than plus or minus 1/4 inch in 10 feet (6 mm in 3 m) from a true plane in finished plaster surfaces when measured by a 10-foot (3-m) straightedge placed on surface.
2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces ready to receive field applied finishes indicated.

B. Flat Surface Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet (3 mm in 3 m) from a true plane in finished plaster surfaces, measured by a 10 foot (3m) straightedge placed at any location on surface.

C. Walls; Base Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three coat plasterwork with 3/4 inch (19 mm) total thickness:
1. Portland cement mixes.

D. Plaster Finish Coats: Apply to provide dash finish.

E. Acrylic Based Finish Coatings (Contractor Option to Plaster Finish Coat): Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.

F. Concealed Exterior Plasterwork: Where plaster application is used as a base for adhered finishes, omit finish coat.

3.5 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.

B. Cut, patch, replace, repair, and point up plaster as necessary to accommodate other work. Repair cracks and indented surfaces. Point up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.

3.6 TOLERANCES

A. Maximum Variation from True Lines and Levels: 1/8 inch in 10 feet (3mm in 3 m).

B. Maximum Variation from True Position: 1/8 inch (3mm).

3.7 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

B. Remove unused materials, containers, equipment, and plaster debris.

C. Protect plaster and maintain conditions ensuring finished plaster is without damage or deterioration at time of Substantial Completion.

END OF SECTION - 09 24 00

SECTION 09 29 00 GYPSUM BOARD

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes requirements including but not limited to:
1. Paper faced gypsum board.
2. Mold, mildew, moisture resistant paper faced gypsum board.
3. Fiberglass mat faced gypsum board.
4. Cement board.
5. Texture finishes.
6. Accessories.
7. Trim.
8. Joint tape.
9. Joint compounds.

B. Related Sections:
1. Section 05 50 00: Metal Fabrications.
2. Section 06 10 00: Rough Carpentry.
3. Section 08 11 13: Hollow Metal Doors and Frames.
4. Section 08 31 13: Access Doors and Frames.
5. Section 08 51 00: Aluminum Windows.
6. Section 09 30 00: Tiling.
7. Section 09 90 00: Painting and Coating.

1.3 REFERENCES

A. American National Standards Institute (ANSI):
1. ANSI A108 Interior Installation of Cementitious Backer Units.

B. ASTM International (ASTM):
1. ASTM C475/C475M Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
2. ASTM C840 Standard Specification for Application and Finishing of Gypsum Board.
3. ASTM C919 Standard Practice for Use of Sealants in Acoustical Applications.
4. ASTM C1002 Standard Specifications for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
5. ASTM C1178/C1178M Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
6. ASTM C1325 Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units.
7. ASTM C1396/C1396M Standard Specification for Gypsum Board.
8. ASTM C1629/C1629M Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
9. ASTM C1658/C1658M Standard Specification for Glass Mat Gypsum Panels.
10. ASTM C1766 Standard Specification for Factory-Laminated Gypsum Panel.
11. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface

of Interior Coatings in an Environmental Chamber.
12. ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
13. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

C. Gypsum Association (GA):
1. GA-214 Recommended Levels of Gypsum Board Finish.
2. GA-216 Application and Finishing of Gypsum Panel Products.

1.4 SUBMITTALS

A. Product Data: Submit for each type of drywall including calculations for loadings and stresses of exterior walls and specially fabricated framing based on manufacturer's load tables.
1. Gypsum Board.
2. Foil Backed Gypsum
3. Cementitious Board.
4. Texture finishes.
5. Trim accessories.
6. Samples
7. Textured Finishes: Apply to gypsum board, 4 by 6 inches.
8. Trim Accessories: 12-inch length of trim.

B. Shop Drawings: Indicate locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.

C. Samples:
1. Trim Accessories: Full size Sample in 12 inch (300 mm) long length for each trim accessory indicated.
2. Textured Finishes: 12 inches by 12 inches (300 mm by 300 mm) for each textured finish indicated and on same backing indicated for Work.

D. Calculations: Submit calculations verifying steel partition stud minimum base metal thickness and depth compliance with Code and ASTM C645 for height, load, and deflection.

E. Evaluation Reports: ICC-ES reports for dimpled steel studs and runners and firestop tracks.

F. Sustainable Design Submittals.
1. Sustainable Design closeout Requirements.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
1. CBC 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA):
   a. CBC-7 – Chapter 7, Fire Resistant Materials and Construction
   b. CBC-19A – Chapter 19A, Concrete
   c. CBC – Chapter 25, Gypsum Board and Plaster.
2. Division of the State Architect, Interpretation of Regulations (DSA-IR):
   a. DSA-IR 25-3, Drywall Ceiling Suspension Conventional Construction-One Layer.
   b. DSA-IR 25-2.13, Metal Suspension Systems for Lay in Panel Ceilings.
3. Fire Resistance Rated Assemblies: For fire resistance rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. Single Source Responsibility:
   1. Framing Members: Obtain steel framing members from single manufacturer.
   2. Panel Products: Obtain each type of gypsum board and other panel products from single manufacturer.
   3. Finishing Materials: To the extent possible, obtain finishing materials from same manufacturer supplying gypsum board products. When not possible, obtain materials from manufacturer acceptable to gypsum board manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

PART 2 PRODUCTS

2.1 MATERIALS

A. Basis of Design: Products from **National Gypsum Company**, 2001 Rexford road, Charlotte, North Carolina 2811. 704-365-7300 ng@nationalgypsum.com.
   1. All other manufacturers are subject to compliance with requirements to match or exceed products listed here-in.

2.2 PAPER FACED GYPSUM BOARD

A. Gypsum Board, Regular Core, ASTM C1396/C1396M: Walls & Ceilings
   1. Gold Bond® Gypsum Board.
   2. Gold Bond® High Strength LITE® Gypsum Board.
   3. Gold Bond® High Flex® Gypsum Board.
      a. Thickness: 5/8 inch
      b. Core: Regular.
      c. Edges: Tapered

2.3 MOLD, MILDEW, MOISTURE RESISTANT PAPER FACED GYPSUM BOARD

A. Gypsum Board, Regular Core, Mold, Mildew, Moisture Resistant: ASTM C1396/C1396M. Provide at interior walls subjected to moisture/humidity and at adhesive application of ceramic tile and wallcoverings.
   1. Gold Bond® XP® Gypsum Board.
      a. Thickness: 5/8 inch.
      b. Core: Regular.
      c. Edges: Tapered
      d. Mold/Mildew Resistance: ASTM D3273; Score of 10.
      e. Mold/Mildew Resistance: ASTM G21, Score of 0.

B. Gypsum Board, Mold, Mildew, Moisture, and Abuse Resistant: ASTM C1396/C1396M. Abuse Resistant: Refer to Interior Elevations for locations.
   1. Gold Bond® XP® Hi-Abuse® Gypsum Board.
      a. Thickness: 5/8 inch.
      b. Core: Type X.
      c. Edges: Tapered.
      d. Mold/Mildew Resistance: ASTM D3273; Score of 10.

e. Surface Abrasion: ASTM C1629/C1629M; Level 3.
f. Indentation: ASTM C1629/C1629M; Level 1.
g. Soft-Body Impact: ASTM C1629/C1629M; Level 2.
h. Hard-Body Impact: ASTM C1629/C1629M; Level 1.

2.4 CEMENT BOARD

A. Cement Board, Backer, Interior/Exterior: ASTM C1325.
1. PermaBASE® Cement Board.
2. PermaBASE PLUS® Cement Board.
a. Thickness: 1/2 inch
b. Weight: 2.5 lbs./sq.ft.
c. Edges: Round.
d. Mold/Mildew Resistance: ASTM D3273; Score of 10.
e. Shear Bond Strength: 241 psi.

B. Cement Board, Interior Underlayment: ASTM C1325.
1. PermaBASE UltraBacker® Cement Board.
a. Thickness: 1/4 inch.
b. Weight: 1.8 lbs./sq.ft.
c. Edges: Round.
d. Mold/Mildew Resistance: ASTM D3273; Score of 10.

2.5 TEXTURE FINISHES

A. Primer: Manufacturer recommended for surface being coated.

B. Non-Aggregated Wall and Ceiling Texture:
1. ProForm™ Wall and Ceiling Spray.
2. ProForm™ Perfect Spray® EM.
a. Texture: Orange peel

2.6 ACCESSORIES

A. Acoustical Sealant: ASTM C919.
1. Manufacturers and Products:
b. Grabber Construction Products; Acoustical Sound and Smoke Sealant GSCSF.
a. Specified Technologies Inc.; SpecSeal SNS Smoke N Sound Acoustical Sealant.
b. BOSS Products; BOSS 826 Acoustical Acrylic Sound Sealant.

B. Fasteners for Cement Board: ASTM C1002.
1. PermaBASE™ Cement Board Screws Hi-Lo.
a. Wafer head, corrosion-resistant.
b. Thickness, overall: [1-1/4 inch][2 inch][2-1/2 inch].
2. PermaBASE™ Cement Board Screws Drill Point.
a. Wafer head, corrosion-resistant.
b. Thickness, overall: [1-1/4 inch][2 inch][2-1/2 inch].

C. Fasteners for Tile Backer: ASTM C1002.
1. Fasteners for 1/2 inch thick panels:
a. Wood Framing: 1-1/4 inch minimum corrosion resistant course thread bugle head

D. Fasteners for 5/8 inch thick panels:
1. Wood Framing: 1-1/4 inch minimum corrosion resistant course thread bugle head

2.7 TRIM

A. Vinyl Trim:
   1. One-Piece: Extruded vinyl form; vinyl coating matching boards.(1/2 inch Board)
   2. Two-Piece: Extruded vinyl form; vinyl coating matching boards.(5/8 inch Board)

2.8 JOINT TAPE

A. Paper Tape: 2-1/16 inch wide, cross-fibered paper, ASTM C475/C475M.
   1. ProForm™ Paper Joint Tape.

B. Fiberglass Mesh Tape: Polymer-coated (alkali-resistant) fiberglass mesh.
   1. PermaBASE™ Cement Board Tape, 2 inches.

2.9 JOINT COMPOUNDS

A. Setting Type Compound
   1. Field mixed quick setting and hardening: ASTM C475/C475M.
      a. ProForm® Quick Set™ Setting Compound.
   2. Field mixed quick setting and hardening; fire resistant: ASTM E814.
      a. ProForm® Quick Set™ Fire and Smoke Stop 90 Setting Compound.

B. Drying Type Compound:
   1. Ready mix, vinyl base: ASTM C475/C475M.
      a. ProForm® Multi-Use Joint Compound.
      b. ProForm® All Purpose Joint Compound.
      c. ProForm® Ultra Lite® All Purpose Joint Compound.
      d. ProForm® All Purpose Machine Grade Joint Compound.
      e. ProForm® Lite Blue™ Joint Compound.
      f. ProForm® Lite Joint Compound.
   2. Ready mix, vinyl base, reduced dust: ASTM C475/C475M.
      a. ProForm® All Purpose with Dust-Tech® Joint Compound.
      b. ProForm® Lite with Dust-Tech®.
      c. ProForm® Lite Blue™ with Dust-Tech® Joint Compound.
         1) Mold/Mildew Resistance: ASTM D3273; Score of 10.
         2) Mold/Mildew Resistance: ASTM G21, Score of 0.
   3. Ready mix, vinyl base, topping compound: ASTM C475/C475M.
      a. ProForm® Topping Joint Compound.
   4. Ready mix, vinyl base, embedding tape and trim: ASTM C475/C475M.
      a. ProForm® Taping Joint Compound.
      b. ProForm® Taping Lite Joint Compound.
   5. Ready mix, vinyl base, specialty: ASTM C475/C475M.
      a. ProForm® All Purpose Texture Grade Joint Compound.
      b. ProForm® All Purpose Heavy Viscosity Joint Compound.
      c. ProForm® Tinted Lite™ Joint Compound.
      d. ProForm® Concrete Cover Joint Compound.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations:
   1. Comply with ASTM C840 for gypsum board manufacturer's written instructions, whichever are more stringent:
      e. Do not install paper faced gypsum panels until installation areas are enclosed and

conditioned.

B. Room Temperatures: Maintain minimum 40 degrees F (4 degrees C). For adhesive attachment and finishing of gypsum board, maintain minimum 50 degrees F (10 degrees C) for 48 hours before application and continuously after until dry. Do not exceed 95 degrees F (35 degrees C) when using temporary heat sources.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

D. Do not install panels that are wet, moisture damaged, and mold damaged:
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.2 EXAMINATION

A. Examine areas and substrates including welded hollow metal frames, cast in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.4 INSTALLATION

A. Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated. Install in accordance with:
1. Manufacturer recommendations.
2. ANSI A108.
3. GA-214.
4. GA-216.

B. Gypsum Board Assemblies: Comply with requirements in ASTM C840 applicable to framing installation.

C. Gypsum Board:
1. Install interior gypsum board where indicated on drawings.
   a. Single Layer Application:
      1) On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
      2) On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire resistance rated assembly, and minimize end joints. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      3) Fastening Methods: Apply gypsum panels to supports with steel drill screws.
   b. Multilayer Application:

1) On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
2) On Z shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
3) Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Cementitious Backer Units: ANSI A108.11; install where indicated with 1/4-inch (6.4 mm) gap where panels abut other construction or penetrations. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

E. Trim Accessories:
1. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Attach trim according to manufacturer's written instructions:
   a. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.
   b. Exterior Trim:
      1) Install in the following locations:
         a) Cornerbead: Use at outside corners.
         b) LC Bead: Use at exposed panel edges.
   c. Interior Trim - Install in the following locations:
      1) Cornerbead: Use at outside corners, unless otherwise indicated.
      2) Bullnose Bead: Use at outside corners.
      3) LC Bead: Use at exposed panel edges.
      4) L Bead: Use where indicated or necessary.
      5) U Bead: Use at exposed panel edges.

F. Gypsum Board Finishing:
1. Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces:
   a. Prefill open joints, rounded or beveled edges, and damaged surface areas.
   b. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
   c. Gypsum Board Finish Levels - Finish panels to levels indicated below and according to ASTM C840:
      1) Level 1: Ceiling plenum areas, concealed areas, and where indicated.
      2) Level 2: Panels that are substrate for tile.
      3) Level 3: Surfaces be coated with drywall primer prior to final finishes. Heavy or medium texture finishes before final painting, or where heavy-grade wall coverings are to be applied as the final decoration. This level of finish is not recommended where smooth painted surfaces, or light to medium weight wall coverings as specified.
      4) Level 4: For surfaces receiving wall covering and flat paints.
      5) Level 5: For surfaces receiving gloss or semigloss paint and surfaces subjected to severe lighting. To be used in Kitchen areas and food service areas only.

G. Installation Tolerances:

1. Suspension System: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.
2. Installation Tolerances, Suspension System: Install suspension systems level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged:
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 00 | TILING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Ceramic tile.
   2. Quarry tile.
   3. Accessories required for indicated installation.
   4. Crack isolation membrane.
   5. Tile backing panels.
   6. Metal edge strips.

B. Related Sections:
   1. Division 09: Gypsum Board Assemblies.
   2. Division 09: Resilient Base.

1.3 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction:
   1. Level Surfaces: Minimum 0.6.
   2. Ramp Surfaces: Minimum 0.8.

B. Tile Flooring should be stable, firm, and slip resistant, pursuant to CBC Section 11B-302.1.

1.4 SUBMITTALS

A. Product Data: Technical data including data sheets, installation recommendation, and recommended joint widths.

B. Shop Drawings - Show locations of each type of tile and tile pattern:
   1. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples - Submit samples showing full range of color and texture variations expected:
   1. Full size units of each type and composition of tile and for each color and finish required.
   2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required; minimum 12 inches (300 mm) square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed work.
   3. Waterproof membrane in 6 x 6-inch sample.
   4. Thresholds in 6-inch (150 mm) lengths.

D. Test Reports: Submit test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of tile products with requirements for slip resistance.

E. Maintenance Instructions: Submit maintenance instructions for each type of product specified.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code: Comply with applicable requirements for the CBC for interior finishes.
   2. Surface Burning Characteristics - ASTM E84; identify products with appropriate markings of applicable testing agency:
      a. Flame Spread Index: 25 or less.
      b. Smoke Developed Index: 450 or less.
   3. Accessibility Requirements - Comply with applicable requirements:
      a. Americans with Disabilities Act of 1990, as amended:
      b. ADA Title II Regulations & the 2010 ADA Standards for Accessible Design.
      c. CBC 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA):
      d. CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.

B. Source Limitations for Tile: Obtain tile of same type and color or finish from one source or producer. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

D. Source Limitations for Other Products - Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
   1. Stone thresholds.
   2. Waterproofing.
   3. Joint sealants.
   4. Cementitious backer units.
   5. Metal edge strips.

E. Mockups:
   1. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
      a. Build mockup of each type of floor tile installation.
      b. Build mockup of each type of wall tile installation.
      c. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided. Store liquid materials in unopened containers and protected from freezing.

C. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

PART 2 PRODUCTS

2.1 MATERIALS

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated. Provide tile complying with Standard grade requirements.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting:
   1. For factory mounted tile, provide back or edge mounted tile assemblies as standard with manufacturer unless otherwise indicated:
      a. Where tile is indicated for installation in swimming pools, on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

E. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.

F. Low-Emitting Materials: Tile flooring systems 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."

2.2 TILE PRODUCTS

A. Manufacturers are subject to compliance with requirements; provide products by one of the following:

B. Floor Tile – Porcelain tile:
   1. Basis of Design Product/Manufacturer: **Daltile**.
   2. Type: TL-4, TL-5, TL-6.
   3. Module Size: Refer to Finish Legend in the Drawings.
   4. Thickness: Refer to Finish Legend in the Drawings.
   5. Surface: Textured, slip resistant.
   6. Dynamic Coefficient of Friction: Not less than 0.42.
   7. Location: As indicated in the Drawings.
   8. Grout Color: Refer to Finish Legend in the Drawings.
   9. Tile color: Refer to Finish Legend in the Drawings.
   10. Installation Pattern: Straight Joint.

C. Wall Tile - Ceramic tile:
   1. Basis of Design Product/Manufacturer: **Daltile**.
   2. Types: TL-1, TL-2, TL-3
   3. Module Size: Refer to Finish Legend in the Drawings.
   4. Thickness: Refer to Finish Legend in the Drawings.
   5. Surface: Matte glazed.
   6. Base: Metal edge strip. Basis of design: Schluter
   7. Grout Color: Refer to Finish Legend in the Drawings.
   8. Tile Color: Refer to Finish Legend in the Drawings.
   9. Installation Pattern: Refer to Finish Legend in the Drawings.

D. Floor Tile – Porcelain tile:

1. Basis of Design Product/Manufacturer: **Crossville**.
2. Type: TL-9, TL-10
3. Module Size: Refer to Enlarged Site Plan.
4. Thickness: 3/8 inches (9.5mm).
5. Surface: Textured, slip resistant.
6. Dynamic Coefficient of Friction: Not less than 0.50.
7. Location: As indicated in the Drawings.
8. Grout Color: To be selected by Architect from full range of colors.
9. Tile color: Refer to Finish Legend in the Drawings.
10. Installation Pattern: Straight Joint.

E. Floor Tile – Porcelain Mosaic:
1. Basis of Design Product/Manufacturer: **Daltile**.
2. Type: TL-8
3. Module Size: Refer to Enlarged Site Plan.
4. Thickness:1/4”.
5. Surface: Textured, slip resistant.
6. Dynamic Coefficient of Friction: Not less than 0.50.
7. Location: As indicated in the Drawings.
8. Grout Color: To be selected by Architect from full range of colors.
9. Tile color: Refer to Finish Legend in the Drawings.
10. Installation Pattern: Straight Joint.

F. Floor Tile – Quarry Tile:

a. DESIGNATION: Shown on the Interior Color Schedule in Construction Documents.
b. MANUFACTURER: Shown on the Interior Color Schedule in Construction Documents.
c. SIZE: Shown on the Interior Color Schedule in Construction Documents.
d. STYLE: Shown on the Interior Color Schedule in Construction Documents.
e. COLOR: Shown on the Interior Color Schedule in Construction Documents.

1. Subject to compliance with requirements, comparable products by one of the following may be used in strict in accordance with Division 01, Substitution Procedures and Forms:
a. American Marazzi Tile, Inc.
b. American Olean; a Division of Dal-Tile Corporation.
c. Crossville, Inc.
d. Emser Tile.
e. Trinity Tile.
f. Interceramic.
g. Concept Surfaces, LLC.

2. Trim Units - Coordinated with sizes and coursing of adjoining flat tile where applicable matching characteristics of adjoining flat tile. Provide shapes selected from standard shapes:
a. Base Cove: See Interior Color Schedule, in the Construction Documents.
b. Wainscot Cap for Thinset Mortar Installations: Surface bullnose, module size 1 inch by 1 inch (25.4 mm by 25.4 mm) or 2 inch by 1 inch (50.8 mm by 25.4 mm) or 2 inch by 2 inches (50.8 mm by 50.8 mm).
c. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
d. External Corners for Thinset Mortar Installations: Surface bullnose, module size 1 inch by 1 inch (25.4 mm by 25.4 mm) or 2 inch by 1 inch (50.8 mm by 25.4 mm) or 2 inch by 2 inches (50.8 mm by 50.8 mm).
e. Internal Corners: Cove, module size 1 inch by 1 inch (25.4 mm by 25.4 mm) or 2 inches by 1 inch (50.8 mm by 25.4 mm).
f. Internal Corners: Field-butted square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.
g. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor

and adjoining floor finishes of different thickness, tapered to provide reduction in thickness from 1/2 to 1/4 inch (12.7 to 6.4 mm) across nominal 4 inch (100 mm) dimension.

G. Threshold - Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes:
   1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
   2. Granite Thresholds - ASTM C615/C615M, with polished finish:
      a. Description: Uniform, medium grained, black stone without veining.

2.3 WATERPROOF MEMBRANE

A. Waterproof membrane complies with ANSI A118 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fluid Applied Membrane - Liquid latex rubber or elastomeric polymer:
   1. Basis of Design - Laticrete 9235 Waterproofing Membrane. Subject to compliance with requirements, provide basis if design or comparable product by one of the following:
      a. Laticrete International, Inc.
      b. MAPEI Corporation.
      c. TEC; H.B. Fuller Construction Products Inc.

C. Fabric Reinforced, Fluid Applied Membrane - System consisting of liquid latex rubber or elastomeric polymer and continuous fabric reinforcement:
   1. Basis of Design - Laticrete 9235 Waterproofing Membrane and reinforcing Fabric. Subject to compliance with requirements, provide basis if design or comparable product by one of the following:
      a. Laticrete International, Inc.
      b. MAPEI Corporation.
      c. Merkrete by Parex USA, Inc.

D. Latex Portland Cement Waterproof Mortar - Flexible, waterproof mortar consisting of cement based mix and latex additive:
   1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
      a. C-Cure.
      b. MAPEI Corporation.
      c. TEC; H.B. Fuller Construction Products Inc.

E. Liquid Latex Waterproofing/Crack Isolation Membrane - Single Component, self-curing, load bearing liquid rubber polymer that forms a flexible seamless combined waterproofing membrane and crack isolation membrane compliance with ANSI A118:
   1. Basis of Design - Hydroban by Laticrete International. Subject to compliance with requirements, provide basis of design or comparable product by one of the following:
      a. Laticrete International, Inc.
      b. MAPEI Corporation.
      c. TEC; H.B. Fuller Construction Products Inc.

2.4 CRACK ISOLATION MEMBRANE

A. Crack isolation membrane complying with ANSI A118 for standard performance and recommended by manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fabric Reinforced, Modified Bituminous Sheet - Self adhering, modified bituminous sheet with fabric reinforcement facing; 0.040-inch (1 mm) nominal thickness:

1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Custom Building Products.
   b. MAPEI Corporation.

C. Fluid Applied Membrane - Liquid latex rubber or elastomeric polymer:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Custom Building Products.
   b. Laticrete International, Inc.
   c. MAPEI Corporation.
   d. Merkrete by Parex USA, Inc.
   e. TEC; H.B. Fuller Construction Products Inc.

D. Fabric Reinforced, Fluid Applied Membrane - System consisting of liquid latex rubber or elastomeric polymer and fabric reinforcement:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Bonsal American, an Oldcastle company.
   b. Bostik, Inc.
   c. Custom Building Products.
   d. Laticrete International, Inc.
   e. MAPEI Corporation.
   f. Merkrete by Parex USA, Inc.

2.5 SETTING MATERIALS

A. Dry Set Mortar (Thinset) - ANSI A108:
1. Mortar Bed - Proportions of 1 part Portland Cement to 5 parts sand:
   a. Portland Cement: ASTM C150, Type 1.
   b. Sand: ASTM C144.
   c. Water: Potable.
2. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Custom Building Products.
   b. Laticrete International, Inc.
   c. MAPEI Corporation.
3. Wall Applications: Provide mortar complying with requirements for nonsagging mortar in addition to requirements in ANSI A108.

B. Modified Dry Set Mortar (Thinset) - ANSI A118:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Laticrete International, Inc.
   b. MAPEI Corporation.
   c. TEC; H.B. Fuller Construction Products Inc.
2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at site.
3. Wall Applications: Provide mortar complying with requirements for nonsagging mortar in addition to requirements in ANSI A118.

C. Improved Modified Dry Set Mortar (Thinset) - ANSI A118:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Laticrete International, Inc.
   b. MAPEI Corporation.
   c. TEC; H.B. Fuller Construction Products Inc.

2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at Project site.
3. For wall applications, provide mortar complying with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.

D. Modified Dry Set Mortar (Medium Bed): ANSI A118; product approved by manufacturer for application thickness of 5/8 inch (16 mm).
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Laticrete International, Inc.
   b. MAPEI Corporation.
   c. TEC; H.B. Fuller Construction Products Inc.
2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at Project site.

E. Portland Cement Mortar (Thickset) Installation Materials - ANSI A108:
1. Mortar Bed - Proportions of 1 part Portland Cement to 5 parts sand:
   a. Portland Cement: ASTM C150, Type 1.
   b. Sand: ASTM C144.
   c. Water: Potable.
2. Cleavage Membrane: Asphalt felt, ASTM D226/D226M, Type I (No. 15); or polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.
3. Reinforcing Wire Fabric: Galvanized, welded-wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57 mm) diameter; comply with ASTM A1064, except for minimum wire size.
4. Expanded Metal Lath - Diamond mesh lath complying with ASTM C847:
   a. Base Metal and Finish for Interior Applications: Uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.
   b. Base Metal and Finish for Exterior Applications: Zinc coated (galvanized) steel sheet.
   c. Configuration over Studs and Furring: Flat.
   d. Configuration over Solid Surfaces: Self furring.
   e. Weight: 3.4 lb/sq. yd. (1.8 kg/sq. m).
5. Latex Additive: Styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex additive manufacturer for use with field mixed portland cement and aggregate mortar bed.

F. Tile Setting Epoxy - ANSI A118, water cleanable; 100 percent solids epoxy grout:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Polyblend Tile Grout with 100% Solids Epoxy; Custom Building Products.
   b. SpectraLOCK PRO Stainless Grout; Laticrete International, Inc.
2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 degrees F and 212 degrees F (60 degrees C and 100 degrees C), respectively, and certified by manufacturer for intended use.
3. Color: Selected by Architect.

G. EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar (Thinset) - ANSI A118:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Laticrete International, Inc.
   b. MAPEI Corporation.
   c. TEC; H.B. Fuller Construction Products Inc.
2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at Project site.

2.6 GROUT MATERIALS

A. Sand Portland Cement Grout - ANSI A108, consisting of white or gray cement and white or colored

aggregate as required to produce color indicated:
1. Portland Cement: ASTM C150, Type 1.
2. Lime: ASTM C206, Type S.
3. Sand: ASTM C144.

B. Commercial Cement Grout (Sanded Grout) - ANSI A118 for joints 1/8 inch (3.2 mm) or wider:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Custom Building Products.
   b. Laticrete International, Inc.
2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid latex form for addition to prepackaged dry grout mix.

C. High Performance Tile Grout - ANSI A118:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Custom Building Products.
   b. Laticrete International, Inc.
2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid latex form for addition to prepackaged dry grout mix.

D. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

E. Water Cleanable Epoxy Grout - ANSI A118:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   a. Polyblend Tile Grout with 100% Solids Epoxy; Custom Building Products.
   b. SpectraLOCK PRO Stainless Grout; Laticrete International, Inc.
   c. MAPEI Corp., Kerapoxy or Kerapoxy CQ Epoxy Grout.
2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 degrees F and 212 degrees F (60 degrees and 100 degrees C), respectively, and certified by manufacturer for intended use.

2.7 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. Vapor Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.

C. Metal Edge Strips:
1. Angle or L-shaped, height to match tile and setting bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A666, 300 Series exposed edge material.
   a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
   b. Blanke Corporation.
   c. Ceramic Tool Company, Inc.
   d. Schluter Systems L.P.

D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

E. Tile and Grout Sealer - Sealer for sealing grout joints and that does not change color or appearance of grout:
1. Manufacturers are subject to compliance with requirements; provide products by one of the

following:
a. Custom Building Products.
b. Summitville Tiles, Inc.
c. TEC; H.B. Fuller Construction Products Inc.

F. Sealant: Silicone sealant; refer to Section 07 92 00.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

B. Contractor is required to achieve the specified concrete moisture content prior to installation of all flooring materials or use a flooring manufacture approved moisture barrier prior to installation of all flooring products.

C. Maintain temperatures at 50 degrees F or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

3.2 EXTRA MATERIALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage 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.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

3.3 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed for compliance with requirements for installation tolerances and other conditions affecting performance of the work:
1. Verify 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 for installations indicated.
2. Verify concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108 for installations indicated:
a. Verify surfaces that received a steel trowel finish have been mechanically scarified.
b. Verify protrusions, bumps, and ridges have been removed by sanding or grinding.
3. Verify installation of grounds, anchors, recessed frames, electrical and mechanical units of

work, and similar items located in or behind tile has been completed.

4. Verify joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation after correcting unsatisfactory conditions.

3.4 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thinset 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 and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, verify tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at site before installing.

3.5 INSTALLATION

A. Comply with TCNA *Handbook for Ceramic, Glass, and Stone Tile Installation* for TCNA 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 TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used:

1. FLOOR TILE (Interior – Concrete Slab on Grade with Mortar Bed):
   a. Install tile to comply with requirements in the TCNA installation methods and ANSI A108 series of tile installation standards:
   b. TCNA Installation Method: F111 (latest version).

2. WALL TILE (Interior – Wood or Metal Studs, Coated Glass Mat Water-Resistant Gypsum Backer Board):
   a. Install types of tile designated for wall installations to comply with requirements, including those referencing TCNA installation methods and ANSI setting bed standards:
   b. TCNA Installation Method: W245 (latest version).

3. WALL TILE (Exterior – Wood or Metal Studs, Cement Backer Board):
   a. Install types of tile designated for wall installations to comply with requirements, including those referencing TCNA installation methods and ANSI setting bed standards:
   b. TCNA Installation Method: W244E (latest version).

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 trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting bed thickness so tiles are flush.

F. Jointing Pattern:
1. 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:
   a. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
   b. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
   c. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

G. Joint Widths - Unless otherwise indicated, install tile with the following joint widths:
1. Ceramic Mosaic Tile: 1/8 inch (3.2 mm).

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints:
1. Provide expansion joints and 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:
   a. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Thresholds:
1. Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated:
   a. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry set mortar (thinset).
   b. Do not extend cleavage membrane waterproofing or crack isolation membrane under thresholds set in standard dry set, modified dry set or improved modified dry set mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane, waterproofing, or crack isolation membrane with elastomeric sealant.

K. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

L. Floor Sealer: Apply floor sealer to grout joints according to floor sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

M. Waterproofing:
1. Install waterproofing to comply with ANSI A108 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate:
   a. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

N. Crack Isolation Membrane:
1. Install crack isolation membrane to comply with ANSI A108 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate:
   a. TCNA Installation Method: EJ171 series of methods.
   b. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.6 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning:

1. On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter:
   a. Remove grout residue from tile as soon as possible.
   b. 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.

3.7 PROTECTION

A. 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.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION - 09 30 00

SECTION 09 51 00 | ACOUSTICAL CEILING PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Acoustical panels.
   2. Concealed and exposed suspension systems for ceilings.
   3. Ceiling panel for food service area.
   4. Accessories necessary for a complete installation.

1.3 SUBMITTALS

A. Product Data: Technical data for each product including installation instructions.

B. Samples:
   1. Acoustic Panel: Set of 6-inch (150 mm) square samples of each type, color, pattern, and texture.
   2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch (300 mm) long samples of each type, finish, and color.

C. Coordination Drawings:
   1. Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
      a. Suspended ceiling components.
      b. Structural members to which suspension systems will be attached.
      c. Size and location of initial access modules for acoustical panels.
      d. Items penetrating finished ceiling including but not limited to the following:
         1) Lighting fixtures.
         2) Air outlets and inlets.
         3) Speakers.
         4) Sprinklers.
         5) Access panels.
      e. Perimeter moldings.

D. Maintenance Data: Manufacturer data for finishes for inclusion in maintenance manuals.

E. Submit one copy of ICC-ES Reports.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code:
      a. Comply with applicable requirements of the CBC for interior finishes:
         1) DSA Interpretation of Regulations – IR 25-2.13 Metal Suspension Systems for Lay-in Panel Ceilings.
         2) CBC - 2025 California Building Code.
         3) Chapter 19, 2025 California Building Code.

4) Chapter 23, 2025 California Building Code.
5) Acoustical Panel Standard: ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance:
a) Mounting Method for Measuring NRC: Plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface according to ASTM E795.

2. Surface Burning Characteristics:
a. Ceiling panels with surface burning characteristics complying with CBC and ASTM E1264 for Class A materials determined by testing identical products in accordance with ASTM E84:
1) Flame Spread Index: 25 or less.
2) Smoke Developed Index: 450 or less.

3. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE 7.

B. Source Limitations:
1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
2. Suspension System: Obtain each type through one source from a single manufacturer.

C. Comply with applicable regulations regarding toxic and hazardous materials:
1. Coating Based Antimicrobial Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment; and showing no mold or mildew growth when tested in accordance with ASTM D3273.
2. Panel Based Antimicrobial Treatment: Provide acoustical panels manufactured with antimicrobial treatment in the panels.

D. Pre-installation Conference: Conduct conference at site.

1.5 WARRANTY

A. Standard Ceiling Panels: Warrant ceiling panels to be free from sagging, warping, shrinking, buckling, or delaminating as a result of manufacturing defects for a period of one (1) year from the date of Substantial Completion.

B. Sag Resistant Ceiling Panels: warrant products to be free from sagging, warping, shrinking, buckling, or delaminating as a result of manufacturing defects for a period of ten (10) years from the date of Substantial Completion.

C. Standard Suspension System: Suspension systems shall be warranted to be free from defects in material or factory workmanship and shall not incur 50 percent red rust as defined by ASTM B117 test procedures for a period of ten (10) years from the date of Substantial Completion.

D. Suspension system / ceiling panels: Provide manufacturers standard 15 year warranty for suspension systems when used in combination with same manufacturers sag resistant ceiling panels. Ceiling panels to be free from sagging, warping, shrinking, buckling, or delaminating as a result of manufacturing defects. Suspension systems shall not incur 50 percent red rust as defined by ASTM B117 test during the period of the warranty, extra materials.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to site in

original, unopened packages and store in a fully enclosed, conditioned space protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, allow panels to attain room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers are subject to compliance with requirements; provide ceiling panels and grid systems by one of the following:
   1. Concealed and Exposed Suspension Grid:
      a. Armstrong World Industries, Inc.
      b. CertainTeed Corporation.
      c. Chicago Metallic; Rockfon (Roxul Inc.).
      d. Hunter Douglas.
      e. USG Interiors.
   2. Acoustical Ceiling Panel:
      a. Armstrong World Industries, Inc.
      b. CertainTeed Corporation.
      c. Rockfon (Roxul Inc.).
      d. Tectum Inc.
      e. USG Interiors.
   3. Molding and Edge Trim:
      a. Armstrong World Industries, Inc.
      b. CertainTeed Corp.
      c. Chicago Metallic Corporation.
      d. Fry Reglet Corporation.
      e. Gordon, Inc.
      f. USG Interiors, Inc.; Subsidiary of USG Corporation.
   4. Acoustical Sealant for Exposed and Concealed Joints:
      a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
      b. USG Corporation; SHEETROCK Acoustical Sealant.
   5. Acoustical Sealant for Concealed Joints:
      a. Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
      b. Pecora Corporation; AIS-919.

B. Acoustical Panel Colors and Patterns:
   1. Match appearance characteristics indicated for each product type:
      a. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E1264 and not manufacturers' proprietary product designations, provide products selected by Architect that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.2 METAL SUSPENSION SYSTEM

A. Metal Suspension System:
   1. Direct hung metal suspension systems of types, structural classifications, and finishes indicated complying with applicable requirements in ASTM C635/C635M:
      a. High Humidity Finish:

1) Comply with ASTM C635/C635M requirements for Coating Classification for Severe Environment Performance where high humidity finishes are indicated.

b. Attachment Devices - Size for five times the design load indicated in ASTM C635/C635M, Table 1 Direct Hung, unless otherwise indicated. Comply with seismic design requirements:
   1) Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E488 or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency:
      a) Type: Cast in place, postinstalled expansion or postinstalled bonded anchors.
      b) Corrosion Protection: Carbon steel components zinc plated to comply with ASTM B633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
      c) Corrosion Protection: Stainless steel components complying with ASTM F593 and ASTM F594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
      d) Corrosion Protection: Components fabricated from nickel copper alloy rods complying with ASTM B164 for UNS No. N04400 alloy.
   2) Power Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E1190, conducted by a qualified testing and inspecting agency.

2. Wire Hangers, Braces, and Ties:
   a. Zinc Coated, Carbon Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
   b. Stainless Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
   c. Nickel Copper Alloy Wire: ASTM B164, nickel copper alloy UNS No. N04400.
   d. Size: Select wire diameter so its stress at three times hanger design load (ASTM C635/C635M, Table 1 Direct Hung) will be less than yield stress of wire, but provide not less than 0.106 inch (2.69 mm) diameter wire.
3. Hanger Rods and Flat Hangers: Mild steel, zinc coated or protected with rust inhibitive paint.
4. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04 inch (1 mm) thick, galvanized steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation; with bolted connections and 5/16 inch (8 mm) diameter bolts.
5. Hold Down Clips: Provide hold down clips spaced 24 inches (610 mm) o.c. on all cross tees in areas with exterior opening larger than 48” x 96”.
6. Impact Clips: Provide impact clip system designed to absorb impact forces against acoustical panels in Gymnasiums.

B. Metal Suspension Systems:
   1. Wide Face, Steel Capped, Double Web, Steel Suspension System:
      a. Main and cross runners roll formed from cold rolled steel sheet; prepainted, electrolytically zinc coated, or hot dip galvanized according to ASTM A653/A653M, not less than G30 (Z90) coating designation; with prefinished 15/16 inch (24 mm) wide metal caps on flanges:
         1) Structural Classification: Heavy duty system.
         2) Face Design: Flat, flush.
         3) Cap Finish: Color selected by Architect.
   2. Narrow Face, Steel Capped, Double Web, Steel Suspension System:

a. Main and cross runners roll formed from cold rolled steel sheet; prepainted, electrolytically zinc coated, or hot dip galvanized according to ASTM A653/A653M, not less than G30 (Z90) coating designation; with prefinished, cold rolled, 9/16 inch (15 mm) wide metal caps on flanges:
   1) Structural Classification: Intermediate-duty system.
   2) Face Design: Flat, flush.
   3) Cap Finish: Color selected by Architect.

2.3 ACOUSTICAL PANELS

A. ACOUSTIC PANEL TYPE I (ACT-I):
1. Basis of Design Product: School Zone Fine Fissured No. 1713 by Armstrong World Industries.
2. Classification - Provide panels complying with ASTM E1264 for type, form, and pattern:
   a. Type and Form: Type III, mineral base with painted finish; Form 2, water felted.
   b. Pattern: CE (perforated, small holes and lightly textured).
3. Color: White.
4. LR: Not less than 0.85.
5. NRC: Not less than 0.70.
6. CAC: Not less than 35.
7. Edge/Joint Detail: Square.
8. Thickness: 3/4 inch (19 mm).
9. Modular Size: 24 by 24 inches (610 by 610 mm).
10. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273 and evaluated according to ASTM D3274 or ASTM G21.
11. Typical Location: **Dining and Lobby.**

B. ACOUSTIC PANEL TYPE III (ACT-III):
1. Basis of Design Product: Clean Room VL No. 868 by Armstrong World Industries.
2. Classification - Provide fire resistance rated panels complying with ASTM E1264 for type, form, and pattern:
   a. Type and Form: Type IV, mineral base with membrane faced overlay; washable vinyl film overlay.
   b. Pattern: GH (smooth and printed).
   c. Color: White.
3. LR: Not less than 0.80.
4. CAC: Not less than 40.
5. Edge/Joint Detail: Square.
6. Thickness: 5/8 inch (15 mm).
7. Modular Size: 24 by 24 inches.
8. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273 and evaluated according to ASTM D3274 or ASTM G21.
9. Typical Location: **Food preparation areas.**

C. ACOUSTIC PANEL TYPE IV (ACT-IV):
1. Basis of Design Product: Clean Room VL No. 868 by Armstrong World Industries.
2. Classification - Provide fire resistance rated panels complying with ASTM E1264 for type, form, and pattern:
   d. Type and Form: Type IV, mineral base with membrane faced overlay; washable

vinyl film overlay.
e. Pattern: GH (smooth and printed).
f. Color: White.
3. LR: Not less than 0.80.
4. CAC: Not less than 40.
5. Edge/Joint Detail: Square.
6. Thickness: 5/8 inch (15 mm).
7. Modular Size: 24 by 48 inches.
8. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273 and evaluated according to ASTM D3274 or ASTM G21.
9. Typical Location: **Food preparation areas.**

D. ACOUSTIC PANEL TYPE V (ACT-V):
1. Basis of Design Product: School Zone Fine Fissured No. 1713 by Armstrong World Industries.
2. Classification - Provide panels complying with ASTM E1264 for type, form, and pattern:
g. Type and Form: Type III, mineral base with painted finish; Form 2, water felted.
h. Pattern: CE (perforated, small holes and lightly textured).
3. Color: White.
4. LR: Not less than 0.85.
5. NRC: Not less than 0.70.
6. CAC: Not less than 35.
7. Edge/Joint Detail: Square.
8. Thickness: 3/4 inch.
9. Modular Size: 24 by 48 inches.
10. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273 and evaluated according to ASTM D3274 or ASTM G21.
11. Typical Location: **Dining and Lobby.**

2.4 MOLDING, TRIM AND ACCESSORIES

A. Shadow Molding: Where an acoustical lay in ceiling abuts a gypsum board ceiling in the same plane, provide a "W" shaped reveal or "shadow" molding similar to Armstrong Shadow Molding No. 7873.

B. Roll Formed, Sheet Metal Edge Moldings and Trim:
1. Type and profile for standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color used for exposed flanges of suspension system runners:
a. Provide edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
b. For lay in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
c. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

C. Extruded Aluminum Edge Moldings and Trim:
1. Where indicated, provide extruded aluminum edge moldings and trim of profile

indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:

a. Aluminum Alloy: 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 aluminum extrusions complying with ASTM B221 for Alloy and Temper 6063-T5.
b. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
c. Baked Enamel or Powder Coat Finish: Minimum dry film thickness of 1.5 mils (0.04 mm). Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

D. Acoustical Sealant:
1. Comply with ASTM C834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90:
a. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.
b. Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations:
1. Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use:
a. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

3.2 EXTRA MATERIALS

A. Furnish extra materials matching products installed and packaged with protective covering for storage and identified with labels describing contents:
1. Acoustical Ceiling Panels: Full size panels equal to 2 percent of quantity installed.
2. Suspension System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
3. Hold Down Clips: Equal to 2 percent of quantity installed.
4. Impact Clips: Equal to 2 percent of quantity installed.

3.3 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut for compliance with requirements specified that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation after correcting unsatisfactory conditions.

3.4 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less than half width panels at borders, and comply with layout shown on reflected ceiling plans.

3.5 INSTALLATION

A. Install acoustical panel ceilings to comply with ASTM C636/C636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA *Ceiling Systems Handbook*:
   1. Fire Rated Assembly: Install fire-rated ceiling systems according to tested fire rated design.

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers where required and, if permitted with fire resistance rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
   4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
   6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast in place hanger inserts, postinstalled mechanical or adhesive anchors, or power actuated fasteners that extend through forms into concrete.
   7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
   8. Do not attach hangers to steel deck tabs.
   9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
   11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast in place or postinstalled anchors.

D. Panel Accessibility: Install panels downward accessible by disengaging hinge support rail on one side of panel from the T Bar Flange or optional A Mount rail flange without the use of tools, for access without removal of panel from the ceiling.

E. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels:

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

F. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

G. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit:
1. Arrange directionally patterned acoustical panels with pattern running in one direction parallel to long axis of space.
2. For square edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
3. For reveal edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. For reveal edged panels on suspension system members with box shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
6. Install hold-down clips in areas indicated, in areas with exterior opening larger than 48” x 96”, where required by authorities having jurisdiction, and for fire resistance ratings; space as recommended by panel manufacturer's written instructions unless otherwise indicated.
7. Install clean room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
8. Protect lighting fixtures and air ducts to comply with requirements indicated for fire resistance rated assembly.

3.6 FIELD QUALITY CONTROL

A. Special Inspections:
1. Engage a qualified special inspector to perform the following special inspections:
a. Compliance of seismic design.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements:
1. Extent of Each Test Area:
a. When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed:
1) Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.

2) When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

D. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.7 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION - 09 51 00

SECTION 09 65 13.13 | RESILIENT BASE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Rubber topset wall base.
      a. At all wall to floor transitions, unless otherwise noted on the plans.
   2. Accessories necessary for a complete installation.

1.3 SUBMITTALS

A. Product Data: Technical data for each type of product including manufacturer's installation instructions.

B. Samples: Sample of Base Selected or Color Chart if none selected.

C. Maintenance Data: Submit for inclusion in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Entity having minimum 5 years documented experience who employs workers competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store base and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 degrees F (10 degrees C) or more than 85 degrees F (29 degrees C). Store floor tiles on flat surfaces.

1.6 PROJECT CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Maintain ambient temperatures within range recommended by Tarkett, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

C. Maintain the ambient relative humidity between 40% and 60% during installation.

D. Until Substantial Completion, maintain ambient temperatures within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

PART 2 PRODUCTS

2.1 MATERIALS

A. Basis of Design Product: Mohawk, designation of RTB-1 on Interior Color Schedule, in Construction Documents.
   1.
   2. Manufacturers and tile series, pattern, and color selections are indicated in the Finish Schedule and are a basis of design. Subject to compliance with requirements, provide product indicated in Finish Schedule or comparable product by one of the following:

      a. Flexco Floors.
      b. Johnsite, a division of Tarkett Group.
      c. Mannington Commercial.
      d. Roppe.

B. RUBBER WALL BASE – RTB-1
   1. DESIGN:
      a. TYPE: Elemental Edges
      b. PRODUCT TYPE: Rubber
      c. COLOR: As shown on the Interior Color Schedule, in the Construction Documents.
      d. MINIMUM THICKNESS: 0.125 inch (3.2 mm).
      e. HEIGHT: 4 inches, unless otherwise indicated on drawings.
      f. LENGTH: Minimum 100 foot coil, cut to length required.
      g. STYLE: Topset coved
   2. PERFORMANCE:
      a. COMPOSITION
         i. Rubber: Proprietary TP Rubber formulation including, pigments, stabilizers, and other functional fillers.
         ii. Vinyl: Proprietary vinyl formulation including, pigments, stabilizers and other functional fillers
      b. CRITICAL RADIANT FLUX: ASTM E648-Class I (>0.45 W/cm^2).
      c. FIRE RESISTANCE: ASTM E84-Class II (26-75).
      d. FLAME PROPAGATION: UL 992-< 2.0.
      e. RESILIENT WALL BASE STANDARD: ASTM F1861
   3. Outside Corners: Job formed.
   4. Inside Corners: Job formed.

C. Adhesives: Water resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 degrees F (21 degrees C) or more than 85 degrees F (29 degrees C), in spaces to receive floor tile during the following time periods:
   1. 48 hours before installation.
   2. During installation.

3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 degrees F (13 degrees C) or more than 95 degrees F (35 degrees C).

C. Close spaces to traffic for 48 hours after installation.

3.2 EXAMINATION

A. Examine substrates for compliance with requirements for maximum moisture content and other conditions affecting performance of the work:
   1. Verify that finishes of substrates comply with tolerances and other requirements specified for other work and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation after correcting unsatisfactory conditions. Installation of resilient flooring and accessories indicates acceptance of surfaces and conditions.

3.3 PREPARATION

A. Immediately before installation, sweep clean substrates to be covered by resilient base.

B. Prepare substrates according to manufacturer’s written instructions to ensure adhesion of resilient wall base.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Vacuum clean substrates to be covered by resilient products immediately before installation.

3.4 INSTALLATION

A. Comply with manufacturer's written instructions for installing flooring. Scribe and cut flooring to butt neatly and tightly to vertical surfaces, permanent fixtures, and built in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Extend flooring into toe spaces, door reveals, closets, and similar openings.

B. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on flooring as marked on substrates. Use chalk or other nonpermanent marking device.

C. Resilient Base:
   1. Comply with manufacturer's written instructions for installing resilient base. 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:
      a. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
      b. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
      c. Do not stretch resilient base during installation.
      d. On masonry surfaces or other similar irregular substrates, fill voids along top

edge of resilient base with manufacturer's recommended adhesive filler material.

e. Preformed Corners: Install preformed corners before installing straight pieces.

f. Job Formed Corners:

iii. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.

iv. Form without producing discoloration (whitening) at bends.

v. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length:

a) Miter or cope corners to minimize open joints.

2. 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.
3. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
4. Tightly adhere resilient wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
5. Do not stretch resilient base during installation.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer’s written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

C. Remove adhesive and other blemishes from exposed surfaces.

D. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION - 09 65 13.13

SECTION 09 72 00 ACOUSTICAL WALL/CEILING PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for the following:
   1. Cementitious wood fiber plank acoustical wall system

B. Related Sections:
   1. Section 09 20 00 – Plaster and Gypsum Board
   2. Section 01 81 13 – Sustainable Design Requirements
   3. Section 01 81 19 – Indoor Air Quality Requirements
   4. Divisions 23 – HVAC Air Distribution
   5. Division 26 – Electrical

C. Alternates
   1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been approved by Addenda, the specified products shall be provided without additional compensation.
   2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
   2. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
   3. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
   4. ASTM E 1264 Classification for Acoustical Ceiling Products

1.4 SYSTEM DESCRIPTION

A. Direct attached acoustical (wall or ceiling) systems manufactured from domestic cementitious wood fiber.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of Tectum® DesignArt acoustical wall unit required.

B. Samples: Minimum 6 inch x 6 inch samples of specified Tectum® DesignArt acoustical wall panel.

C. Shop Drawings: Layout and details of Tectum® DesignArt show locations of items that are to be coordinated.

D. Certifications: UL certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. Acoustical performance, products must be tested to the A, D-20, C-20, or C-40 method.

E. Country of Origin: Submittals must be accompanied by letter, label or certification indicating the manufacturing country of origin. Comply with Made in USA requirements as applicable for the project.

F. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.6 SUSTAINABLE MATERIALS

A. Transparency: Manufacturers will be given preference when they provide documentation to support sustainable requirements for the following: Material ingredient transparency, Removal of Red List Ingredients per LBCV3, Life Cycle impact information, Low-Emitting Materials, and Clean Air performance.

B. Health Product Declaration. The end use product has a published, complete Health Product Declaration with disclosure at a minimum of 1000ppm of known hazards in compliance with the Health Product Declaration open Standard.

C. Declare Label. The end use product has a published Declare label by the International Living Future Institute with disclosure of 100 ppm with a designation of Red List Free or Compliant (less than 1% proprietary ingredients).

D. Low Emitting products with VOC emissions data. Preference will also be given to manufacturers that can provide emissions data showing their products meet CDHP Standard Method v1.1 (Section 01350).

E. Life cycle analysis. Products that have communicated lifecycle data through Environmental Product Declarations (EPDs) will be preferred.

F. End of Life Programs/Recycling: Where applicable, manufacturers that provide the option for recycling of their products into new products at end-of-life through take-back programs will be preferred.

G. Products meeting LEED V4 requirements including:
1. Storage & Collection of Recyclables

2. Construction and Demolition Waste Management Planning
3. Building Life-Cycle Impact Reduction
4. Building Product Disclosure and Optimization Environmental Product Declarations
5. Building Product Disclosure and Optimization Sourcing of Raw Materials
6. Building Product Disclosure and Optimization Material Ingredients
7. Construction and Demolition Waste Management

1.7 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical wall components with appropriate markings of applicable testing and inspecting organization.
   1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.

C. Tectum® DesignArt, as with other architectural features located wall, may obstruct or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

D. Coordination of Work: Coordinate Tectum® DesignArt work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical wall units to protect site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Provide labels indicating brand name, style, size, and thickness.

C. Before installing acoustical wall units, permit them to reach room temperature and a stabilized moisture content.

D. Handle acoustical wall units carefully to avoid chipping edges or damaged units in any way.

1.7 PROJECT CONDITIONS OR SITE CONDITIONS

E. Do not install wall panels until building is closed in and HVAC system is operational.

F. Locate materials onsite at least 24 hours before beginning installation to allow materials to reach temperature and moisture content equilibrium.

G. Maintain the following conditions in areas where acoustical materials are to be installed 24 hours before, during and after installation:
   1. Relative Humidity: 65 - 75%.
   2. Uniform Temperature: 55 - 70 degrees F (13 - 21 degrees C).

1.8 WARRANTY

A. Tectum® DesignArt: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
   1. Defects in materials or factory workmanship.

B. Tectum® DesignArt one source manufacturer is Thirty (30) years from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Tectum® DesignArt Custom Wall Panels:
   1. Tectum® by Armstrong World Industries, Inc.

2.2 ACOUSTICAL WALL/CEILING UNITS

A. Acoustical Panels (AP-1):
   1. Surface Texture: Coarse
   2. Composition: Aspen wood fibers bonded with inorganic hydraulic cement
   3. Color: to match adjacent wall
   4. Size: 24” x 48”
   5. Thickness: Standard: 1”
   6. Edge Profile: Beveled
   7. Noise Reduction Coefficient (NRC): ASTM C 423 (A-mounting); (Standard NRC 0.40) Classified with UL label.
   8. Location: Team Room
   9. Dimensional Stability: HumiGuard Plus
   10. Sustainable: EPD (Environmental Product Declaration) and HPD (Health Product Declaration)
   11. USDA Certified Biobased Product, 98%
   12. Acceptable Product: Tectum® DesignArt Wall Panels as manufactured by Armstrong World Industries

B. Acoustical Panels (AP-2):
   1. Surface Texture: Coarse
   2. Composition: Aspen wood fibers bonded with inorganic hydraulic cement
   3. Color: to match adjacent wall
   4. Size: Rectangle 24” x 36”
   5. Thickness: Standard 1”
   6. Edge Profile: Beveled
   7. Noise Reduction Coefficient (NRC): ASTM C 423 (A-mounting); (Standard NRC 0.40) Classified with UL label.
   8. Location: Gym Walls
   9. Dimensional Stability: HumiGuard Plus
   10. Sustainable: EDP (Environmental Product Declaration) and HPD (Health Product Declaration)
   11. USDA Certified Biobased Product, 98%
   12. Acceptable Product: Tectum® DesignArt Wall Panels as manufactured by Armstrong

World Industriesap

PART 3 EXECUTION

3.1 EXAMINATION

A. 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.

3.2 PREPARATION

A. Measure each wall area and establish layout of Tectum® DesignArt units. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

A. Install Tectum® DesignArt system in accordance manufacturer's installation instructions. Follow the requirements pf the International Building Code and in accordance with the local building code and the authorities having jurisdiction.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken Tectum ® DesignArt

B. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any Tectum® DesignArt products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

END OF SECTION 09 72 00

SECTION 09 72 16 | VINYL-COATED FABRIC WALL COVERINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section relates to the installation of Vinyl-covered fabric wall surfaces.

B. Related Sections:
1. Section 06 10 00: Rough Carpentry.
2. Section 09 21 16: Gypsum Board Assemblies.

1.3 SUBMITTALS

A. Product Data:
1. Manufacturer's specifications and technical data.
2. Manufacturer’s installation instructions.

B. Samples: 8 inch by 10 inch samples showing manufacturer's full range of colors, textures and patterns for Architect's selection.

1.4 QUALITY ASSURANCE

A. Wall covering must carry the maximum UL Fire Hazard classification (Class A) when tested in accordance with ASTM E84.

B. Wall covering must meet CFFA-W-101.

C. Section 803.1.1 of the 2025 California Building Code:
1. Interior Wall and Ceiling Finish to meet Class A Requirements:
a. Flame spread index 0-25.
b. Smoke-developed index 0-450.

D. Adhesives shall conform to the low-emitting material requirements of SJVAPCD Rule 1168.

E. Pre-installation Conference:
1. Pre-installation conference to be conducted on job site.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers listed whose products meet or exceed those specified are approved for use on the Project. Other manufacturers shall have a minimum of five (5) years’ experience manufacturing products meeting or exceeding those specified and shall comply with Division 01 requirements for substitutions in order to be considered:
1. Basis of Design: Pro-Screen Inc Signs & Graphics, laminated vinyl or comparable product approved by Architect.
2. MDC Wallcoverings.

3. Koroseal Interior Products
4. ABC School Equipment, Inc.
5. ADP Lemco Inc.
6. Claridge Products and Equipment, Inc.
7. Chatfield-Clarke Company.

2.2 MATERIALS

A. Vinyl Wall Covering (VWC-1):
   1. Physical Properties:
      a. Material: Vinyl.
      b. Type / Fire Rating: Type II / Class A.
      c. Width: 54 inches
      d. Gauge: 26 mils.
      e. Fabric: Woven.
      f. Bacteria Resistance: Provide manufacturers standard anti-microbial additive.
      g. Color: As indicated on Drawings.
      h. Location: As indicated on Drawings.
      i. Finishing: Plotter Cut and Weeded to Shape
      j. Overlaminate: 3M 8520 Overlaminate for protection of VWC-1
      k. Unique Feature: Use of clear ink to achieve spot gloss detail.

B. Fabric: Faces, all edges, and return on through back of a minimum of 1-1/2 inch, manufactured by Maharam, “Tek-Wall”, 979 Third Avenue, Suite 1701, New York, NY 10022, Phone: (212) 319-4789, Fax: (212) 223-3129, newyork@maharam.com. ASTM E84, Class A fabric, flame spread less than 15, smoke density less than 20.

C. Fiberboard core system:
   1. Core: 1/2 inch thick, fiberboard complying with ASTM C208, medium density cellulose fiber insulating board.

D. Trims: Fabric-covered plastic and edge moldings and corner trims, manufacturer's standard, square butt joints with fabric-covered edges.

E. Accessories: Manufacturer’s materials for products specified.

F. Primer and Adhesive:
   1. Borden or other primer and adhesive recommended in writing by wall covering manufacturer. Provide mildew resistant and non-staining materials:
      a. Adhesive shall have VOC content of **50** g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 EXECUTION

3.1 APPLICATION

A. Do not begin until all walls are clean, dry, true and free of irregularities. Inspect surfaces before commencing work and report defects to General Contractor.

B. Commencement of work will be an indication that the wall covering subcontractor accepts the scheduled walls as being free of imperfections.

C. Check walls for moisture with a moisture meter and obtain readings of 5% or less before proceeding with installation.

D. Ensure wall surface flatness tolerance does not vary more than 1/8” in 10’ nor vary at a rate greater than 1/16” per running foot.

E. Fill nicks gouges, and other minor imperfections of wall surfaces with latex filler. Sand smooth flush with surface. Follow with prime coat sealer recommended by wall covering manufacturer.

F. Remove rust dirt, and grease from metal surfaces. Prime with recommended metal primer.

G. Remove switch plates, wall plates, and surface mounted fixtures in areas where wall covering is to be applied.

H. Apply one (1) coat of primer in accordance with the printed instructions of manufacturer.

I. Before beginning application of vinyl wall covering, confirm products for uniform color, texture and quality.

J. Apply vinyl wall covering vertically in lot and roll number sequence.

K. Use butt joints only (no overlapping).

L. Trim vinyl wall covering to within 3/4 inch of top of scheduled base.

3.2 CLEANING

A. At completion of job, clean all paste residue and matter from surfaces.

B. Assure that all joints have achieved continuous lamination.

END OF SECTION - 09 72 16

SECTION 09 90 00 | PAINTING AND COATING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Surface preparation and field painting of exposed items and surfaces.
   2. Field preparation and painting of factory primed metal products and fabrications.
   3. Accessories necessary for a complete installation.

B. Related Sections (Including but not limited to):
   1. Division 05: Metal Fabrications.
   2. Division 06: Rough Carpentry.
   3. Division 08: Hollow Metal Doors and Frames.
   4. Division 09: Gypsum Board Assemblies.

1.3 DEFINITIONS

A. Standard coating terms defined in ASTM D16 apply:
   1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
   2. Eggshell refers to low sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
   3. Satin refers to a slightly higher sheen than eggshell and more reflective and durable finish and is less lustrous than semi-gloss.
   4. Semigloss refers to medium sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
   5. Full gloss refers to high sheen finish with a gloss range more than 70 when measured at a 60-degree meter

1.4 SUBMITTALS

A. Product Data:
   1. Submit technical data and information for block fillers, primers, paints, and coatings, including label analysis and instructions for handling, storing, and applying each coating material proposed for use:
      a. Indicate manufacturer's instructions for special surface preparation procedures, substrate conditions requiring special attention.
      b. Material List: Provide inclusive list of required coating materials. Indicate each material and cross reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number, series, and general classification.

B. Samples:
   1. Submit for each type of paint system and in each color and gloss of topcoat:
      a. Provide stepped samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.

b. Provide list of material and application for each coat of each sample. Label each sample as to location and application.
c. Submit samples on following substrates for review of color and texture only:
   1) Concrete: Provide two 4-inch square samples for each color and finish.
   2) Concrete Masonry: Provide two 4" x 8" samples of masonry, with mortar joint in the center, for each finish and color.
   3) Painted Wood: Provide two 12-inch square samples of each color and material on hardboard.
   4) Ferrous and Nonferrous Metals: Provide two 4-inch square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.

C. Product List: Submit product list of each paint system, color, and location of application. Use same product and location designations indicated in Finish Schedule.

D. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams “Custodian Project Color and Product Information” report or equal. Manual shall include an Area Summary with Finish Schedule, Area Detail designating where each product/color/finish was used, including product data pages, Manual Safety Data sheets, care and cleaning instructions, touchup procedures, and color samples of each color and finish used.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Comply with Federal and local toxicity and air quality regulations and with Federal requirements on content of for heavy metals, including but not limited to, lead and mercury. Do not use solvents in paint products that contribute to air pollution.
   2. Comply with CARB suggested control measures using the Method 24 analysis.
   3. Performance and Durability:
      a. ASTM D16 – “Standard Test Method for Load Testing Refractory Shapes at High Temperatures.”
      b. ASTM D2486 – “Standard Test Method for Scrub Resistance of Interior Wall Paint.”
      c. ASTM D2805 – “Standard Test Method for Hiding Power of Paints by Reflectometry.”
      d. ASTM D4828 – “Standard Test Method for Practical Washability of Organic Coatings.”
      e. ASTM D3363 – “Standard Test Method for Film Hardness by Pencil Test.”

B. Applicator Qualifications: A firm or individual having minimum 5 years documented experience in applying paints and coatings similar in material, design, and extent to those indicated.

C. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

1.6 WARRANTY

A. Written warranty signed by the manufacturer and the installer in which the manufacturer and installer agree to repair or replace paint and primers that fail within specified warranty period:
   1. Failures include, but are not limited to, the following:
      a. Flaking or delamination of paint with the substrate.
      b. Rust, scale, similar imperfections due to improper surface preparation.
      c. Thinning or watering of paint beyond that considered acceptable of paint manufacturer.

d. Failure to achieve dry film thickness (DFT) recommended by manufacturer for each coat in a paint system.
e. Deterioration or loss of color of paint beyond normal weathering.

2. Warranty Period: One year from date of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F (7 degrees C):
1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

PART 2 PRODUCTS

2.1 MATERIALS

A. Basis of Specifications: **Sherwin Williams** paints:
1. Subject to compliance with requirements, provide first quality, 100% acrylic, commercial or industrial products of one of the specified manufacturers. Residential products are not permitted:
a. Proprietary Names:
1) Paint Schedule is based on a single manufacturer for convenience with exception to the paint used in specific areas where specialized coatings are required (Refer to Drawings).
2) Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that named products are required to the exclusion of comparable products of specified manufacturers.
3) Furnish product technical data, including per cent solids by weight and volume: (Method 24 analysis)
a) VOC content limits and emissions data.
b) Certificates of performance for comparable paint products of specified manufacturer.
4) Use MPI index to coordinate performance based
b. Paint Products:
1) Sherwin-Williams Co.
2) PPG Industries, Inc.
3) Dunn Edwards
4) Dulux; Theater Black (Where applicable, see Drawings)

B. Material Compatibility: Provide each paint system including block fillers, primers, and finish coats, that are compatible with one another and with substrates indicated under conditions of service and application, demonstrated by manufacturer based on testing and field experience.

C. Material Quality: Provide manufacturer's best quality commercial paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint material containers not displaying manufacturer's product identification will not be acceptable. Residential quality paint products are not permitted.

D. Chemical Components of Interior Paints and Coatings:
1. Provide products complying with limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
a. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or

more benzene rings).
b. Restricted Components: Paints and coatings shall not contain components restricted by the EPA.

E. Accessories: Materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

F. Patching Materials: Latex filler compatible with paint systems.

G. Fastener Head Cover Materials: Latex filler.

H. Theater Black: No Exceptions or alternates.

2.2 SOURCE QUALITY CONTROL

A. Testing of Paint Materials:
1. Owner reserves the right to invoke to engage the services of a qualified testing agency to sample paint materials:
   a. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to site, samples may be taken at the site. Samples will be identified, sealed, and certified by testing agency.
   b. Testing agency will perform tests for compliance with product requirements.
   c. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Apply waterborne paints when temperatures of surfaces to be painted and surrounding air are between 50 degrees F and 90 degrees F (10 degrees and 32 degrees C).

B. Do not thin or add water to waterbased paints, including waterbased alkyds.

C. Weather Conditions:
1. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
2. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 degrees F (3 degrees C) above dew point; or to damp or wet surfaces.
3. Minimum Application Temperatures for Water based Paints: Between 50 degrees F (10 degrees C) and 90 degrees F (32 degrees C).

D. Apply solvent thinned paints when temperatures of surfaces to be painted and surrounding air are between 45 degrees F. and 95 degrees F (7 degrees F and 35 degrees C):
1. Minimum Application Temperature for Varnish Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions.
2. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

E. Provide lighting level of 80-foot candles (860lx) measured midheight at substrate surface.

F. Labels: Do not paint over Underwriters Laboratories, Factory Mutual, other code required labels, or equipment name, identification, performance rating, or nomenclature plates.

3.2 EXTRA MATERIALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents:
   1. Paint: 2 percent, but not less than 1 gallon (3.8 L) of each material and color applied.

3.3 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for maximum moisture content and conditions affecting performance of the work.

B. Test substrates after repairing and cleaning substrates but prior to application of paint and coatings:
   1. Maximum moisture content of substrates, when measured with an electronic moisture meter as follows:
      a. Concrete: 12 percent.
      b. Fiber Cement Board: 12 percent.
      c. Masonry (Clay and CMUs): 12 percent.
      d. Wood: 15 percent.
      e. Gypsum Board: 12 percent.
      f. Plaster: 12 percent.
   2. Test cementitious and plaster cement/stucco for alkalinity (pH).

C. Gypsum Board Substrates: Verify joints are taped and finishing compound is sanded smooth.

D. Plaster Substrates: Verify plaster has fully cured. Verify existing plaster is in good condition and can receive new paint coating.

E. Spray Textured Ceiling Substrates: Verify surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers:
   1. Verify previously painted surfaces can be stripped to bare substrate, repaired if necessary, and prepared to receive new paint system consisting of primer and two top coats at a minimum:
      a. Note: If previously painted surfaces have failed to accept new paint systems, determine cause of failure and take corrective measures to ensure each surface accepts new paint system. Failure of new paint system is not permitted.

G. Commence paint and coating application after correcting unsatisfactory conditions and surfaces are dry. Application of coating indicates applicator’s acceptance of surfaces and conditions.

3.4 ITEMS TO RECEIVE PAINT

A. Generally, all new items that are normally painted in any typical building, including but not limited to the following list:
   1. All ferrous metal

2. All exterior galvanized metal
3. All exterior wood
4. All interior wood
5. All prime coated hardware
6. All exposed pipe, plumbing, ductwork, conduit, outlet boxes and electrical cabinets, excluding those located in mechanical rooms.
7. All metal grilles, except aluminum, unless otherwise indicated.
8. All exposed gypsum board surfaces, including all mechanical rooms.
9. Miscellaneous other items which normally require painting or are scheduled to be painted.
10. Consult plans, finish schedule, details, and specifications for other trades, as all items usually field painted or finished will be considered as part of the Contract.
11. All exposed mechanical equipment and electrical equipment.
12. Traffic lanes and parking spaces including fire lanes and crosswalks.
13. Rolling doors.
14. Bollards.
15. Loose lintels.
16. Refer to MEP specifications for additional items to receive paint.

B. All work where a coat of material has been applied must be inspected and approved by Architect before application of succeeding specified coat, otherwise no credit for coat applied will be given. Notify Architect when a particular coat has been completed for inspection and approval. Apply coats of material in strict accordance with manufacturer's specifications except where requirements of these specifications are in excess of manufacturer's requirements. Paint all sight exposed pipe and plumbing only after all mechanical work and tests have been completed.

3.5 PREPARATION

A. Coordination of Work:
   1. Review work in which primers are provided to ensure compatibility of the total system for various substrates. Notify Architect of anticipated problems when using materials specified over substrates primed by others:
      a. Preprimed Substrates: Inspect existing conditions in which primers are factory applied to ensure compatibility of the total system for each substrate. Notify Architect of anticipated problems when using the materials specified over factory primed or preprimed substrates.
      b. Existing Painted Surfaces: Inspect previously painted surfaces to ensure compatibility of the existing paints with new paint system for each substrate. Notify Architect of anticipated problems.
      c. Correct defects and clean surfaces affecting bond with paint system. Remove existing paints exhibiting loose surface defects showing signs of rust, scale, or delamination.
      d. Seal marks which may bleed through surface finishes.

B. Surface Preparation:
   1. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified. Provide barrier coats over incompatible primers or remove and reprime. If removal is impractical or impossible because of size or weight of item, provide surface applied protection before surface preparation and painting:
      a. Remove hardware and hardware accessories, plates, lighting fixtures, and similar items that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface applied protection before surface preparation and painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

b. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface applied protection if any.
c. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
d. Clean and prepare surfaces to receive paint according to manufacturer's written instructions for each substrate condition and as specified. Provide barrier coats over incompatible primers, existing paint or coating, or remove and reprime.
e. Correct defects and clean surfaces affecting bond with paint or coating system. Remove existing coatings exhibiting loose surface defects. Seal marks which may bleed through surface finishes.

C. Cleaning:
1. Before applying paint or surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and contaminants from the cleaning process will not fall on wet, newly painted surfaces:
a. Remove incompatible primers, including factory applied primers, and reprime substrate with compatible primers or apply barrier coat as necessary to produce paint systems indicated.
b. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
c. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
d. Galvanized Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
e. Aluminum Substrates: Remove surface oxidation.
2. Power Washing:
f. Loxon Self cleaning Acrylic:
1) 1 Coat Loxon LX02 Masonry Primer
2) 2 coats Loxon Self Cleaning Acrylic LX13-50

D. Mildew and Mold Removal: Remove mildew and mold by high power washing (pressure range of 1500 to 4000 psi) with solution of trisodium phosphate and bleach. If substrate is too soft for high power washing, scrub substrate with solution. Rinse with clean water and allow surface to dry.

E. Protective Coverings: Provide protections for duration of the work, including covering furnishings and decorative items. Protect and mask adjacent finishes and components against damage, marking, overpainting, and injury. Clean and repair or replace damage caused by painting.

F. Renovated Surfaces:
1. Clean surface free of loose dirt and dust. Except at gypsum board surfaces, remove existing paint and coatings to bare substrate and prepare substrates to receive new paint system. Test substrate to verify it will bond with primer and receive new paint system without failure. If test fails, clean surface to base substrate and apply barrier coat. Retest to verify surface will accept new paint system:
a. Remove surface film preventing proper adhesion and bond.
b. Wash glossy paint with a solution of sal soda and rinse thoroughly.
c. Remove loose, blistered, and defective paint and varnish; smooth edges with sandpaper.
d. Clean corroded iron and steel surfaces.
e. Repair and blend into portland cement plaster.
f. Prime bare surfaces.

g. Tone varnished surfaces with stain bringing to uniform color.
h. If existing surfaces cannot be put in acceptable condition for finishing by customary cleaning, sanding, and puttying operations, notify Owner and do not proceed until correcting unsatisfactory conditions.

G. Cementitious Substrates:
1. Prepare concrete surfaces to receive paint. Remove efflorescence, chalk, dust, dirt, grease, oils, release agents, mold, mildew, and existing paint. Roughen as necessary to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation:
a. Use abrasive blast cleaning methods if recommended by paint manufacturer.
b. Do not paint surfaces if moisture content or alkalinity of surfaces exceeds that permitted in manufacturer's written instructions:
1) Determine alkalinity and moisture content of surfaces by performing appropriate pH testing. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct condition prior to application of paint.
2) Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m).
3) Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation after substrates have obtained percent relative humidity level recommended by paint manufacturer.
4) Perform additional moisture tests when recommended by manufacturer. Proceed with installation when moisture content complies with that permitted in manufacturer's written instructions.
5) Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to thoroughly dry.

2. Clean concrete floors to receive paint or coating with a 5 percent solution of muriatic acid or etching cleaner. Flush floors with clean water to remove acid; neutralize with ammonia, rinse, allow to dry; vacuum before painting.

H. Ferrous Metals:
1. Clean ungalvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations:
a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

I. Galvanized Ferrous Metal Substrates: Clean galvanized surfaces with nonpetroleum based solvents leaving surface free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

J. Shop Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop primed surfaces.

K. Aluminum Substrates: Clean surfaces to remove oil, grease, surface oxidation, and contaminants in accordance with SSPC SP-1 Solvent Cleaning. Lightly abrade surface with

a nonmetallic pad.

L. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

M. Plaster/Stucco Substrates:
1. Remove contaminants, release agents, curing compounds, efflorescence, chalk, mold, mildew, and similar deterrents. Spot patch existing plaster to eliminate blisters, buckles, excessive crazing, and to check cracking, dryouts, efflorescence, sweat outs, and similar deflects the prevent plaster from bonding with paint or coatings. Sand or texture repair or patch to match adjacent finish and to remove trowel marks and arises:
   a. Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
   b. Deep Cracks: Clean out and fill deep cracks with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
   c. Do not paint surfaces if moisture content or alkalinity of surfaces exceeds that permitted in manufacturer's written instructions. Test for alkali using litmus paper.
   d. Allow patching and repair compounds to set and cure before painting.

N. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.

O. Wood Substrates:
1. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
2. Sand surfaces that will be exposed to view and dust off.
3. Prime, stain, or seal wood to be painted. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
4. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
5. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

P. Pipe Covering and Insulation: Clean to remove loose, foreign, and objectionable material before applying sealing coat.

Q. Preparation of Substrates for Wallcovering:
1. Prime and seal substrate with release coat in accordance with wallcovering manufacturer's recommendations for substrate:
   a. Assure compatibility with product of wall covering manufacturer.
   b. Fill indentations in substrate and prime with opaque white primer before applying release coat.
   c. Apply release coat in accordance with manufacturer's recommendations.

R. Barrier Coat: Provide barrier coats over incompatible primers or remove and reprime. Notify Owner in writing of anticipated problems using specified finish coat material over previously coated substrates.

S. Material Preparation:
1. Mix and prepare paint materials according to manufacturer's written instructions:
   a. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

b. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
c. Do not use thinners for water-based paints.
d. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.6 APPLICATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated:
1. The term *exposed surfaces* includes areas visible when permanent or built in fixtures, grilles, convector covers, covers for finned tube radiation, and similar components are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.
2. Use applicators and techniques suited for paint and substrate indicated.
3. Provide finish coats compatible with primers.
4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
5. Paint exposed surfaces. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces:
   a. Field painting of exposed surfaces include bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory applied final finish.
   b. Areas visible when permanent or built in fixtures, grilles, convector covers, covers for finned tube radiation, and similar components are in place.
   c. Extend coatings in areas, as required, to maintain system integrity and provide desired protection.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
8. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
9. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
10. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or surface imperfections. Cut in sharp lines and color breaks.
11. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
12. Provide finish coats compatible with primers used.
13. Sand lightly between each succeeding enamel or varnish coat.

B. Items not to Receive Paint: Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

C. Applicators:
1. Apply paints and coatings by brush, roller, spray, or applicators recommended by manufacturer:

a. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
b. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool recommended by manufacturer for material and texture required.
c. Spray Equipment: Use airless spray equipment with orifice size recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness:
1. Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer:
a. Measure film thickness on magnetic surfaces by use of Elcometer thickness gauge and on nonmagnetic surfaces by pit gauge or Tooke Gauge.

E. Application:
1. Apply first coat to surfaces (top, bottom, sides, edges, underneath) that have been cleaned, pretreated, or prepared for painting as soon as practicable after preparation and before subsequent surface deterioration:
a. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
b. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished after removing rust and scale and priming or touching up surface sand if acceptable to topcoat manufacturers.
c. If undercoats, stains, or conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
d. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried and cured to where it feels firm and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

F. Mechanical and Electrical Work:
1. Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces:
a. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
b. Prime and paint uninsulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, heat exchangers, tanks, ductwork, conduit, switchgear, and paintable insulation except where items are prefinished.
c. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
d. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
e. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
f. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
g. Concealed Members: Wherever steel and metal parts to receive paint are built into and concealed by construction, paint as specified for exposed parts so finish painting is complete before members are concealed.

G. Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Painting is limited to items exposed in equipment rooms and occupied spaces:
      a. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
      b. Prime and paint uninsulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, heat exchangers, tanks, ductwork, conduit, switchgear, and paintable insulation except where items are prefinished.
      c. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
      d. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
      e. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
      f. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

H. Electrostatic Spray Painting:
   1. Apply coating electrostatically to finished surfaces, free from runs, sags, visible overlaps, holidays, craters, pinholes and other defects detrimental to protective and decorative qualities of coating:
      a. Thickness of Coatings: 1.5 to 2.0 mils dry film thickness. Measure dry film thickness with magnetic gauge.
      b. Use application techniques, equipment, materials, and preparation procedures recommended by manufacturer.

I. Block Fillers: Apply block fillers to concrete masonry block at rate to ensure complete coverage with pores filled.

J. Prime Coats: Before applying finish coats, apply prime coat, recommended by manufacturer, to material required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or defects due to insufficient sealing.

K. Finish Coats:
   1. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance without bleed through:
      a. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or surface imperfections is not acceptable.
      b. Transparent (Clear) Finishes: Use multiple coats to produce glass smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats.

L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

M. Touch Up:
   1. Touch up marred, scraped, and blemished areas of surfaces which were factory primed or previously coated:
      a. Prepare and touch up scratches, abrasions, and blemishes and remove foreign matter before proceeding with succeeding coats.
      b. Touch up marred, scraped, and blemished areas of factory primed or previously coated surfaces.
      c. Feather touch up coating overlapping minimum 2 inches onto adjacent unblemished areas producing smooth, uniform surface.
      d. As soon after erection and installation as possible, touch up fasteners, welded surfaces and surroundings, field connections, and areas on which shop coat has been abraded or damaged with specified primer before corrosion and other damage occurs from exposure.

3.7 FIELD QUALITY CONTROL

A. Dry Film Thickness (DFT) Testing:
   1. Tests for dry film thickness may be determined by using a Tooke Scale and microgroover, an electronic scanner, or the Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness:
      a. Contractor shall touch up and restore painted surfaces damaged by testing.
      b. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.8 CLEANING AND PROTECTION

A. It is of the upmost importance to the AISD that the site remains in a safe, clean, and well-maintained condition. At the end of each day, leave the site ready to use by staff and students. Protect staff and students and the learning environment throughout the work.

B. Cleanup: At the end of each day, remove empty cans, rags, rubbish, and discarded paint materials from site. After completion of painting work, clean glass and paint spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. Provide *Wet Paint* signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work. After related work is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

E. At completion of painting activities, touch up and restore damaged or defaced painted surfaces.

F. Waste Management: Legally dispose of unused paint and paint containers in accordance with manufacturer’s recommendations and environmental regulations.

PART 4 SCHEDULES

A. The following is a schedule of typical painted items and does not specifically include every

item that is to receive paint but should establish type and quality of finish for all items normally included in a complete paint job.

B. Exterior Surfaces (Note: Exterior surfaces are divided into two (2) different categories, based upon color and level of graffiti resistance required. System 1 will be used when standard earthtone colors or neutral colors are specified, and System 2 will be used when bright colors (primary reds, yellows, and oranges) are specified and/or when a graffiti resistant coating is required.):
   1. Galvanized Metal **(E_GM-1)(NOT USED):**
      a. Surface Preparation: Acid etch galvanized surfaces that have not weathered at least six (6) months prior to beginning painting operations.
      b. Primer: One (1) coat Pro-Cryl Pro Industrial Universal Primer (B66W310)
      c. Finish: Two (2) coats Sher-Cryl HPA High Performance Acrylic (B66W300)
   2. Galvanized Metal - Chloramine environment **(E_GM-2) (NOT USED):**
      a. Surface Preparation: Acid etch galvanized surfaces that have not weathered at least six (6) months prior to beginning painting operations.
      b. Finish: One coat Macropoxy 646 (B58-600), two (2) coats HS Polyurethane.
   3. Un-galvanized Metal **(E_U-GM-1)**:
      a. Primer: One (1) coat Pro-Cryl Pro Industrial Universal Primer (B66W310).
      b. Finish: Two (2) coats Sher-Cryl HPA High Performance Acrylic (B66W300).
   4. Concrete and CMU **(E_C/CMU-1)**:
      a. Primer/Finish: (2) coats Loxon XP Exterior Waterproofing System, 14-18 mils wet, 6.4 – 8.3 mils dry per coat.
   5. Wood (Includes plywood siding and wooden trim) **(E_WD-1) (NOT USED):**
      a. Primer: One (1) coat A-100 Ext. Latex Wood Primer (B42).
      b. Finish: Two (2) coats A-100 Acrylic Gloss (A8 ser.).
   6. Wood (Elastomeric) (Includes plywood siding and wooden trim): Buildings J1 & L only **(E_WD-2) (NOT USED):**
      a. Primer: One (1) coat A-100 Ext. Latex Wood Primer (B42).
      b. Finish: Two (2) coats A80W01151 – SuperPaint Exterior Latex Semi-Gloss Extra White
   7. Fiber-Cement Materials/Cement plaster (Elastomeric): Buildings J1 & L only **(E_CP-1) (NOT USED):**
      a. Primer: LX02W0050 – LXN C&M PRIMER WH
      b. Finish: Two (2) coats CF11W0051 – CNFLX XL SMTH EW Semi-Gloss
   8. Fiber-Cement Materials/Cement plaster **(E_CP-2)**:
      a. Primer: One (1) coat Loxon Masonry Primer (A24W300).
      b. Finish: Two (2) coats A-100 Acrylic Gloss (A8 Series).
   9. Parking Line and Driveway Paint: Setfast Waterborne Yellow (TM225) (meets Federal Specification (FS) TTP-1952-B) **(E_PL&DP-1)**:
   10. All piping in mechanical rooms shall be painted in their entirety, in the following colors:
      a. Gas lines: Orange
      b. Domestic cold water: White
      c. Domestic hot water: Pink
      d. Heating hot water: Red
      e. Condenser water: Green
      f. Chilled water: Blue

C. Interior Surfaces:
   1. Galvanized Metal **(I_GM-1)**:
      a. Primer: One (1) coat Pro-Cryl Pro Industrial Universal Primer (B66W310).
      a. Finish: Two (2) coats Pro Industrial 0 VOC Acrylic Semi-Gloss.
   2. Shop-Primed Ferrous Metals (Use for metal doors and frames and miscellaneous metal items) **(I_SPFM-1)**:
      a. Shop coat by others.
      a. One (1) coat over Steel and Aluminum, Pro Industrial Pro-Cryl Universal Primer

(B66W610).
b. Two (2) coats Pro Industrial Acrylic Semi-Gloss, B66 Series.

3. Gypsum Wallboard **(I_GB-1)**:
   a. Primer: One (1) coat ProMar 200 Zero VOC Latex Primer (B28W2600).
   a. Finish: Two (2) coats ProMar 200 Zero VOC Latex Eg-Shel (B20W2651 Series).
   b. Alternate:
      1) Primer: One (1) coat ProMar 200 Zero VOC Latex Primer (B28W2600).
      2) Finish: Microbicidial Paint: Paint Shield (EPA# 64695-1).
         a) Substitutions must meet EPA #64695-1.
4. Primer Concrete and CMU (Enamel) **(I_C/CMU-1)**:
   a. One (1) coat ProMar Block Filler (AB25W25).
   a. Finish: Two (2) coats ProMar 200 Zero VOC Latex Semi-Gloss (B31W2651 Series).
5. Wood (Painted) **(I_WD-1)**:
   a. Primer: Premium Wall and Wood Primer (B25W8111).
   a. Finish: ProClassic Waterborne Semi-Gloss (B31 Series).
6. Wood (Stained) **(I_WD-2)**:
   a. Stain: Minwax stain.
   a. Finish (First Coat): Wood Classics Polyurethane Varnish (A67 Series).
   b. Finish (Second Coat): Wood Classics Polyurethane Varnish (A67 Series).
7. Gypsum Wallboard (Epoxy) – Kitchens, bathrooms, laboratories, etc. **(I_WD-3)**:
   a. Primer: One (1) coat ProMar 200 Zero VOC Latex Primer (B28W2600).
   b. Finish: Two (2) coats Macropoxy Epoxy, Semi--Gloss (646 Series).
      OR
   c. Finish - Two (2) coats Pro Industrial Pre-Catalyzed, Semi-Gloss (K46 Series):
      1) Location: Corridors & Stairwells.
8. CMU (Epoxy) - Kitchens, bathrooms, laboratories, etc. **(I_CMU-1)**:
   a. Primer: Two (2) coats Heavy Duty Block Filler (B42W46).
   a. Finish: Two (2) coats Macropoxy Epoxy, Semi--Gloss (646 Series).
9. Pipe and fittings, including but not limited to copper and brass, at kitchen areas (but excluding aluminum, stainless steel, nickel and chrome plated pipe and fittings):
   a. Primer: One (1) coat; product recommended for the substrate by the finish coat manufacturer.
   a. Finish: Two (2) coats bright aluminum paint, S-W BondPlex Aluminum (B71S200).

D. Paint Types: Review with Construction Drawing, Interior Finish Schedule:
   1. Paint Type (P-1):
      a. Manufacturer: See Interior Finish Schedule.
      b. Number: See Interior Finish Schedule.
      c. Style: See Interior Finish Schedule.
      d. Color: See Interior Finish Schedule.
   2. Paint Type (P-2):
      a. Manufacturer: See Interior Finish Schedule.
      b. Number: See Interior Finish Schedule.
      c. Style: See Interior Finish Schedule.
      d. Color: See Interior Finish Schedule.
   3. Paint Type (P-3):
      a. Manufacturer: See Interior Finish Schedule.
      b. Number: See Interior Finish Schedule.
      c. Style: See Interior Finish Schedule.
      d. Color: See Interior Finish Schedule.
   4. Paint Type (P-4):
      a. Manufacturer: See Interior Finish Schedule.
      b. Number: See Interior Finish Schedule.
      c. Style: See Interior Finish Schedule.

d. Color: See Interior Finish Schedule.

5. Paint Type (P-5):
   a. Manufacturer: See Interior Finish Schedule.
   b. Number: See Interior Finish Schedule.
   c. Style: See Interior Finish Schedule.
   d. Color: See Interior Finish Schedule.
6. Paint Type (P-6):
   a. Manufacturer: See Interior Finish Schedule.
   b. Number: See Interior Finish Schedule.
   c. Style: See Interior Finish Schedule.
   d. Color: See Interior Finish Schedule.

END OF SECTION - 09 90 00

SECTION 10 01 00 MISCELLANEOUS SPECIALTIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Furnish and install the following:
      a. Unistrut Support Systems
      b. Projector Support Panel

B. Related Sections:
   1. Section 26 05 19: Low-Voltage Electrical Power Conductors and Cables.
   2. Section 26 27 26: Wiring Devices.
   3. Section 27 41 00: Audio-Visual Systems.

1.3 SUBMITTALS

A. Product Data:
   1. Manufacturer’s specifications and other data needed to prove compliance with specified requirements.
   2. Manufacturer’s installation instructions.
   3. Manufacturer's operation and maintenance data, as applicable.

B. Shop Drawings: Show sizes, locations and installation details. Include utility (electrical, water, gas) requirements.

C. Samples: Color charts showing manufacturer's full range of colors.

1.4 QUALITY ASSURANCE

A. Pre-installation Conference:
   1. Refer to Section 01 31 00: Project Management and Coordination.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Specifications are based on named products and manufacturers. Other manufacturers must have a minimum of five (5) years’ experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.

2.2 MATERIALS

A. "Unistrut" Support System:
   1. UNISTRUT CHANNEL SYSTEM - The metal framing shall be by UNISTRUT CORPORATION or approved equivalent. Provide Model #P 5500 (and #P 3300SL - Stainless Steel) channels or as noted on the Drawings. Channels shall be 1-5/8"

wide with 7/8" continuous slot opening and with in-turned edges to engage spring mounted gripping nuts. Nuts shall be made of hardened steel with serrated grooves to prevent longitudinal movement. Fittings shall be accurately formed from 1/4" thick steel. Channels and fittings shall be cleaned, phosphated and coated with a rust inhibiting custom color enamel paint. Hardware shall be zinc plated in accordance with ASTM B 633 “Specification for Electrodeposited Coatings of Zinc on Iron and Steel , Type SC-1.

a) Materials used in the manufacture of framing components shall be in accordance with the following:
   1) Channel Members in accordance with ASTM A 1011 “Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength”, SS Grade 33.
   2) Fittings in accordance with ASTM A 575 “Specification for Steel Bars, Carbon, Merchant Quality, M-Grades”.
   3) Fitting Steel conforms to ASTM A 1011 “Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength”, SS Grade 33.
   4) Channel Nuts in accordance with ASTM A 675 “Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties”, Grade 60.
   5) Bolts in accordance with ASTM A 1011 “Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength ,SS Grade 33.
   6) Screws, SAE J429 Grade 2, and ASTM A 307 “Specification for Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength”.

b) All Nuts and Bolts 1/2 inch in diameter and greater shall be torqued to a minimum of 50 ft-lbs each.

B. Projector Support Panel:
1. Model No. CMA455 "Suspended Ceiling Tile Reinforcing Kit" as manufactured by CHIEF MANUFACTURING, INC. Include all necessary accessories or components to provide a complete installation.
2. UL Listed.
3. Size: 1.1" X 23.8" X 23.8".
4. Color: White.
5. Provide one 10 foot safety cable, so foot strand wire, two outlet knockouts, four turnbuckles, wood eye bolts and concrete anchors.
6. Install according to manufacturer's written instructions and recommendations.
   a) Panel shall be installed in place of 2 foot x 2 foot ceiling tile.
   b) Secure to the structure above with four tie wires.

C. Perforated Metal:
1. Model No. 178R006331 as manufactured by McNICHOLS, Include all necessary accessories or components to provide a complete installation.
2. Size: 1/8" x 1" Round-End Slot, Side Staggered, 44% Open Area
3. Gauge: 14 Gauge
4. Finish: Powder Coated, Black
5. Install according to manufacturer's written instructions and recommendations.

PART 3 EXECUTION

3.1 COORDINATION

A. Coordinate Work of this Section with work of other sections in which items are to be installed.

3.2 EXAMINATION

A. Verify utility (electrical, water, and gas) requirements, where applicable, are installed and ready for connection.

B. Verify items fastened to walls have proper blocking or support items installed.

C. Verify locations for items are ready for their installation.

3.3 INSTALLATION

A. Install all items in accordance with manufacturer's printed instructions in locations shown on drawings or otherwise indicated.

B. Provide blocking for LCD TVs mounting as indicated in drawings or per manufacturer’s instructions.

C. Fiberglass Green Screen: Grind flanges and surface where joint mud goes before bolting modules together using a palm sander with 60-grit sandpaper.

3.4 CLEANING AND ADJUSTING

A. Make final adjustment after installation and clean all backstop support piping of dirt and other substances which may affect final finish.

B. Clean all items of dirt and foreign matter which may affect appearance and operation.

C. Adjust items for proper operation.

D. Instruct Owner’s personnel on proper operation and maintenance of items.

END OF SECTION 10 01 00

SECTION 10 11 00 | MARKERBOARD AND TACKBOARD

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
1. Visual display board assemblies.
2. Floor to ceiling visual display assemblies.
3. Rail support systems for visual display board assemblies.
4. Modular support systems for visual display board assemblies.
5. Sliding visual display units.
6. Visual display conference units.
7. Natural slate chalkboards.
8. Glass markerboards.
9. Display rails.
10. Accessories necessary for a complete installation.

B. Related Sections:
1. Section 06 10 00: Rough Carpentry.
2. Section 09 21 16: Gypsum Board Assemblies.
3. Section 09 90 00: Painting and Coating.

1.3 SUBMITTALS

A. Product Data:
1. Technical data for each type of product including construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units:
a. Include electrical characteristics for motorized units.

B. Shop Drawings:
1. Submit plans, elevations, sections, details, and attachment to other work:
a. Indicate sizes and layout, method of attachment, accessories, trim, details and finish.
b. Show locations of panel joints. Show locations of field assembled joints for factory fabricated units too large to ship in one piece.
c. Show locations and layout of special purpose graphics.
d. Include sections of typical trim members.
e. Include wiring diagrams for power and control wiring.

C. Samples:
1. Submit for each type of visual display unit indicated:
a. Visual Display Panel: Not less than 8-1/2 inches by 11 inches (215 mm by 280 mm), with facing, core, and backing indicated for final work. Include one panel for each type, color, and texture required.
b. Trim: 6 inch (150 mm) long sections of each trim profile.
c. Display Rail: 6 inch (150 mm) long section of each type.
d. Modular Support System: 6 inch (152 mm) long sections.

e. Accessories: Full size Sample of each type of accessory.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface burning characteristics of tackboards.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Surface Burning Characteristics:
a. Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency:
1) Flame Spread Index: 25 or less.
2) Smoke Developed Index: 450 or less.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Accessibility Requirements:
a. Comply with applicable requirements:
1) Americans with Disabilities Act of 1990, as amended:
a) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design.
2) CBC 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA):
a) CBC Chapter 11B, Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing.

B. Installer Qualifications: Entity having minimum 5 years documented experience that employs installers and supervisors who are trained and approved by manufacturer.

C. Source Limitations: Obtain each type of visual display unit from single source from single manufacturer.

D. Mockups:
1. Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and installation:
a. Build mockup of typical wall area or visual display unit and floor to ceiling visual display assembly as shown on Drawings. Include accessories and temporary power.
b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
c. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Pre-installation Conference: Conduct conference at site.

1.5 WARRANTY

A. Porcelain Enamel Face Sheets:
1. Written warranty in which Manufacturer agrees to repair or replace porcelain enamel face sheets that fail in materials or workmanship within specified warranty period:
a. Failures include, but are not limited to, the following:
1) Surfaces lose original writing and erasing qualities.
2) Surfaces exhibit crazing, cracking, or flaking.
3) Noticeable deterioration of finish.

4) Writing surface delamination.
5) Fabric discoloration, tearing, or delamination.
6) Unit releasing from substrate.

2. Warranty Period: 5 years from date of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. NACO.

B. Equivalent manufacturers on approval.

2.2 MATERIALS

A. Porcelain Enamel Face Sheet: PEI-1002, with face sheet two or three coat process.

B. High Pressure Plastic Laminate: NEMA LD 3.

C. Natural Cork Sheet: Seamless, single layer, compressed fine grain cork sheet; bulletin board quality; face sanded for natural finish with surface burning characteristics indicated.

D. Plastic Impregnated-Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout with surface-burning characteristics indicated.

E. Vinyl Fabric: Mildew resistant, washable, complying with FS CCC-W-408D, Type II, burlap weave; weighing not less than 13 oz./sq. yd. (440 g/sq. m); with surface burning characteristics indicated.

F. Polyester Fabric: Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. yd. (508 g/sq. m); with surface-burning characteristics indicated.

G. Hardboard: ANSI A135.4, tempered.

H. Particleboard: ANSI A208.1, Grade M-1.

I. Medium Density Fiberboard: ANSI A208.2, Grade 130.

J. Fiberboard: ASTM C208 cellulosic fiber insulating board.

K. Clear Tempered Glass: ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality Q3, with exposed edges seamed before tempering.

L. Extruded Aluminum: ASTM B221, Alloy 6063.

M. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by visual display unit manufacturer.

N. Primer/Sealer: Mildew resistant primer/sealer recommended in writing by visual display unit manufacturer for intended substrate.

2.3 VISUAL DISPLAY BOARD ASSEMBLY

A. Manufacturers:
   1. Subject to compliance with requirements, provide products by one of the following:
      a. Claridge Products and Equipment, Inc.
      b. Egan Visual Inc.
      c. Comparable product.

B. Liquid Markerboard:
   1. LCS Elite – Frameless Magnetic Whiteboard
      a. Size: 5’ x 6’.
      b. Corners: Square.
      c. Writing Surface: Whiteboard Porcelain (White)
      d. Mounting Method: Direct to wall, Invisimount
      e. Orientation: Indicated on Drawings
      f. Quantity: Indicated on Drawings

C. Visual Display Board Assembly:
   1. Field or factory fabricated:
      g. Assembly: Chalkboard, markerboard, and tackboard.
      h. Corners: Square.
      i. Width: Indicated on Drawings.
      j. Height: Indicated on Drawings.
      k. Mounting Method: Direct to wall or Modular support system.

D. Chalkboard Panel:
   1. High pressure laminate faced chalkboard panel on core indicated:
      a. Color: Selected by Architect.

E. Markerboard Panel:
   1. Single:
      a. High pressure laminate faced markerboard panel on core indicated:
         1) Color: White
   2. Slider 3- panel and 4 – panel:
      a. High pressure laminated faced markerboards on sliders.
      b. Color and Pattern: Selected by Architect.

F. Tackboard Panel:
   1. Vinyl fabric faced tackboard panel on core indicated:
      a. Fabric Wrapped Edge: Wrap edge of tackboard panel with fabric facing.
      b. Color and Pattern: Selected by Architect.

G. Aluminum Frames:
   1. Fabricated from not less than 0.062 inch (1.57 mm) thick, extruded aluminum; slim size and standard shape of size and shape indicated on Drawings:
      a. Field Applied Trim: Snap on trim with no visible screws or exposed joints
      b. Aluminum Finish: Clear anodic finish.
      c. Color and Pattern: Selected by Architect.

H. Factory Applied Wood Trim: Red oak not less than 1/2 inch (13 mm) thick; standard size and shape with transparent finish.

I. Vinyl Trim: Selected by Architect.

J. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board as indicated on approved Shop Drawings.

K. Combination Assemblies: Provide hidden spline between abutting sections of visual display panels.

L. Chalktray:
1. Continuous:
   a. Box Type: Extruded aluminum with slanted front, grooved tray, and cast aluminum end closures.
   b. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.

M. Display Rail:
1. Extruded aluminum display rail with plastic impregnated cork insert, end stops, and continuous paper holder, designed to hold accessories:
   a. Size: 2 inches (50 mm) high by length indicated on Drawings.
   b. Map Hooks: Two map hooks for every 48 inches (1200 mm) of display rail or fraction thereof.
   c. Map Hooks and Clips: Two map hooks with flexible metal clips for every 48 inches (1200 mm) of display rail or fraction thereof.
   d. Flag Holder: One for each room.
   e. Tackboard Insert Color: Selected by Architect.
   f. Aluminum Color: Match finish of visual display assembly trim.

N. Paper Holder Display Rail: Extruded aluminum; designed to hold paper by clamping action.

O. Special Purpose Graphics: Fuse or paint semivisible writing guidelines, penmanship lines, music staff lines, grid, 1 inch (25 mm) square, rectangular graph coordinates, [polar graph coordinates] [horizontal lines, 2 inches (50 mm) o.c., graphic onto surface of porcelain enamel visual display unit. Exact location to be determined by District.

2.4 VISUAL DISPLAY ASSEMBLIES

A. Manufacturers:
1. Subject to compliance with requirements, provide products by one of the following:
   a. AJW Architectural Products.
   b. Claridge Products and Equipment, Inc.
   c. Egan Visual Inc.
   d. Platinum Visual Systems.

B. Markerboard Panel Assemblies:
1. Consisting of markerboard panels with high pressure laminate facing on core indicated, fabricated for floor-to-ceiling assemblies:
   a. Color: Selected by Architect.

C. Tackboard Panel Assemblies:
1. Consisting of tackboard panels with vinyl fabric or polyester fabric facing on core indicated, fabricated for floor to ceiling assemblies:

a. Edge Treatments:
   1) Panel Joint Edges: Wrapped with fabric.
   2) Top of Wall Edges: Wrapped with fabric.
   3) Bottom of Wall Edges: Wrapped with fabric.
   4) Corners: Wrapped with fabric.
b. Color: Selected by Architect.

D. Width: As indicated on Drawings.

E. Height: As indicated on Drawings.

F. Joint Accessories: Unless otherwise indicated concealed aluminum or steel spline at butt joints.

2.5 MODULAR SUPPORT SYSTEM FOR VISUAL DISPLAY BOARD ASSEMBLIES

A. Manufacturers:
1. Subject to compliance with requirements, provide products by one of the following:
   a. AARCO Products, Inc.
   b. Architectural School Products Ltd.
   c. Claridge Products and Equipment, Inc.
   d. Platinum Visual Systems.

B. Standards:
1. 72 inch (1829 mm) long extruded aluminum slotted standards designed for supporting visual display boards on panel clips. Space slots at not less than 4 inches (100 mm) o.c.:
   a. Finish and color: As selected by Architect.

C. Panel Clips: Extruded aluminum or steel with finish to match standards.

2.6 VISUAL DISPLAY CONFERENCE UNITS

A. Manufacturers:
1. Subject to compliance with requirements, provide products by one of the following:
   a. A-1 Visual Systems.
   b. AARCO Products, Inc.
   c. Architectural School Products Ltd.
   d. Best-Rite; MooreCo, Inc.
   e. Claridge Products and Equipment, Inc.
   f. Egan Visual Inc.
   g. Ghent Manufacturing, Inc.
   h. Marsh Industries, Inc.
   i. Peter Pepper Products, Inc.
   j. Platinum Visual Systems.

B. Visual Display Conference Units:
1. Factory fabricated units consisting of hinged door wood cabinet with perimeter face frame, sides, and back; not less than 3 inch (75 mm) interior depth and designed for surface wall mounting. Fabricate inside of cabinet and cabinet doors with fixed visual display units:
   a. Wood Cabinets - Fabricated from solid wood with integral, solid wood marker tray. Fabricate hinged door panels with solid wood frame and wood veneer exterior surface:
      1) Species and Finish: Red oak with natural lacquered finish.

b. Plastic Laminate Cabinets - Cabinet and hinged door panels fabricated from high pressure, plastic laminate finished wood panels; with integral marker tray:
   1) Color: Selected by Architect.
c. Hardware - Full height continuous hinges, wire door pulls, and door bumpers.
d. Fixed Rear Panel - High pressure laminate markerboard panel:
   1) Color: Selected by Architect.
e. Inside Surface of Doors - Same as fixed rear panel.
f. Inside Surface of Doors - Tackboard panel consisting of polyester fabric facing on core:
   1) Color: Selected by Architect.
g. Projection Screen - Pull down, matte, white projection screen, not less than 8 inches (200 mm) smaller in each direction than overall cabinet size, and mounted above rear visual display panel.
h. Fluorescent Light - Minimum 24 inches (610 mm) long, and mounted above rear visual display panel.
i. Width - As indicated on Drawings.
j. Height - As indicated on Drawings.
k. Accessories - Cylinder lock and flip chart pad clamp.

2.7 FINISH REQUIREMENTS

A. Comply with NAAMM *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 unacceptable. 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. Aluminum Finishes:
1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
2. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
3. Baked Enamel or Powder Coat Finish: AAMA 2603, except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Field Measurements:
1. Verify actual dimensions of construction contiguous with visual display units by field measurements before fabrication:
   a. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the work.

B. Examine roughing in for electrical power systems to verify actual locations of connections before installation of motorized, sliding visual display units.

C. Examine walls and partitions for proper preparation and backing for visual display units.

D. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.

E. Proceed with installation after correcting unsatisfactory conditions.

3.3 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation. Clean substrates of substances, such as dirt, mold, and mildew, that impair the performance of and affect the smooth, finished surfaces of visual display boards.

B. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces:
   1. Moisture Content: Maximum of 4 percent when tested with an electronic moisture meter.
   2. Prepare substrates indicated to receive glass writing surfaces required by manufacturer's written instructions to achieve a smooth, dry, clean, structurally sound surface that is uniform in color:
      a. Gypsum Board: Prime gypsum board with primer as recommended in writing by primer/sealer manufacturer and glass writing surface manufacturer.
      b. Painted Surfaces: Treat areas susceptible to pigment bleeding.

C. Prime wall surfaces indicated to receive visual display units, direct applied floor to ceiling visual display assemblies and as recommended in writing by primer/sealer manufacturer and visual display unit manufacturer.

D. Prepare recesses for sliding visual display units as required by type and size of unit.

3.4 INSTALLATION

A. Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

B. Field Assembled Visual Display Board Assemblies:
   1. Coordinate field assembled units with grounds, trim, and accessories indicated. Join parts with a neat, precision fit:
      a. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.
      b. Where size of visual display board assemblies or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
      c. Field Applied Aluminum Trim: Attach trim over edges of visual display boards and

conceal grounds and clips. Attach trim to boards with fasteners at maximum 24 inches (610 mm) o.c.

C. Factory Fabricated Visual Display Board Assemblies:
   1. Adhere to wall surfaces with egg size adhesive gobs at 16 inches (400 mm) o.c., horizontally and vertically:
      a. Field Applied Aluminum Trim - Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at maximum 24 inches (610 mm) o.c.
      b. Mounting - Height Install visual display units at mounting heights indicated on Drawings, or if not indicated, at heights indicated:
         1) Mounting Height for Grades K through 3: 24 inches (610 mm) above finished floor to top of chalktray.
         2) Mounting Height for Grades 4 through 6: 28 inches (711 mm) above finished floor to top of chalktray.
         3) Mounting Height for Grades 7 and Higher: 36 inches (914 mm) above finished floor to top of chalktray.

D. Factory Fabricated Visual Display Board Assemblies:
   1. Attach concealed clips, hangers, and grounds to wall surfaces and to visual display board assemblies with fasteners at not more than 16 inches (400 mm) o.c. Secure tops and bottoms of boards to walls:
      a. Field Applied Aluminum Trim - Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at maximum 24 inches (610 mm) o.c.
      b. Mounting Height - Install visual display units at mounting heights indicated on Drawings, or if not indicated, at heights indicated:
         1) Mounting Height for Grades K through 3: 24 inches (610 mm) above finished floor to top of chalktray.
         2) Mounting Height for Grades 4 through 6: 28 inches (711 mm) above finished floor to top of chalktray.
         3) Mounting Height for Grades 7 and Higher: 36 inches (914 mm) above finished floor to top of chalktray.

E. Natural Slate Chalkboards:
   1. Align and level joints between adjoining panels, and apply manufacturer's recommended joint filler compound. Hone and finish joints to continuous even plane:
      a. Field Applied Aluminum Trim - Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at maximum 24 inches (610 mm) o.c.
      b. Mounting Height - Install visual display units at mounting heights indicated on Drawings, or if not indicated, at heights indicated:
         1) Mounting Height for Grades K through 3: 24 inches (610 mm) above finished floor to top of chalktray.
         2) Mounting Height for Grades 4 through 6: 28 inches (711 mm) above finished floor to top of chalktray.
         3) Mounting Height for Grades 7 and Higher: 36 inches (914 mm) above finished floor to top of chalktray.

F. Display Rails:
   1. Install rails at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall surface with fasteners at not more than 16 inches (400 mm) o.c.:
      a. Mounting Height: 72 inches (1829 mm) above finished floor to top of rail.

G. Floor to Ceiling Markerboard Panels:

1. Attach panels to wall surface with egg size adhesive gobs at 16 inches (400 mm) o.c., horizontally and vertically:
   a. Join adjacent panels with concealed steel splines for smooth alignment.
   b. Join adjacent panels with exposed, H shaped aluminum trim painted to match wall panel.

H. Floor to Ceiling Tackboard Panels:
1. Attach panels to wall surface with egg size adhesive gobs at 16 inches (400 mm) o.c., horizontally and vertically:
   a. Install wrapped edge panels with butt joints between adjacent wall panels.
   b. Join adjacent panels with exposed, H shaped aluminum trim covered with same fabric as wall panels.

I. Rail Support System:
1. Install horizontal support rail at mounting heights indicated on Drawings. Attach to wall with fasteners at 12 inches (300 mm) o.c.:
   a. Mounting Height: 72 inches (1829 mm) above finished floor to top of rail.
   b. Hang visual display units on rail support system.

J. Modular Support System:
1. Install adjustable standards at mounting heights indicated on Drawings. Install standards at 48 inches (1200 mm) o.c., vertically aligned and plumb, and attached to wall with fasteners at 12 inches (300 mm) o.c.:
   a. Mounting Height: 12 inches (305 mm) above finished floor to bottom of standard.
   b. Install single slotted standard at each end of each run of standards and double slotted standards at intermediate locations.
   c. Provide locking screw at top corner of visual display board at each standard.
   d. Hang visual display units on modular support system.

K. Sliding Visual Display Units:
1. Install units at mounting heights indicated. Attach to wall framing with fasteners at not more than 16 inches (400 mm) o.c.:
   a. Adjust panels to operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

L. Visual Display Conference Units:
1. Install units at mounting heights indicated on Drawings. Attach to wall surface with concealed brackets screwed to wall:
   a. Mounting Height: 72 inches (1829 mm) above finished floor to top of cabinet.

3.5 CLEANING AND PROTECTION

A. Clean visual display units according to manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.

B. Touch up factory applied finishes to restore damaged or soiled areas.

C. Cover and protect visual display units after installation and cleaning.

END OF SECTION - 10 11 00

SECTION 10 14 00 | GRAPHICS AND SIGNAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
1. Room identification signs.
2. Restroom signs.
3. Misc. identification signs.
4. Informational signs (not identification signs).
5. Accessories necessary for a complete installation.
6. Mascot Logo.

B. Related Sections:
1. DIVISION 06: Rough Carpentry.
2. DIVISION 07: Composite Wall Panels
3. DIVISION 09: Gypsum Board Assemblies.

1.3 SUBMITTALS

A. Product Data: Technical data for each type of signage.

B. Shop Drawings:
1. Submit fabrication and installation details and attachments to other work:
a. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
b. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
c. Exterior applied signage on face of wall to include mounting brackets and support anchorage to fit condition.

C. Samples: Submit one sample of each specified sign type, full-sized.

1.4 QUALITY ASSURANCE

A. FIELD INSPECTIONS:
1. All new tactile signage must be field inspected after installation per CBC 11B-703.1.1.2.

B. ACCESSIBILITY REQUIREMENTS:
1. Raised characters shall comply with CBC Section 11B-703.2.
a. DEPTH (CBC 11B-703.2.1):
It shall be 1/32-inch (0.8 mm) minimum above their background.
b. CASE (CBC 11B-703.2.2):
Shall be uppercase only.
c. STYLE (CBC 11B-703.2.3):
Shall be sans serif. Characters shall not be italic, oblique, script, highly decorative or of other unusual forms and shall be duplicated in Braille.

d. CHARACTER PROPORTIONS (11B-703.2.4): It shall be selected from fonts where the width of the uppercase letter “O” is 60% minimum and 110% maximum of the height of the uppercase letter “I.”
e. HEIGHT (11B-703.2.5): Character height measured vertically from the baseline of the character shall be 5/ 8 inch (15.9 mm) minimum and 2 inches (51 mm) maximum based on the height of the uppercase letter "I".Stroke
f. CHACTER THICKNESS (CBC 11b703.2.6): thickness of the uppercase letter “I” shall be 15% maximum of the height of the character. See CBC Sections 11B-703.22.4 and 11B-703.2.8.
g. FINISH AND CONTRAST: Characters and their background shall have a non-glare finish. Character shall contrast with their background with either light characters on a dark background or dark characters on a light background. See CBC Section11B-703.5.1.
h. Character Spacing: Spacing between individual raised characters shall comply with CBC Section 11B-703.2.7 and 11B-703.2.8.
i. Format: Text shall be in a horizontal format. See CBC Section 11B-703.2.9.
j. Braille: It shall be contracted (Grade 2) and shall comply with CBC Sections 11B-703.3 and 11B-703.4. Braille dots shall have a domed or rounded shape and shall comply with CBC Table and Figure 11B-703.3.1.
k. Mounting Height: Tactile characters on signs shall be located 48 inches minimum to the baseline of the lowest Braille cells and 60 inches maximum to the baseline of the highest line of raised characters above the finish floor or ground surface. See CBC Section and Figure 11B-703.4.4.
l. Mounting Location:
    1) A tactile sign shall be located per CBC Section and Figure 11B-703.4.2 as follows:
        a) Alongside a single door at the latch side.
        b) On the inactive leaf at double doors with one active leaf.
        c) To the right of the right-hand door at double doors with two active leafs.
        d) On the nearest adjacent wall where there is no wall space at the latch side of a single door or at the right side of double doors with two active leafs.
        e) So that a clear floor space of 18 inches x 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45-degree open position.
m. Visual Characters: Shall comply with CBC Section 11B-703.5 and shall be 40 inches minimum above finish floor or ground.
n. Pictograms: Shall comply with CBC Section 11B-703.6.
o. Symbols of Accessibility: Shall comply with CBC Section 11B-703.7.
p. Variable Message Signs: Shall comply with CBC Section 11B-703.8.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. BASIS OF DESIGN: Pro-Screen Inc Signs & Graphics, located at: 6093 S. Lincoln Court, Fresno, CA 93725; Tel: 559-255-8079; Email: info@pro-screen.com; Web: www.pro-screen.com

B. ACCEPTABLE MANUFACTURER: Any one (1) of the following manufacturers whose product meets or exceeds the specifications for those specified is approved for use on the Project. Other manufacturers must have a minimum of five (5) years’ experience manufacturing products meeting or exceeding those specified for design, size, finish, and fabrication and comply with Division 01 requirements for substitutions in order to be considered:

1. Pro-Screen Inc Signs & Graphics
2. Or Architect approved substitute.

2.2 OR ARCHITECT APPROVED SUBSTITUTEPERFORMANCE REQUIREMENTS:

A. ALUMINUM CASTINGS: ASTM B26/B26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated. Refer to drawings for location.

B. ALUMINUM SHEET AND PLATE: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated. Refer to drawings for location.

C. ALUMINUM EXTRUSIONS: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

D. ACRYLIC SHEET: ASTM D4802, category standard with manufacturer for each sign, Type UVF (UV filtering).

E. PLASTIC LAMINATE SHEET: NEMA LD 3, general purpose HGS grade, 0.048-inch (1.2-mm) nominal thickness.

F. VINYL FILM: UV resistant vinyl film of nominal thickness indicated, with pressure sensitive, permanent adhesive on back; die cut to form characters or images indicated and suitable for exterior applications.

G. PAINTS AND COATINGS FOR SHEET MATERIALS: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

H. ACCESSORIES:
   1. FASTENERS AND ANCHORS:
      a. As necessary for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
         1) Use concealed fasteners and anchors unless indicated to be exposed.
         2) Exposed Metal Fastener Components: Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
   2. SIGN MOUNTING FASTENERS:
      a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
   3. ADHESIVE: Recommended by sign manufacturer.
   4. TWO FACE TAPE: High bond, foam core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.
   5. BITUMINOUS PAINT: Cold applied asphalt emulsion complying with ASTM D1187.

2.3 SIGNAGE

A. Laminated Plastic Tactile Room, Restroom and Miscellaneous Identification Signs:
   1. Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
      a. LAMINATED SHEET SIGN:
         1) Photopolymer face sheet with raised graphics laminated over subsurface graphics to acrylic backing sheet to produce composite sheet:
            a) Color(s): Selected by Architect from manufacture’s full range of standard

colors.

b. SIGN PANEL PERIMETER:
   1) Finish edges smooth:
      a) Edge Condition: Beveled.
      b) Corner Condition in Elevation: Square.
c. MOUNTING AT WALLS: Stainless steel vandal-proof pin-in-head torx screws Surface mounted to wall with concealed anchors.
d. MOUNTING AT GLAZING: Clear silicone adhesive.
e. TEXT AND TYPEFACE, PANEL AND PHOTO POLYMER SIGNS:
   1) Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color:
      a) Raised Characters: Refer to Drawings.
      b) California Contracted Grade 2 Braille: Refer to Drawings.
      c) Pictograms: Field height of minimum 6 inches; no characters or braille in pictogram field; nonglare, field contrast to pictogram, text descriptors below pictogram field
      d) Accessibility Symbols: Where used, symbols shall comply with CBC 11B-703.7.

B. SOLID PLASTIC TACTILE ROOM, RESTROOM AND MISCELLANEOUS IDENTIFICATION SIGNS:
1. 1/4-inch thick, Graphic Process Sand Carved with pre-drilled holes for mounting screws:
   a. Sign Panel Perimeter:
      1) Edge Condition: Square cut.
      2) Corner Condition in Elevation: 3/8” radius.
   b. Mounting at Walls: Stainless steel vandal-proof pin-in-head torx screws
   c. Mounting at Glazing: Clear silicone adhesive
   d. Text and Typeface:
      1) Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color:
         a) Raised Characters: Refer to drawings
         b) California Contracted Grade 2 Braille: Refer to drawings
         c) Pictograms: Field height of minimum 6 inches; no characters or braille in pictogram field; nonglare, field contrast to pictogram, text descriptors below pictogram field
         d) Accessibility Symbols: Where used, symbols shall comply with CBC 11B-703.7.
   e. Color: As selected by Architect from manufacture’s full range of standard colors.
   f. For exterior uses, fabricate signs from exterior grade materials with UV inhibitor.

C. CAST CHARACTERS:
1. Characters with uniform faces, sharp corners, and precisely formed lines and profiles:
   a. Character Material: Cast aluminum.
   b. Character Height: Indicated on Drawings.
   c. Finishes:
      1) Baked Enamel or Powder Coat Finish: Color to be selected by the Architect from manufacture’s full range of standard colors.
      2) Overcoat: Baked on clear coating.
   d. Mounting: Concealed studs.
   e. Typeface: Selected by Architect.

D. FIELD APPLIED, VINYL CHARACTER SIGN:
1. Prespaced characters die cut from 3 mil to 3.5 mil (0.076 mm to 0.089 mm) thick, weather resistant vinyl film with release liner on the back and carrier film on the front for onsite alignment and application:

a. Manufacturers:
   1) Subject to compliance with requirements, provide products by one of the following:
      a) Allen Markings.
      b) APCO Graphics, Inc.
      c) Mohawk Sign Systems.
      d) Seton Identification Products.
   2) Size: Indicated on Drawings.
   3) Substrate: Indicated on Drawings.

2.4 FABRICATION

A. Provide sign assemblies according to requirements indicated:
   1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
   2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
   3. Comply with AWS for recommended practices in welding and brazing. 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.
   4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
   5. Internally brace signs for stability and for securing fasteners.
   6. 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 sign finish.
   7. 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. BRACKETS:
   1. Fabricate brackets, fittings, and hardware for bracket mounted signs to suit sign construction and mounting conditions indicated. Modify brackets as necessary:
      a. Aluminum Brackets: Factory finish brackets with baked enamel or powder coat finish to match sign background color unless otherwise indicated.

2.5 FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. 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.

C. DIRECTIONAL FINISHES: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. ORGANIC, ANODIC, AND CHEMICALLY PRODUCED FINISHES: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

E. ALUMINUM FINISHES:
1. CLEAR ANODIC FINISH: AAMA 611, Class I, 0.018 mm or thicker.
2. BAKED ENAMEL OR POWDER COAT FINISH: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. FIELD MEASUREMENTS: Verify locations of anchorage devices and electrical service embedded in permanent construction by other installers by field measurements before fabrication and indicate measurements on Shop Drawings.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of signage work. Verify sign support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

B. Proceed with installation after correcting unsatisfactory conditions.

3.3 INSTALLATION

A. Install signs using mounting methods indicated and according to manufacturer's written instructions:
1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. INTERIOR WALL SIGNS:
a. Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door:
1) See drawings for the mounting height and location of each sign.
4. Before installation, verify sign surfaces are clean and free of materials or debris that impair installation.
5. 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 HEIGHT:
1. Tactile characters on signs shall be located 48 inches minimum to the baseline of the lowest Braille cells and 60 inches maximum to the baseline of the highest line of raised characters above the finish floor or ground surface, pursuant to CBC Section and Figure 11B-703.4.1.

C. MOUNTING LOCATION:
1. A tactile sign shall be located as follows, pursuant to CBC Section and Figure 11B-703.4.2:
a. Alongside a single door at the latch side.
b. On the inactive leaf at double doors with one active leaf.
c. To the right of the right-hand door at double doors with two active leafs.
d. On the nearest adjacent wall where there is no wall space at the latch side of a

single door or at the right side of double doors with two active leafs.

e. So that a clear floor space of 18 inches by 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45-degree open position.

D. MOUNTING METHODS:

1. EXPOSED FASTENER: Install vandal-resistant fastener; set screw head flush with sign face.
2. CONCEALED STUDS:
   a. Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface:
      1) Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
      2) Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
3. BRACKETS: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
4. Shim Plate Mounting: Provide 1/8 inch (3 mm) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach signs to plate using method specified above.

E. Visual Characters shall comply with CBC Section 11B-703.5 and shall be 40 inches minimum above finish floor or ground.

F. FIELD APPLIED, VINYL CHARACTER SIGNS: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.

G. SIGNS MOUNTED ON GLASS: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

H. DSA INSPECTIONS: Signs and identifications or other information shall be field inspected after installation and approved by Division of the State Architect prior to the issuance of a final certificate of occupancy, or final approval where no certificate of occupancy is issued. The inspection shall include, but not limited to, verification that Braille dots and cells are properly spaced, and the size, proportion, and type of raised characters are in compliance with CBC, Section 11B-703.1.1.2.

3.4 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

3.5 SCHEDULES

A. All items shall be as scheduled or approved equivalent items as set forth in the Substitution Section of these Specifications, and all provisions under General Conditions

B. Dimensional Letters
   1. Provide and install, where shown on the drawings, Dimensional Letters as manufactured by Pro-Screen Inc Signs & Graphics, or approved equivalent.
      a) 1" Deep Fabricated Stainless Steel or Aluminum. Height Varies, refer to drawings
      b) Custom Block Style
      c) Custom Painted (PMS colors to be provided to architect)
      d) Return Finish Painted Same as Face
      e) Stud Mount – Standard, See drawings for anchoring
      f) Refer to exterior elevations for spacing and location
      g) See spec sheet for manufacturing

C. Backlit Dimensional Letters
   1. Provide and install, where shown on the drawings, Backlit Dimensional Letters as manufactured by Pro-Screen Inc Signs & Graphics, or approved equivalent.
      a) 1" Deep Fabricated Stainless Steel or Aluminum. Height Varies, refer to drawings
      b) LED Halo Lit package includes UL or UR certified labels, documents, and required Class 2 power supplies with an interior/exterior rated enclosure
      c) Custom Block Style
      d) Custom Painted (PMS colors to be provided to architect)
      e) Return Finish Painted Same as Face
      f) Stud Mount – Standard, See drawings for anchoring
      g) Refer to exterior elevations for spacing and location
      h) See spec sheet for manufacturing

D. Illuminated Pan Channel Lettering
   1. Provide and install, where shown on the drawings, Illuminated Pan Channel Lettering as manufactured by Pro-Screen Inc Signs & Graphics, or approved equivalent.
      a) 5" Deep Illuminated Pan Channel Letters.
      b) 040 Face + 5” Aluminum Return + Backing
      c) LED package includes UL or UR certified labels, documents, and required Class 2 power supplies with an interior/exterior rated enclosure
      d) Stud Mount – Standard, See drawings for anchoring
      e) Refer to exterior elevations for spacing and location
      f) See spec sheet for manufacturing

E. Pan Channel Lettering
   1. Provide and install, where shown on the drawings, Pan Channel Lettering as manufactured by Pro-Screen Inc Signs & Graphics, or approved equivalent.
      a) 5" Deep Non-Illuminated Pan Channel Letters.
      b) 040 Face + 5” Aluminum Return + Backing
      c) Refer to exterior elevations for spacing and location
      d) See spec sheet for manufacturing

F. Pan Channel Logo Box
   1. Provide and install, where shown on the drawings, Pan Channel Logo Box as manufactured by Pro-Screen Inc Signs & Graphics, or approved equivalent.
      a) 3" Deep Non-Illuminated Pan Channel Logo Box. 60” x 102”
      b) 040 Face + 3” Aluminum Return + Backing
      c) Refer to exterior elevations for spacing and location
      d) See spec sheet for manufacturing

G. Aluminum 3D Logo
   1. Provide and install, where shown on the drawings, Aluminum 3D logo as manufactured by Pro-Screen Inc Signs & Graphics, or approved equivalent.
      a) 3" Deep Non-Illuminated Aluminum Logo. 138” x 192”
      b) 040 Face + 3” Aluminum Return + Backing
      c) Painted black with vinyl overlay
      d) Return Finish Painted Same as Face
      e) Refer to exterior elevations for spacing and location
      f) See spec sheet for manufacturing

H. Double Faced LED Illuminated Hanging Blade Sign
   1. Provide and install, where shown on the drawings, Double Faced LED Illuminated Hanging Blade Sign as manufactured by Pro-Screen Inc Signs & Graphics, or approved equivalent.
      a) 4’ – 6” radius x 24” deep
      b) Aluminum construction, extruded aluminum frame; 3MM minimum Lexan or transparent acrylics faces. Vinyl Logo overlay or custom face design from PMS color
         1) Transparent Polycarbonate or Acrylic Face color to be selected by architect
      c) LED package includes UL or UR certified labels, documents, and required Class 2 power supplies with an interior/exterior rated enclosure
      d) Refer to drawings for mounting conditions
      e) Refer to exterior elevations for spacing and location
      f) See spec sheet for manufacturing

END OF SECTION - 10 14 00

SECTION 10 21 13.19 | PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Solid plastic toilet partitions, floor mounted, overhead braced.
   2. Privacy Screens.

1.3 RELATED SECTIONS:

A. Division 05: Metal Fabrications.

B. Division 06: Rough Carpentry.

C. Division 09: Gypsum Board Assemblies.

D. Division 09: Tiling.

1.4 REFERENCES

A. ASTM A 666 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

B. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

E. United States EPA (Environmental Protection Agency) Registration - Bactericidal Surfaces Registered with the U.S. EPA to Legally Make Claims that these Materials Kill Infectious Bacteria.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Shop Drawings:
   1. Within four (4) weeks of award of contract, submit:
      a. Complete shop drawings for the Architect's approval, showing all required field measurements, all details and elevations, plans and sections required to indicate all conditions.
      b. Manufacturer's installation instructions.
      c. Samples: 2x3 inch samples in each color.

C. Certification: Provide a certificate of compliance attesting that all materials are in accordance with manufacturer's specifications.

1.6 PERFORMANCE REQUIREMENTS

A. Accessible Toilet Compartments:
   1. Wheelchair accessible compartment shall comply with CBC Section 11B-604.8.1.
   2. Toe clearance for at least one side partition of a wheelchair accessible compartment shall comply with CBC Section and Figure 11B-604.8.1.4. It shall be a minimum of 9 inches high above the finish floor, and a minimum of 6 inches deep beyond the compartment side face of the partition, exclusive of partition support members. It shall be a minimum of 12 inches high above the finish floor for children's use. Partition components at toe clearances shall be smoother without shop edges or abrasive surfaces. Toe clearance at the side partition is not required in a compartment greater than 66 inches wide.
   3. Ambulatory accessible compartments shall be provided where there are six or more toilet compartments, or where the combination of urinals and water closets total six or more fixtures. Such compartments shall be provided in the same quantity as wheelchair accessible compartments per CBC Section 11B-213.3.1 and shall comply with CBC Section 11B-604.8.2.
   4. Door and door hardware for accessible compartments shall be self-closing and shall comply with CBC Section 11B-404 except that if the approach is to the latch side of an ambulatory compartment door, clearance between the door side of the compartment and any obstruction shall be 44 inches minimum. See CBC Figure 11B-604.8.2.
   5. A door pull complying with CBC Section 11B-404.2.7 shall be placed on both sides of the accessible compartment door near the latch.
   6. Ambulatory Accessible Toilet Compartment doors shall not swing into the clear floor space or clearance required for any fixture or into the minimum required compartment area. See CBC Section 11B-604.8.2.2.

1.7 QUALITY ASSURANCE

A. Accessibility Requirements:
   1. Comply with applicable requirements.
      a. Americans with Disabilities Act of 1990, as amended.
         1) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design.
      b. CBC 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA).
         1) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.

B. Manufacturer Qualifications: Minimum 5 years' experience in manufacture of solid plastic toilet compartments with products in satisfactory use under similar service conditions.

C. Installer Qualifications: Minimum 5 years' experience in work of this Section.

D. Field Measurements:
   1. Field verify dimensions prior to submittals and fabrication.

E. Materials: Doors, panels and pilasters, constructed from high density polyethylene (HDPE) resins. Partitions to be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments. Cover all plastic components with a protective plastic masking.

F. Performance Requirements:
   1. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with ASTM E 84, Class B:
      a. Tested to Meet ASTM E84, Class B flame spread/smoke developed rating.
   2. Material Fire Ratings:
      a. National Fire Protection Association (NFPA) 286: Pass.
      b. International Code Council (ICC): Class B.
   3. Antimicrobial Touch Surfaces: Hardware touch surfaces shall be manufactured from substrates that are registered with the U.S. EPA to kill specific bacteria tested according to U.S. EPA protocols.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.9 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.

1.10 WARRANTY

A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge. Labor not included in warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. BASIS OF DESIGN: Scranton Products, which is located at: 801 E. Corey St.; Scranton, PA 18505; ASD Toll Free Tel: 800-445-5148; Fax: 855-376-6161; Email:request info (info@scrantonproducts.com); Web:https://www.scrantonproducts.com

B. ACCEPTABLE MANUFACTURER: Any one (1) of the following manufacturers whose product meets or exceeds the specifications for those specified is approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding those specified for design, size, finish, and fabrication and comply with Division 01 requirements for substitutions in order to be considered:
   1. Scranton Products, Scranton, PA.
   2. Or Architect approved substitute.

2.2 MATERIALS

A. Basis of Design: Hiny Hiders by Scranton Products.

B. Plastic Panels: High density polyethylene (HDPE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant textured surface.

C. See Construction Documents, Interior Color Schedule for style and color.

D. Designation on Interior Color Schedule within the Construction Document is PRT-1.

2.3 SOLID PLASTIC TOILET COMPARTMENTS

A. Basis of Design: Hiny Hiders Toilet Partitions as manufactured by and supplied by Scranton Products.
   1. Style: Floor mounted overhead-braced toilet compartments.

B. Doors, Panels, and Pilasters: 1 inch (25 mm) thick with all edges rounded to a radius. Mount doors and dividing panels based on height of specified system.
   1. Door and Panel Height: 55 inches (1397 mm).
   2. Panel Edge: Standard.
   3. Pilasters: 82 inches (2083 mm) high and fastened to floor.

C. Pilaster Shoes: 3 inches (76 mm) high one-piece molded HDPE. Secured to pilasters with a stainless steel tamper resistant Torx head sex bolt.

D. Headrail: Heavy-duty extruded 6463-T5 alloy aluminum with anti-grip design. Finish to be clear anodized. Fastened to headrail brackets with stainless steel tamper resistant Torx head sex bolt, and fastened at the top of the pilaster with stainless steel tamper resistant Torx head screws.
   1. Headrail Brackets: 20 gauge stainless steel with satin finish. Secured to the wall with stainless steel tamper resistant Torx head screws.

E. Wall Brackets:
   1. Bracket Type: Continuous 54 inches (1372 mm) plastic.
   2. Brackets are fastened to pilasters with stainless steel tamper resistant Torx head screws and fastened to the panels with stainless steel tamper resistant Torx head sex bolts.
   3. Bracket Type: Continuous stainless steel.

F. Door Hardware:
   1. Accessible Toilet Compartments:
      a. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds maximum. CBC Section 11B-604.8.1.
   2. Stainless Steel Helix Hinge:
      a. Hinges operate on field-adjustable nylon cams, field adjustable in 30-degree increments.
      b. Operate accessible stalls per 11B-404.2.9.
   3. Door Strike/Keeper:
      a. Heavy-duty extruded aluminum 6436-T5 alloy with a bright dip anodized finish.
      b. Secured to pilasters with stainless steel tamper resistant Torx head sex bolts.
      c. Bumper shall be made of extruded black vinyl.
      d. Accessible compartment: 11B-604.8.1.
   4. Latch Mechanism: Healthy Hardware Slide Bolt, Pulls and Coat Hook: Made from U.S. EPA registered materials by manufacturer currently holding U.S. EPA Company Number, U.S. EPA Establishment Number and California Broker's License. Satin finish.
   5. Latch Mechanism: Occupancy Indicator Latch and Housing:
      a. Material: Satin stainless steel.
      b. Occupancy indicators: Green for occupied and red not occupied.
      c. Slide bolt and button.
      d. Accessible Latch to comply with 11B-404.
   6. Coat Hook:
      a. Doors supplied with one coat hook/bumper and door pull made of chrome plated

Zamak.
b. Accessible Stalls only: 11B-602 through 11B-612.
1) Height: 48 inches A.F.F. maximum.
7. Door Pulls:
a. Chrome plated Zamak.
b. Accessible Stalls: 11B-404.2.7.
c. Equip outswing handicapped doors with second door pull and door stop.

2.4 SOLID PLASTIC PRIVACY SCREENS

A. Provide plastic privacy screens in urinal and entry toilet room applications as indicated or scheduled.

B. Panels, and pilasters, if required, 1 inch (25 mm) thick with edges rounded to a radius. Screens to be mounted at 14 inches (356 mm) above the finished floor. Color as selected by Architect from manufacturer's full line of current colors.
1. Aluminum heat sink fastened to bottom edges.
2. Recycled Content: Minimum 25 percent.

C. Screen Type: Wall mounted.
1. Urinal Screens: 24 inches (610 mm) wide by 42 inches (1067 mm) high.

D. Wall Brackets: Extruded PVC plastic. Fastened to the panel/pilaster with stainless steel tamper resistant torx head screws and fastened to wall with stainless steel tamper resistant torx head sex bolts.
1. Length of Wall Brackets: 41 inches

E. Headrail: heavy duty aluminum extrusions, anodized with anti-grip configuration, and shall be fastened to the pilaster tops.

PART 3 EXECUTION

3.1 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.

3.2 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. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.3 INSTALLATION

A. Install in accordance with manufacturer's printed instructions.

B. Install all toilet partitions where indicated on the drawings, and as indicated on the shop drawings, anchoring all components firmly in place for long life under hard use and in

complete accordance with the manufacturer's recommendations.

C. Provide blocking/anchoring devices to secure to wall. Anchoring devices must be compatible to wall type to ensure adequate strength.

D. Install partitions rigid, straight, plumb, and level manor, with plastic laid out as shown on shop drawings.

E. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8 inch (9.5 mm).

F. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.

G. Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.4 CLEANING AND ADJUSTING

A. Clean surfaces free of dirt, oil, grease and other contaminants which detract from appearance of partitions.

B. Except for compartments for the handicapped, adjust doors to remain at a uniformly open position when unlocked.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 REPLACEMENT OF DEFECTIVE MATERIALS

A. Defaced, damaged, scratched or marred materials will not be permitted, will be considered defective, and rejected. Rejected materials shall be replaced with new materials at no additional expense to Owner.

END OF SECTION - 10 21 13.19

SECTION 10 26 13 - WALL PROTECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Corner guards.
   2. Accessories necessary for a complete installation.
   3. DIVISION 06 and DIVISION 09 for in wall blocking for fasteners.

1.3 SUBMITTALS

A. Product Data:
   1. Technical data for each product, including construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes:
      a. Fire Ratings: Where applicable, indicate fire ratings of units recessed in fire rated walls and listings for door protection items attached to fire rated doors.

B. Shop Drawings: Submit for each wall and door protection showing locations and extent of work including plans, elevations, sections, and attachment details. Show handrail design and support spacing required to withstand structural loads.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. FIRE PERFORMANCE CHARACTERISTICS:
      a. Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
      b. Provide engineered PVC FREE wall protection system components with UL label indicating that they are identical to those tested in accordance with ASTM E84 for Class A/1 characteristics listed below:
         1) Flame spread: 25 or less
         2) Smoke developed: 450 or less
         3) Fire performance characteristics: Provide engineered PVC FREE wall protection units with fire barrier that are identical to those tested in accordance with UL-263 (E-119) for one hour or two hour rated installation.
   2. ACCESSIBILITY REQUIREMENTS:
      a. Comply with applicable requirements:
         1) U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) 2010.
         2) ICC/ANSI A117.1 Accessible and Useable Building and Facilities.
         3) CBC, Section 11B Accessibility.
   3. IMPACT STRENGTH:
      a. Provide wall protection components that have been tested for impact using a ram-type impact test in accordance with the applicable provisions of ASTM F476 -84 .
   4. Abrasion testing in accordance with ASTM D 4060-7, Standard Test Methods for

Abrasion Resistance of Organic Coatings by the Taber Abraser.

5. Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.
6. Color match: Provide wall protection components that are color matched in accordance with the following:
   a. Delta Ecmc of no greater than 1.0 using CIELab color space.

B. Source Limitations: Obtain wall and door protection products from single source from single manufacturer.

C. Installer qualifications: Engage an installer who has no less than 3 years' experience in installation of systems similar in complexity to those required for this project.

D. Manufacturer's qualifications: Not less than 5 years' experience in the production of specified products and a record of successful in-service performance.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the project site in unopened original factory packaging clearly labeled to show manufacturer.

B. Store materials in original, undamaged packaging in a cool, dry place out of direct sunlight and exposure to the elements. A minimum room temperature of 40°F (4°C) and a maximum of 100°F (38°C) should be maintained.

C. Material must be stored flat.

1.6 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.

1.7 WARRANTY

A. Written warranty in which the manufacturer agrees to repair or replace components of wall and door protection units that fail in materials or workmanship within specified warranty period:
   1. Failures include, but are not limited to, the following:
      a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
      b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
   2. Warranty Period: Five years from date of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity:
   1. Maintain room temperature within storage area at not less than 70 degrees F (21 degrees C) during the period plastic materials are stored.
   2. Keep plastic materials out of direct sunlight.
   3. Store plastic wall and door protection components for a minimum of 72 hours, or until

plastic material attains a minimum room temperature of 70 degrees F (21 degrees C):
a. Store corner guard covers in a vertical position.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Unless noted otherwise, specifications are based on products of manufacturer listed below. Manufacturers whose products meet or exceed the specifications, who have manufactured and installed the materials and systems of the type specified may apply for approval as a substitution in accordance with Division 01 requirements regarding substitutions. The following are approved manufacturers subject to compliance with requirements:

B. BASIS-OF-DESIGN PRODUCT:
1. **CONSTRUCTION SPECIALTIES,**
3 Werner Way, Lebanon, NJ 08833 USA 800-233-8493; email: cet@c-sgroup.com
2. InPro Corporation (IPC).
3. JL Industries, Inc.
4. Korogard Wall Protection Systems.

2.2 MATERIALS

A. ALUMINUM:
1. Continuous 6063-T6 aluminum retainer behind entire height of corner guard, minimum 0.070 inch thick.
2. Minimum strength and durability properties as specified in ASTM B221.
3. To be alloy 5005 H34 with clear anodized finish for models ACO-8 and ACO-8M; minimum strength and durability properties as specified in ASTM B221.
4. All necessary fasteners to be supplied by the manufacturer.

B. PLASTIC MATERIALS:
1. Engineered PVC FREE: Extruded material should be high-impact Acrovyn 4000 with Shadowgrain texture, nominal .078" (1.98mm) thickness. Chemical and stain resistance should be per ASTM D543 standards as established by the manufacturer. Colors to be indicated in the finish schedule from one of manufacturer’s available colors and patterns.
2. Chemical and stain resistant, high impact resistant plastic with integral color throughout; extruded and sheet material as required; thickness as indicated.

C. STAINLESS STEEL:
1. To be type 304 alloy with #4 satin finish for models CO-8 and CO-8M; minimum strength and durability properties as specified in ASTM A240.

D. FASTENERS:
1. Aluminum, nonmagnetic stainless steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security type fasteners where exposed to view.
2. All necessary fasteners to be supplied by the manufacturer.

E. Adhesive: Recommended by protection product manufacturer.

2.3 CORNER GUARDS (PVC FREE):

A. Engineered PVC FREE Corner Guards to be CS Acrovyn: Flush mounted, tamper resistant, guards consisting of continuous aluminum retainer with snap- on Acrovyn 4000 cover.

Retainer to be taped and spackled into adjacent drywall. Extruded aluminum base and closure gasket where indicated. Attachment hardware shall be appropriate for wall construction.

1. Model FS-10N 90° flush mounted, tamper resistant, corner guard with 3" (77.6mm) legs and 1" (25.4mm) radiused cover. For odd degree corners specify model FS-10MN. For optional integral fire barrier, specify FS-10RN 1HR (or FS-10MRN 1HR) for one hour fire rated installation or FS-10RN 2HR (or FS-10MRN 2HR) for two-hour fire rated installation.
2. COLOR: See color schedule in construction documents.
3. FABRICATION:
   a. General: Fabricate wall protection systems to comply with requirements indicated for design, dimensions, detail, finish and member sizes.

2.4 CORNER GUARD (STAINLESS STEEL):

A. Stainless steel corner guards to be CS Acrovyn: Surface mounted guards to be 16 gauge stainless steel.
   1. Model CO-8 90° stainless steel corner guard with 3/16" (4.8mm) radius and 3 1/2" (88.9mm) standard legs. Bull nose 3/4" (19.1mm) radius optional. Mounted with construction adhesive standard; stainless steel screws optional. Available in variable angles and leg sizes. For odd angle specify model CO-8M. Optional powder coat finish available; select from standard powder coat finishes.
   2. FABRICATED:
      a. As one piece from formed or extruded metal with formed edges; with 90 degree or 135 degrees turn to match wall condition.
      b. Preassemble components in shop as much as possible to minimize field assembly.
      c. Mounting: Flat head, countersunk screws through factory drilled mounting holes.
   3. FINISH:
      a. Directional satin, No. 4.
      b. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applications and designations of finishes.

2.5 FABRICATION

A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

C. Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.6 FINISHES

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. 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.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of the work.

B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

C. Proceed with installation after correcting unsatisfactory conditions.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing wall and door protection.

B. Prior to installation, clean substrate to remove dirt, debris, and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.

C. PROTECTION: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3.3 INSTALLATION

A. Installation Quality: Install wall protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.

C. Accessories:
   1. Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation:
      a. Provide anchoring devices and suitable locations to withstand imposed loads.
      b. Where splices occur in horizontal runs of more than 20 feet (6.1 m), splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches (305 mm) apart.
      c. Adjust end and top caps as required to ensure tight seams.

3.4 CLEANING

A. General: Immediately upon completion of installation, clean material 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.

PART 4 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 - 10 26 13

SECTION 10 28 13 | TOILET ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
1. Public use washroom accessories.
2. Public use shower room accessories.
3. Private use bathroom accessories.
4. Warm air dryers.
5. Childcare accessories.
6. Underlavatory guards.
7. Custodial accessories.
8. Accessories necessary for a complete installation.

1.3 PERFORMANCE REQUIREMENTS

A. Sanitary Facility Elements:
1. Elements of sanitary facilities shall be mounted at locations in compliance with CBC Sections 11B-602 through 11B-612.
2. Grab bars in toilet facilities and bathing facilities shall comply with CBC Section 11B-609.
3. Grab bars and any wall or other surfaces adjacent to grab bars shall be free of sharp or abrasive elements and shall have rounded edges. The space around the grab bars shall be as follows:
   a. 1 ½ inches between the grab bar and the wall.
   b. 1 ½ inches minimum between the grab bar and projecting objects below and at the ends.
   c. 12 inches minimum between the grab bar and projecting objects above.
4. Grab Bars to meet DSA IR 16-12 – Grab Bar Design and Connections: 2025 CBC.
   a. Grab Bars shall be designed to resist a single concentrated load of 250 lbs. applied in any direction at any point o the grab bar such as to produce the maximum load effect.

1.4 SUBMITTALS

A. PRODUCT DATA:
1. Technical Data including construction details, material descriptions, dimensions of individual components and profiles, and finishes:
   a. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
   b. Include electrical characteristics.

B. SAMPLES:
1. Full size, for each exposed product and for each finish specified:
   a. Approved full size Samples will be returned and may be used in the Work.

C. PRODUCT SCHEDULE: Show types, quantities, sizes, and installation locations by room of

each accessory required. Identify locations using room designations indicated.

D. MAINTENANCE DATA: Submit for inclusion in maintenance manuals.

1.5 QUALITY ASSURANCE

A. ACCESSIBILITY REQUIREMENTS:
1. Comply with applicable requirements:
a. Americans with Disabilities Act of 1990, as amended:
1) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design
b. CBC 2025 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA):
1) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.

B. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. SOURCE LIMITATIONS: Obtain products from single source from single manufacturer.

1.6 WARRANTY

A. Written warranty signed by manufacturer in which manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period:
1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS

A. MANUFACTURERS:
1. Toilet accessories schedule is based on Bobrick Washroom Equipment. Subject to compliance with requirements, provide products by one of the following:
a. AJW Architectural Products.
b. American Specialties, Inc.
c. Bobrick Washroom Equipment, Inc.
d. Bradley Corporation.
e. Brey-Krause Manufacturing Co.
f. GAMCO Specialty Accessories; a division of Bobrick.
g. Tubular Specialties Manufacturing, Inc.

B. STAINLESS STEEL: ASTM A666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.

C. BRASS: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.

D. STEEL SHEET: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.

E. GALVANIZED STEEL SHEET: ASTM A653/A653M, with G60 (Z180) hot dip zinc coating.

F. GALVANIZED STEEL MOUNTING DEVICES: ASTM A153/A153M, hot dip galvanized after

fabrication.

G. FASTENERS: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

H. MIRRORS: ASTM C1503, Mirror Glazing Quality, clear glass mirrors, nominal 6.0 mm thick.

I. ELECTRIC DRYER:
1. Product - Model RA5-974 by World Dryer:
   a. Material: Cover made of 1/4” thick cast iron with porcelain enamel finish.
   b. Motor shall be universal type, 1/10 HP at 7500 RPM. Dryers shall deliver 200 cubic feet per minute of air volume (7300 LFM).
   c. Timer shall be electromechanical cam-style with 25 AMP rated switch to operate dryer for 30 second period on push button units.
   d. Infrared sensor detects hands, initiates and terminates drying on automatic units.
   e. Recessed units are made with cast iron covers and use a 16-gauge steel wall mounting box.
   f. Hand dryers shall be listed under reexamination service of Underwriters Laboratories, Inc.

2.2 COMPONENTS

A. UNDERLAVATORY GUARD:
1. Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with piping and/or burns from piping; allow service access without removing coverings:
   a. Product: Truebro LavShield Protective Lavatory Enclosure.
   b. Material and Finish: Antimicrobial, molded plastic, white.
   c. Provide at all lavatories.

2.3 FABRICATION

A. Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. KEYS: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 EXECUTION

3.1 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

3.2 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. GRAB BARS: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F446.

3.3 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items. Remove temporary labels and protective coatings. Clean and polish exposed surfaces according to manufacturer's written recommendations.

PART 4 SCHEDULE

4.1 ACCESSORY SCHEDULE

A. TA-1 - Soap Dispensers:
1. Mounting: Surface.
2. Model No.: B-2111 (vertical)
3. Model No.: B-2112 (horizontal).
4. Locations: Refer to drawings.

B. TA-2 - Mirrors:
1. Mounting: Surface.
2. Model No.: B-290.
3. Size: 24 inches by 36 inches (600 mm by 900 mm), unless shown otherwise.
4. Locations: Refer to drawings.

C. TA-3 - Toilet Paper Dispensers (At Typical Non-accessible Toilet Stalls):
1. Mounting: Surface.
2. Model No.: B-2888.
3. Locations: Non-accessible water closets and toilet stalls.

D. TA-4 - Paper Towel Dispensers:
1. Mounting: Surface (Less than 4” projection)
2. Model No.: B-262.
3. Locations: Refer to drawings.

E. TA-5 - Grab Bars: Typical Accessible Toilet Stalls:
1. Size/Finish: 42” x 1-1/2 inch diameter satin stainless steel
2. Clearance: 1-1/2 inch between rail and wall.
3. Model No.: B-6806.
4. Mounting: Attach with concealed mounting kit. Mount parallel to floor.
5. Location: Accessible water closets and toilet stalls.

F. TA-6 - Sanitary Napkin Dispensers:
1. Mounting: Recessed.
2. Model No.: B-2706.
3. Operation: Single coin / Double coin - (25/50 cents).
4. Capacity: 20 Napkins/ 30 Tampons.
5. Locations: Women’s toilet room.

G. TA-7 - Sanitary Napkin Disposal:
1. Mounting: Surface.
2. Model No.: B-270.
3. Capacity: 1.0 gal.
4. Locations: Women’s toilet stalls.

H. TA-8 - Mop and Broom Holder:
1. Mounting: Surface.
2. Model No.: B-239 x 34.
3. Capacity: Four hooks, three mop holders.
4. Locations: Mop sink at each custodial rooms.

I. TA-9 - Grab Bars: (At Accessible Shower):
1. Mounting: Surface.
2. Model: B-6861 modified (24 x 16).
3. Locations: Accessible shower stalls.

J. TA-10(a) - Folding Benches: Adult Height:
1. Mounting: Surface, reversible.
2. Models: B-5181.
3. Locations: Accessible shower stalls.

K. TA-10(b) - Folding Benches, Child Height (15 inch (375 mm) seat height):
1. Mounting: Surface, reversible.
2. Models: Bradley 9561.
3. Locations: Accessible shower stalls.

L. TA-11 - Clothes Hook:
1. Mounting: Surface.
2. Model No.: B-6717.
3. Locations: All shower locations.
4. Toilet and Shower Partitions: If toilet and shower partitions are utilized, hooks are to be provided by the partition manufacturer(s) as part of their hardware package.

M. TA-12 - Shower Curtains, Rods and Hooks:
1. Rods: B-047 (36 inches or as indicated).
2. Curtains: B-6047 to 72” (42 inches x 72 inches or as required).
3. Hooks: B-204-1.
4. Mounting/Locations: Accessible shower stalls.

N. TA-13(a) - Electric Hand Dryers:
1. Mounting: Semirecessed, maximum 3-9/16 inch recess.
2. Model No.: B-750, white.
3. Voltage: 120 volt, single phase.
4. Location: Refer to drawings.

O. TA-13(b) – Paper Towel Dispenser:
1. Mounting: Surface mount..
2. Model No.: B-26212, white.
3. Location: Refer to drawings.
4. Dimensions: 10 ¾” W x 7 1/8” H x 4” Deep.

P. TA-14 - Paper Towel Dispenser/Trash Receptacle Combination:
1. Mounting: Surface.
2. Model No.: B-3949.
3. Locations: Refer to drawings.

Q. TA-15 - Grab Bars: (At Typical Semi-ambulatory Toilet Stalls):
1. Size/Finish: 42” x 1-1/2 inch diameter satin stainless steel
2. Clearance: 1-1/2 inch between rail and wall.
3. Model No.: B-6806-42.

4. Mounting: Attach with concealed mounting kit. Mount parallel to floor.
5. Location: Semi-ambulatory toilet stalls.

R. TA-16 - Diaper Changing Stations:
1. Type: Horizontal station to accommodate infants and toddlers.
2. Construction and Features:
   a. FDA approved injection molded polypropylene with steel on steel hinge system. Fabricate to withstand static loads over 400 pounds.
   b. Child protection straps with snap lock fasteners.
   c. Built in diaper bag hooks.
   d. Built in sanitary liner dispensers; 3 ply, biodegradable.
   e. Premium gas spring mechanism.
   f. Molded usage and safety instructions in six languages and Braille.
   g. ADA compatible.
   h. Antifungal to comply with ASTM standards.
3. Color: Selected by Architect from the full list of standard colors.
4. Dimensions: 35 inches long by 22 inches high by 4 inches deep (875 mm by 550 mm by 100 mm).
5. Approved Product/Manufacturer: Koala Bear Kare Baby Changing Stations, Model KB 200, manufactured by Koala Bear Kare.

S. TA-17 - Trash Receptacle:
1. Mounting: Recessed
2. Model No.: B3644.
3. Locations: Refer to drawings.

T. TA-18 - Toilet Paper Dispensers:
1. Mounting: Semi-recessed (Less than 4” projection).
2. Model No.: B-3888.
3. Location: Accessible water closets and toilet stalls.

U. TA-19 - Seat Cover Dispenser:
1. Mounting: Surface.
2. Model No.: B-221
3. Location: All water closets and toilet stalls.

V. TA-20 - Sanitary Napkin Disposal:
1. Mounting: Recessed.
2. Model No.: B-353.
3. Locations: Women’s accessible toilet stalls.

END OF SECTION - 10 28 13

SECTION 10 44 00 | FIRE EXTINGUISHER AND CABINETS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:
1. Fire Extinguisher Cabinets.
2. Fire Extinguishers

B. Related Sections:
1. Section 06 10 00: Rough Carpentry.

1.3 SUBMITTALS

A. Product Data:
1. Manufacturer's specifications and technical data to indicate specification compliance.
2. Manufacturer’s installation instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Specifications are based on the products of named manufacturers. Other listed manufacturers who produce products equivalent to those specified are approved for use on the Project. Other manufacturers must have a minimum of five (5) years’ experience manufacturing equivalent to those specified and comply with Division 01 requirements regarding substitutions to be considered:
1. Larsen's Manufacturing Co.
2. The Williams Bros. Corporation of America.
3. J. L. Industries, Inc.
4. Potter-Roemer.

2.2 MATERIALS

A. Fire Extinguishers and Cabinets must comply with CBC Sections 11B-307, 11B-308, 11B-309, and 11B-403.

B. Fire Extinguisher Cabinets (FEC):
1. Size: 24 inches x 9-1/2 inches x 6 inches inside tub dimension.
2. Type: Semi-recessed with 2-1/2 inch return trim rolled edge; ADA compliant.
3. Tub Construction: 22 gauge min. steel with standard baked acrylic enamel interior finish.
4. Door and Frame: 18 gauge min. 304 stainless steel door and frame with vertical decal lettering "FIRE EXTINGUISHER" in red color, unless directed otherwise by Architect.
5. Glazing: clear acrylic “Duo” vertical glazing panel
6. Hardware: Continuous concealed piano hinge constructed of material which matches door and trim material. Satin finish pull handle with cam cylinder lock with safety pull designed to release upon firm pull on handle (Larsen’s “Larsen-Loc”™, J.L. Industries

"Saf-T-Lok"™; or equivalent).

7. Bracket: Hook type; Larsen's #1007, or equal.
8. Finish of Exterior: #4 Stainless steel.
9. Fire rating: as occurs, provide fire rated cabinet, for one or two hour rated conditions as indicated or required by specific location. Cabinet shall be tested and approved by Warnock Hersey to ASTM E814, and shall bear the Warnock Hersey label.

C. Fire Extinguishers (F.E):

1. Models/Types:
   a. Multipurpose dry chemical with 10 lbs. capacity: C rating conforming to MP10 Series. UL Rating: 4A:80B:C.
   b. Wet-Chemical Type, WC Series, (FE-K): UL-rated 2-A: K, 2.5-gal. (9.5-L) nominal capacity, with potassium carbonate-based chemical in stainless-steel container; with pressure-indicating gage.
2. Mounting: Provide eye brackets for direct wall mounting to hook and for mounting in Fire Extinguisher cabinets. Refer to drawings for location and quantity.
3. Provide initial inspection tag for each extinguisher.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install fire extinguishers and cabinets in openings in accordance with manufacturer's printed instructions.

B. Install fire extinguishers and cabinets where indicated on the drawings, or if not indicated, in locations required by governing code and as directed by Owner.

END OF SECTION - 10 44 00

SECTION 10 51 13 | METAL LOCKERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Conditions of Contract, including General and Supplementary Conditions and Division 01 Administration Sections, apply to this Division.

1.2 SUMMARY

A. This Section includes the following:
1. Knocked-down, quiet metal lockers.
2. Knocked-down athletic lockers.
3. Locker benches.

B. Related Sections include the following:
1. Section 03 30 00: Cast-in-Place Concrete.
2. Section 05 50 00: Metal Fabrications.
3. Section 09 67 00: Epoxy Flooring.

1.3 DEFINITIONS

A. Uncoated Steel Sheet Thicknesses: Indicated as the minimum thicknesses.

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and bench.

B. Shop Drawings - Include plans, elevations, sections, details, and attachments to other work:
1. Show base, sloping tops, filler panels and other accessories.
2. Include locker identification system.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Qualification Data: For Installer.

E. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

F. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative of metal locker manufacturer for installation and maintenance of units required for this Project.

B. Source Limitations: Obtain metal lockers and accessories through one source from a single manufacturer.

C. Regulatory Requirements - Where metal lockers are indicated to comply with accessibility requirements, comply with ADA Guidelines and the California Building Code Sections 11B-225.2.1 and 11B-811:

1. Provide not less than 1 shelf located no higher than 48 inches (1372 mm) above the floor for side reach.
2. Provide 1 shelf located at bottom of locker no lower than 15 inches (230 mm) above the floor for side reach.
3. Provide hardware that does not require tight grasping, pinching, or twisting of the wrist, and that operates with a force of not more than 5 lbf (22.2 N).
4. Provide decal indicating accessibility.

1.6 WARRANTY

A. Special Warranty - Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period:
   1. Failures include, but are not limited to, the following:
      a. Structural failures.
      b. Faulty operation of latches and other door hardware.
   2. Damage from deliberate destruction and vandalism is excluded.
   3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for metal locker installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Products: Subject to compliance with requirements, provide products by one of the specified manufacturers.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008, Commercial Steel (CS) Type B, suitable for exposed applications.

B. Expanded Metal: ASTM F1267, Type II (flattened), Class I, 3/4-inch (19-mm) steel mesh, with at least 70 percent open area.

C. Stainless-Steel Sheet: ASTM A666, Type 304.

D. Extruded Aluminum: ASTM B221, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.

E. Fasteners: Zinc- or nickel-plated steel, slotless-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.

F. Anchors - Select material, type, size, and finish required for secure anchorage to each substrate:
   1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.
   2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.3 KNOCKED-DOWN, QUIET METAL LOCKERS

A. Products:
1. **Lyon Workspace Products**
2. Art Metal Products, Div. of Fort Knox Storage Co.
3. Tennsco Corp.
4. Republic Storage

B. Locker Arrangement: As indicated in Metal Locker Schedule located at the end of Part 3.

C. Body - Assembled by riveting or bolting body components together. Fabricate from unperforated, cold-rolled steel sheet with thicknesses as follows:
1. Tops, Bottoms, and Intermediate Dividers: 0.0209 inch, with single bend at sides.
2. Backs and Sides: 0.0209 inch thick, with full-height, double-flanged connections.
3. Shelves: 0.0209 inch thick, with double bend at front and single bend at sides and back.

D. Frames - Channel formed; fabricated from 0.0528-inch- (1.35-mm-) thick, cold-rolled steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames. Retain subparagraph below if needed; cross frames between tiers are not offered by all manufacturers:
1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical frame members.
2. Frame Vents: Fabricate horizontal face frames with vents.

E. Doors - One-piece; fabricated from 0.0528-inch- (1.35-mm-) thick, cold-rolled steel sheet; formed into channel shape with double bend at vertical edges, and with right-angle single bend at horizontal edges:
1. Doors less than 12 inches (305 mm) wide may be fabricated from 0.0428-inch- (1.1-mm) thick, cold-rolled steel sheet.
2. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches (381 mm) wide; welded to inner face of doors.
3. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet; welded to inner face of doors.
4. Sound-Dampening Panels: Manufacturer's standard, designed to stiffen doors and reduce sound levels when doors are closed, of die-formed metal with full perimeter flange and sound-dampening material; welded to inner face of doors.
5. Door Style - Vented panel as follows:
   a. Louvered Vents - Not less than:
      1) Six louver openings at top and bottom for single-tier.
      2) Three louver openings at top and bottom for double-tier.
      3) Two louver openings at top and bottom for multiple-tier lockers.

F. Hinges - Self-closing; welded to door and attached to door frame with not less than 2 factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees:
1. Hinges - Manufacturer's standard, steel continuous or knuckle type:
   a. Knuckle Hinges: Steel, full loop, 5 or 7 knuckles, tight pin; minimum 2 inches (51 mm) high. Provide not less than 3 hinges for each door more than 42 inches (1067 mm) high.

G. Recessed Door Handle and Latch - Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry resistant:
1. Multipoint Latching - Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic and prelocking:

a. Latch Hooks: Equip doors 48 inches (1219 mm) and higher with 3 latch hooks and doors less than 48 inches (1219 mm) high with 2 latch hooks; fabricated from minimum 0.0966-inch- (2.5-mm-) thick steel; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
b. Latching Mechanism: Manufacturer's standard rattle-free latching mechanism and moving components isolated with vinyl or nylon to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

H. Combination Padlocks: Key-controlled, three-number dialing combination locks; capable of five combination changes.

I. Equipment - Equip each metal locker with identification plate and the following, unless otherwise indicated:
1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
3. Multiple-Tier Units: Two single-prong wall hooks.
4. Coat Rods: In lieu of ceiling hook for metal lockers 18 inches (457 mm) deep or greater.

J. Accessories:
1. Continuous Sloping Tops - Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.0329 inch (0.85 mm) thick:
a. Closures: Vertical-end type.
b. Sloped top corner fillers, mitered.
2. Recess Trim: Fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet.
3. Filler Panels: Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.0329 inch (0.85 mm) thick.
4. Finished End Panels: Fabricated from 0.0209-inch- (0.55-mm-) thick, cold-rolled steel sheet.

K. Finish - Baked enamel or powder coat:
1. Color: As selected by Architect from manufacturer's full range.

2.4 KNOCKED-DOWN ATHLETIC LOCKERS

A. Products are subject to compliance with requirements; provide one of the following available products that may be incorporated into the Work include, as indicated on drawings, but are not limited to, the following:
1. **Lyon Workspace Products, LLC; Knocked Down Expanded Metal** (Basis of Design).
2. ASI Storage Solutions Inc; Competitor.
3. Hadrian Manufacturing Inc; Gladiator.
4. List Industries Inc.
5. Olympus Lockers & Storage Products, Inc; Apollo HDV Lockers.
6. Republic Storage Systems Company; Heavy Duty Ventilated.

B. Expanded-Metal Doors: Fabricated from 0.090-inch (2.28-mm) nominal-thickness expanded metal; welded to 0.105-inch (2.66-mm) nominal-thickness steel angle frame; with 0.090-inch (2.28-mm) nominal-thickness, steel sheet lock panel backed by 0.060-inch (1.52-mm) nominal-thickness, steel sheet retainer welded to door frame.

C. Body - Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

1. Tops and Bottoms: 0.060-inch (1.52-mm) nominal thickness, with single bend at edges.
2. Backs: 0.048-inch (1.21-mm) nominal thickness.
3. Shelves: 0.060-inch (1.52-mm) nominal thickness, with double bend at front and single bend at sides and back.

D. Unperforated Sides: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.

E. Frames - Channel formed; fabricated from 0.060-inch (1.52-mm) nominal-thickness steel sheet or 0.097-inch (2.45-mm) nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames:
1. Cross Frames for Double-TierLockers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.

F. Reinforced Bottoms: Structural channels, formed from 0.060-inch (1.52-mm) nominal-thickness steel sheet; welded to front and rear of side-panel frames.

G. Hinges - Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees; self-closing:
1. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum 2 inches (51 mm) high. Provide no fewer than three hinges for each door more than 42 inches (1067 mm) high.
2. Continuous Hinges: Manufacturer's standard, steel; side or top mounted as required by locker configuration.
3. Hinges: Manufacturer's standard, steel, continuous or knuckle type.

H. Recessed Door Handle and Latch - Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant:
1. Multipoint Latching - Finger-lift latch control designed for use with built-in combination locks, built-in cylinder locks, or padlocks; positive automatic latching and prelocking:
   a. Latch Hooks: Equip doors 48 inches (1219 mm) and higher with three latch hooks and doors less than 48 inches (1219 mm) high with two latch hooks; fabricated from 0.120-inch (3.04-mm) nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
   b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

I. Projecting Turn-Handle and Latch: Steel handle welded to manufacturer's standard, three-point, cremone-type latching mechanism consisting of steel rods or bars that engage locker frame at top and bottom of door, and center latch that engages strike jamb; with steel padlock loop.

J. Door Handle and Latch for Box Lockers: Stainless-steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.

K. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch (9 mm) high.

L. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.

M. Coat Rods: Manufacturer's standard.

N. Continuous Zee Base: 4 inches (102 mm) high; fabricated from 0.075-inch (1.90-mm) nominal-thickness steel sheet.

O. Finish - Baked enamel or powder coat:
1. Color: as selected by Architect from manufacturer's full range.

2.5 LOCKER BENCHES

A. General: Provide locker benches fabricated by same manufacturer as metal lockers.

B. Bench Tops: Manufacturer's standard 1-piece units, of the following material, minimum 9-1/2 inches (240 mm) wide by 1-1/4 inches (32 mm) thick, with rounded corners and edges.

C. ADA Bench tops standard 1-piece units with back 48 inch by 24 inch with 20 inch high back support:
1. Laminated maple with one coat of clear sealer on all surfaces, and one coat of clear lacquer on top and sides.

D. Fixed Pedestals - Manufacturer's standard supports, with predrilled fastener holes for attaching bench top and anchoring to floor, complete with fasteners and anchors, provide one of the following:
1. Cast Iron: 1-1/2-inch- (38-mm-) diameter steel tubing threaded on both ends, with standard pipe flange at top and bell-shaped cast-iron base; with baked-enamel or powder-coat finish; anchored with exposed fasteners.
2. Tubular Steel: 1-1/4-inch- (32-mm-) diameter steel tubing, with 0.1265-inch- (3.2-mm-) thick steel flanges welded at top and base; with baked-enamel or powder-coat finish; anchored with exposed fasteners.
3. Color: As selected by Architect from manufacturer's full range.

2.6 FABRICATION

A. General - Fabricate metal lockers square, rigid, and without warp; with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch:
1. Form body panels, doors, shelves, and accessories from one-piece steel sheet, unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for a complete installation.

B. Unit Principle: Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.

C. Knocked-Down Construction: Fabricate metal lockers for nominal assembly at Project site using nuts, bolts, screws, or rivets. Factory weld frame members together to form a rigid, one-piece assembly.

D. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.

E. Coat Rods: Fabricated from 3/4-inch- (19-mm-) diameter steel; chrome finished.

F. Identification Plates: Manufacturer's standard etched, embossed, or stamped aluminum plates; with numbers and letters at least 3/8 inch (9 mm) high.

G. Continuous Sloping Tops - Fabricated in lengths as long as practicable, without visible fasteners at splice locations; finished to match lockers:

1. Sloped top corner fillers, mitered.

H. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip joint filler angle formed to receive filler panel.

I. Finished End Panels - Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers:
   1. Provide one-piece panels for double-row (back-to-back) locker ends.

2.7 STEEL SHEET FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Factory finish steel surfaces and accessories except stainless-steel and chrome-plated surfaces.

C. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond. Use manufacturer's standard methods.

D. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer's standard thermosetting baked-enamel finish. Comply with paint manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Field Measurements - Verify the following by field measurements before fabrication and indicate measurements on Shop Drawings:
   1. Concealed framing, blocking, and reinforcements that support metal lockers before they are enclosed.
   2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish recessed opening dimensions and proceed with fabricating metal lockers without field measurements. Coordinate wall and floor construction to ensure that actual recessed opening dimensions correspond to established dimensions.

3.2 COORDINATION

A. Coordinate size and location of concrete bases for metal lockers.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

3.3 EXTRA MATERIALS

A. Furnish extra materials described below, before construction begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents:
   1. Full-size units of the following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than 5 units:
      a. Locks.
      b. Identification plates.

c. Hooks.

3.4 EXAMINATION

A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work:
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 INSTALLATION

A. General - Install level, plumb, and true; shim as required, using concealed shims:
   1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches (910 mm) o.c. Install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion, using concealed fasteners.
   2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
   3. Anchor back-to-back metal lockers to floor.

B. Knocked-Down Metal Lockers: Assemble knocked-down metal lockers with standard fasteners, with no exposed fasteners on door faces or face frames.

C. Equipment and Accessories - Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates:
   1. Attach hooks with at least two fasteners.
   2. Attach door locks on doors using security-type fasteners.
   3. Identification Plates:
      a. Identify metal lockers with identification noted on shop drawing submittal.
      b. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
   4. Attach filler panels with concealed fasteners. Locate fillers panels where indicated on Drawings.
   5. Attach sloping top units to metal lockers, with closures at exposed ends.
   6. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

D. Fixed Locker Benches: Provide not less than 2 pedestals for each bench, uniformly spaced not more than 36 inches apart. Securely fasten tops of pedestals to undersides of bench tops, and anchor bases to floor.

3.6 ADJUSTING, CLEANING, AND PROTECTION

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.

B. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit metal locker use during construction.

C. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal locker manufacturer.

3.7 METAL LOCKER SCHEDULE

A. Athletic Lockers.
   1. Locker Size:
      a. 1 tier, 18W x 24D x 60H
   2. Color: LYON Brilliant Blue. As selected by Architect from manufacturer's full range.
   3. Ventilation: Mini-Louvers
   4. Handle Type: Stainless Steel Recessed Handles

END OF SECTION - 10 51 13

SECTION 10 75 00 | FLAGPOLES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum flagpoles.

B. Ground mount.

C. Halyards, accessories, and flag(s).

1.2 REFERENCES

A. AAMA 611 – Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

B. AAMA 612 - Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.

C. AAMA 2603 - Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

D. AAMA 2605 - Specification for Superior Performing Organic Coatings on Architectural Extrusions and Panels.

E. AASHTO M-36 - Corrugated Metal Culvert Pipe.

F. ASTM B241 - Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

G. ASTM C33 - Standard Specification for Concrete Aggregate.

H. ASTM D1187 – Standard Specifications for Asphalt Based Emulsions for Use as Protective Coatings for Metal.

I. NAAMM – National Association of Architectural Metal Manufacturers.

1.3 PERFORMANCE

A. Pole With Flag Flying: Resistant without permanent deformation, 80 miles/hr wind velocity, non-resonant, safety design factor of 1.6.

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01 33 00.

B. Indicate on shop drawings, detailed dimensions, base details, anchor requirements, and imposed loads.

C. Provide product data on pole, accessories, and configurations.

D. Submit samples under provisions of Section 01 33 00.

E. Submit two samples illustrating material, color, and finish.

F. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and protect products under provisions of Section 01 61 00.

B. Spiral wrap flagpole with protective covering and pack in protective shipping tubes orcontainers.

C. Protect flagpole and accessories on site from damage or moisture.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Aabec Pole Division, Morgan Francis Co., www.morgan-francis.com.

B. American Flagpole, www.americanflagpole.com.

C. Concord Industries, Inc., www.concordindustries.com.

D. Eder Flag Manufacturing Co., Inc., www.ederflag.com.

E. Substitutions: Under provisions of Section 01 25 13.

2.2 POLE MATERIALS

A. Aluminum: ASTM B241; 6063 alloy, T6 temper.

2.3 POLE FABRICATION

A. Outside Butt Diameter: 7 inches.

B. Outside Top Diameter: 3..5 inches.

C. Wall Thickness: 3/16 inch.

D. Type: Ground set; fixed type.

E. Pole Design: Cone tapered.

F. Nominal Height: 34'-6" ft measured from ground.

G. Halyard: External type.

2.4 COMPONENTS AND ACCESSORIES

A. Finial Ball: Aluminum; 6 inch diameter.

B. Truck Assembly: Cast aluminum; revolving; stainless steel ball-bearings, non-fouling.

C. Flag: United States and California design, 5 x 8 feet standard size, 100 percent woven, two ply, spun polyester bunting.

D. Cleats: 9 inch size, cast aluminum with stainless steel fastenings, one per halyard.

E. Halyard: 5/16 inch diameter polypropylene, braided, white, with 1/16 inch diameter galvanized steel core.

F. Cleat Cover: Cast aluminum with cylinder lock, one per cleat.

G. Halyard Cover: Cast aluminum with cylinder lock, minimum 5'-0" in length.

H. Connecting Sleeves For Multiple Section Poles: Same material as pole, precision fit for field assembly of

pole, concealed fasteners.

I. Flashing Collar: Spun aluminum.

J. Sand: ASTM C33, fine aggregate.

K. Bituminous paint: ASTM D1187, cold applied asphalt emulsion.

L. Elastomeric Joint Sealant: Single component neutral curing silicone sealant as specified in Section 07 92 00.

2.5 MOUNTING COMPONENTS

A. Foundation Tube Sleeve: AASHTO M-36, corrugated 16 gage steel, galvanized.

B. Pole Base Attachment: 3/16 inch thick steel bottom plate with steel centering wedges. Galvanized.

C. Lightning Ground Rod: 18 inch long copper rod, 3/4 inch diameter.

2.6 GENERAL FINISHES

A. Metal Surfaces in Contact With Concrete: Asphaltic paint.

B. Finial: Spun Aluminum finish.

2.7 ALUMINUM FINISHES

A. Natural Satin Finish: NAAMA AA-M32, fine, directional medium satin polish, buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings.

B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

B. Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Provide forms where required by unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement.

3.3 INSTALLATION

A. Install flagpole, base assembly, and fittings in accordance with manufacturer's instructions.

B. Electrically ground flagpole installation.

C. Place foundation tube sleeve, center, and brace to prevent displacement.

D. Place concrete in accordance with Section 03 30 00. Vibrate concrete.

E. Trowel exposed concrete surfaces to a smooth dense finish. Provide positive slope to perimeter of base.

F. Install flagpole plumb in foundation tube sleeve.

G. Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place.

H. Place and compact sand in place and remove hardwood wedges.

I. Seal top of foundation tube sleeve with a 2 inch thick layer of elastomeric joint sealant and cover with flashing collar. Secure collar in place.

3.4 TOLERANCES

A. Maximum Variation From Plumb: One inch.

3.5 ADJUSTING AND CLEANING

A. Clean surfaces.

B. Adjust operating devices so that halyard and flag(s) function smoothly.

END OF SECTION

SECTION 11 40 00 FOODSERVICE EQUIPMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes furnishing all labor and material required to provide and deliver all food service equipment herein specified into the building, uncrate, assemble, set-in-place, level and completely install, exclusive of final utility connections:
   1. Furnish all material and labor required to completely provide, deliver and install all Food Service Equipment as specified herein and as shown on the drawings. This work shall be in strict accordance with the plans and specifications with all dimensions verified in the field prior to any fabrication:
      a. Coordinate the Food Service Equipment work with the respective trades performing preparatory work for the installation of the Food Service Equipment.
      b. Comply with all Federal, State and Municipal regulations which bear on the execution of this project, including CBC Sections 11B-203.9, 11B-227, 11B-811, and 11B-904, and CBC 1104B-5, 1104B-6 and Figures 11B-16 and 11B-17:
         1) Food service aisles shall be a minimum of 36 inches wide and tray slides shall be mounted between 28 inches minimum and 34 inches maximum above the finished floor.
         2) Food service equipment required to be accessible shall conform to all reach requirements.
         3) County Health Department review and final install by General Contractor.

B. Related Sections include the following:
   1. Division 22: Plumbing.
   2. Division 23: Heating, Ventilating and Air Conditioning.
   3. Division 26: Electrical.

C. Work Includes:
   1. Materials shown on the Food Service Equipment Schedule.
   2. Piping, valves, and plumbing accessories that is integral within the equipment.
   3. Furnishing control devices such as solenoid valves that are not integral with the equipment, for installation by Mechanical Division 23 and/or Electrical Division 26.
   4. Wiring, wiring devices, controls and mechanical accessories that are integral in the equipment.
   5. Ventilating ducts, flues, controls and mechanical accessories that are integral in the equipment.
   6. Anchors, fasteners, fillers and sealants for mounting equipment securely in place.
   7. Cooperation with all other contractors on the job including the furnishing of information in the form of drawings, wiring diagrams and other data.
   8. Touch-up painting after the installation of the food service equipment.

D. Measurements:
   1. Verify all dimensions shown on the drawings by taking field measurements at the job site prior to fabrication of equipment or ordering equipment. Proper fit and attachment of all parts is required and is the sole responsibility of the Food Service Contractor. If necessary, all equipment shall be fabricated so that it may be handled through finished

door openings.

1.3 QUALITY ASSURANCE

A. Qualifications:
1. Installer: Regularly engaged in providing food service equipment from manufacturers of this type of equipment a minimum of 5 years with at least 5 installations of this size and type that are at least each 3 years old.

B. Standard of Manufacture:
1. Food service equipment that is specified as "custom" having no manufacture name or model number shall be manufactured by a Food Service Equipment Fabricator with at least five (5) years' experience with engineering, design and fabrication of food service equipment. The manufacture shall be subject to the review of the Architect and/or Consultant and shall be approved by ANSI/NSF. All Fabricated equipment shall be constructed in strict compliance with the latest standards of the National Sanitation Foundation and shall bear the mark of the National Sanitation Foundation in full compliance with all applicable codes and ordinances.
2. All electrically heated or operated equipment shall bear the seal of approval of the Underwriters Laboratories, and shall comply with the National Electrical Code and all local Codes and Ordinances.
3. All food service equipment that is specified as "buy-out" having a specific manufacture name and model number shall comply with the latest editions of the National Sanitation Foundation.
4. All Gas heated or operated equipment shall be the seal of approval of the American Gas Association (AGA)
5. All Steam heated or operated equipment shall conform to the standard of the American Society of Mechanical Engineers (ASME) and shall be ASME approved.
6. Food shields and Sneeze guards shall meet all the requirements of National Sanitation Foundation (NSF) Standard 2.

C. Discrepancies:
1. In the event of discrepancies within the Contract Documents, the Architect and/or Consultant shall be so notified in sufficient time prior to bid opening, ten (10) days to allow issuance of an addendum.
2. In the event that time does not permit notification or clarification of discrepancies prior to the bid opening, following shall apply: The drawings and drawing schedules shall govern in matters of quantity; the specifications in matter of quality. In the event of conflict within drawings involving quantities, or within the specifications involving quality, the greater quantity and high quality shall apply. Such discrepancies shall be noted and clarified in the contractors bid. No additional allowances will be made because of errors, ambiguities or omissions which reasonable should have been discovered during the preparation of the bid.

D. Responsibility:
1. The work as specified in this division shall include assuring that all required submittals conform to the intent and meaning of the documents, conditions at the job site, and all local codes and ordinances.
2. Visit the job site to field check actual wall dimensions and utility rough-ins. Be responsible for furnishing, fabricating, and installing the equipment in accordance with the available space and utility services as they exist on the job site.
3. Check all door openings, passageways, elevators, etc., to verify that the equipment can be transported to its proper location within the building. If necessary check the possibility with the General Contractor of holding wall erection, placement of doorjambs, window, etc. for the purpose of moving equipment to its proper location.
4. Notify the Architect and/or Consultant of any discrepancies between the plans and

specification prior to fabrication of any equipment, to actual condition on the job.

5. If any special hoisting equipment and operators are required, include cost as part of the bid for this work.

1.4 SUBMITTALS

A. See Section 01 33 00: Submittal Procedures.

B. Shop Drawings/Equipment Brochures:

1. No ordering or fabrication of equipment shall take place until such time as the equipment brochures and shop drawings have been reviewed in writing by the Architect and/or Consultant. Receipt of this review shall not relieve the Contractor from the responsibility of verifying all quantities and related dimensions, maintaining the specified quality of equipment, and verifying conditions of the job site.
2. Equipment Brochures: Within twenty (20) calendar days after award of the contract, PDFs containing manufacturer's specification sheets, dimensioned drawings and/or other pertinent data describing all items of standard manufacture shall be submitted for review by the Architect and/or Consultant. Sheets with the notation "Fabricated Item" and name of the fabricated item, as well as any required mechanical, plumbing or electrical requirements shall be inserted between the manufacturer's specification sheets describing the "buy-out" equipment; thus giving a complete brochure with all items accounted for. The name of the Contractor, Architect, Consultant and project clearly identified in large readable type. Failure to provide PDFs of these brochures in the manner as described above will be cause for rejection of said brochures.
3. Rough-in and Equipment Location Drawings: Within thirty (20) calendar days after award of the contract, six (6) sets of bond prints of complete rough-in and details for electrical and plumbing services with both vertical and horizontal dimensions, from column center-lines or exterior walls for location said connection points and rough-in locations shall be submitted for review by the Architect and/or Consultant. Equipment location plans shall be drawn to scale of not less than 1/4" = 1'-0" and include a schedule of equipment clearly identifying all items. Minimum drawings size shall be 24"x 36".
4. Shop Drawings: Within thirty (30) calendar days after award of the contract, six (6) sets of bond prints of shop fabrication drawings shall be submitted for review by the Architect and/or Consultant. Plans shall be drawn to scale of not less than 1/2"=1'-0". Additional plan views, elevations and sections at 3/4"=1'-0" shall be supplied of all counters and tables with complete dimensions. All shop practices regarding joints, gussets, bracing, tie-downs, supports, etc. shall be clearly defined as well as gauges and quality of metals and brands and model numbers of all miscellaneous fittings, plumbing and electrical trim. The drawings shall also show locations of blocking (supplied under another sections) for all wall and ceiling mounted Food Service Equipment. Minimum drawings size shall be 24"x36".

C. Samples:

1. Provide all samples if specification requested.

D. Substitutions:

1. Manufacturers listed in this section are used as standards for quality. All Substitutions shall be approved by the Architect and/or Consultant prior to installation.
2. Refer to Division 01: General Requirements for procedures governing substitutions
3. Only one substitution for each item will be considered.
4. Installation of any qualified substituted equipment is the Food Service Equipment Contractor's responsibility, including any mechanical, electrical, structural changes required for the installation of qualified substitution shall be without additional cost to the Owner.

E. Deferred Approval Items:
   1. Walk-in Refrigerators and Freezers - Provide complete structural design prepared by a registered professional engineer licensed in the state of California:
      a. Design in accordance with the requirements of C.B.C., Title 24, Chapter 23 including requirements for the Seismic Zone and suspended equipment. Include the following items as a minimum in the analysis.
   2. Critical load compensation.
   3. Load factors.
   4. Stress increases.
   5. Critical distribution of loads.
   6. Anchorages.
   7. Stability against overturning lateral force analysis, torsional movements, including those at connections.
   8. Distribution of horizontal shear:
      a. Make changes required by the reviewer and resubmit corrected documents.

1.5 WARRANTY

A. All work shall be guaranteed by the Foodservice Equipment Contractor against all defects for a term of one (1) year from the date of notice of completion. This guarantee shall cover replacement of defective material at the Foodservice Equipment Contractor expense, including transportation and labor. This guarantee will not cover any cost for replacement of parts or work made necessary by carelessness or misuse of the equipment by others.

B. The Food Service Equipment Contractor shall provide at his own expense the installation, start-up and service for one (1) year from the date of recording the notice of completion of the project; the replacement of all condensing units and other refrigeration devices supplied under this contract. In addition to this one (1) year free service, the condensing units shall have a five (5) year compressor warranty; said warranty commencing at the date of completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. All equipment specified herein shall be delivered to the job site; received and handled by the Contractor or his authorized agent. The Owner shall in no way be expected to store or handle any such equipment.

B. All equipment shall be delivered in such a manner as to protect it against dirt, water, chemical or mechanical injury.

C. Throughout the progress of the work, the Contractor shall keep the working area free of debris of all types resulting from his work.

D. All packing material shall be removed from the project location by the Contractor.

PART 2 PRODUCTS

2.1 MATERIALS

A. Metal for construction purposes, where entirely concealed, shall be steel of wrought iron sections galvanized by the hot-drip process after fabrication. Bolts, screws, rivets, and similar attachments to this galvanized work shall be galvanized or brass. Exposed screw and rivet work shall be finished to match adjacent surfaces, flush and buffed smooth. Finished work shall be free of tool or construction marks, dents, or other imperfections; and at the completion of the work, all metal shall be gone over with a portable machine and

buffed and dressed to perfect surfaces.

B. All materials shall be new and of first grade. All gauges specified herein shall be minimum and shall be minimum and shall be established after polishing. They shall refer to:
   1. U.S. Standard Gauge for sheets and plates.
   2. Stainless steel shall be manufactured by one of the following: Allegheny Ludlum Steel Corporation, American Rolling Mills, U.S. Steel Corporation.

C. The Contractor will be required to furnish a certified copy of the mill analysis of materials to the Architect and/or Consultant.

D. Stainless steel sheets shall conform to ASTM A240, Type 304 Condition A, 18-8 having a No. 4 finish. No.2B finish shall be acceptable on surfaces of equipment not exposed to view. All sheets shall be uniform throughout in color, finish and appearance.

E. Stainless steel tubing and pipe shall be Type 304, 18-8, having a No. 4 finish, and shall conform to either ASTM A213 if seamless or ASTM A249 if welded.

F. Galvanized steel shall be approved grade of copper-bearing steel sheets with a minimum copper content of 20%. All sheets to be commercial quality, stretcher leveled, bonderized and re-rolled to insure smooth surface. Galvanized steel shall not be allowed in the construction and fabrication of any “Fabricated Assembly” items.

G. Plate glass shall be 1/2" thick safety glass with polished edges.

H. Sealant shall be equal to that manufactured by General Electric. Silicone construction 1200 sealant; in either clear or approved color to match surrounding surfaces.

I. Sound deadening material shall be equal to that manufactured by H.W. Mortell Co., Kankakee, Illinois, and shall be sprayed by use of a mechanical device to a thickness of not less than 1/8" thick.

2.2 FINISHES

A. Paint and coatings shall be of an NSF approved type suitable for use in conjunction with food service equipment. Such paint or coating shall be durable, non-toxic, non-dusting, non-flaking and mildew resistant, shall comply with all governing regulations and shall be applied in accordance with the recommendations of the manufacturer.

B. All exterior, galvanized parts, exposed members of framework where specified to be painted shall be cleaned, properly primed with rust inhibiting primer, degreased, and finished with two (2) coats of epoxy-based grey hammertone paint, unless otherwise specified.

C. Stainless steel, where exposed, shall be polished to a #4 commercial finish. Where unexposed, finish shall be #2B. The grain of polishing shall run in the same direction wherever possible. Where surfaces are disturbed by the fabricating process, such surfaces shall be refinished to match adjacent undisturbed surfaces.

2.3 SHOP FABRICATED EQUIPMENT CONSTRUCTION

A. Leg stands for open base tables or dish tables shall be constructed of 1-5/8" dia. 16 gauge stainless steel tubing, with stringer and cross braces of the same material. Joints between legs and cross braces shall be welded and ground smooth. Flattened ends on tube stretchers are not permitted. Mechanical fittings are also not permitted:
   1. Stainless Steel Leg Sockets: Component Hardware Group, Inc. model A18-0206, or

accepted equal; weld to underside of counter top framing or at bottom of enclosed cabinet unit, and fastened with flush set screw locking device.

2. Sanitary Type Stainless Adjustable Foot: Component Hardware Group, Inc. model A10- 0851, or accepted equal.

B. Table tops shall be 14-gauge stainless steel unless otherwise noted, with all shop seams and corners welded, ground smooth and polished. Tops of closed base fixtures shall be reinforced on the underside with a framework of 1-1/2" angles or 16-gauge stainless steel hat section; and on open pipe frames with a 4" channel at each pair of legs. The leg sockets shall be welded to this channel. The channel in turn stud welded to the top. Tops shall be reinforced so that there will be any noticeable deflection. Unless otherwise shown on the detail drawings, metal tops shall be turned down 2", and back at 15 degree angle, with 1-1/8" turn-under, except where adjacent to walls or other pieces of equipment. The wall side shall be turned up 10" and back 2" at a 45-degree angle. Ends of this splash are to be closed. Free corner of tops shall be spherical. All tops shall have 1/8" of sound-deadening material applied to the underside by use of spray equipment in an oven, smooth application for ease in cleaning.

C. Enclosed bases or cabinet bodies shall be of the material and gauge hereinafter specified. They shall be enclosed on the ends and sides as required. The bases shall be reinforced at the top with a framework of 1-1/2" x 1-1/2" x 1/8" stainless steel angles fully welded to the base with the stainless steel angles 36” on center (maximum), with all corners of said framework mitered and fully welded. All vertical joints of the bases shall be fully welded, ground and polished. All free corners of enclosed bases or cabinet bodies and all corners against walls and other fixtures shall be square. In the case of fixtures fitting against or between walls, the bodies shall be set in 1" from the wall line, but the tops shall be extended back to the wall line to permit adjustment to wall irregularities. A flush fitting vertical trim strip (extension of the vertical end mullion without vertical seam of the same material as the body shall be provided at each end of the body, and shall extend 1" to the wall line). These fixtures shall be constructed to set on bases or legs as hereinafter specified, and shall be set in mastic in a vermin-proof manner.

D. Shelves, mullions and aprons shall be fabricated flush with the cabinet body, welded, ground, and polished. Butt joints are not acceptable.

E. Drawers, to be furnished with stainless steel flush pull, Component Hardware Group Inc., model number P63-1012 or equal installed into the 18 gauge double-pan drawer front panel:

1. Stainless steel locks, Component Hardware Group, Inc., model number P30-4781 or equal for each drawer. All drawers are to be keyed alike.
2. Stainless Steel full extension slides, Component Hardware Group, Inc., model no S52-0024 or equal. Provide two (2) per drawer. Slides to be installed so drawer will roll closed when released.
3. Stainless steel removable drawer pan, Component Hardware Group, Inc., model number, S81-1520 or equal one (1) per drawer set loosely in a channel frame so it can be easily lifted out for cleaning. This supporting frame shall be welded stainless steel channel.
4. Drawer face panel to be constructed of 18 gauge stainless steel double pan construction. (Single metal thickness drawer faces are not be expectable.)

F. Hinged doors in base cabinets shall be of double pan construction, insulated and constructed of 18 gauge stainless steel. Doors shall have wire type pull Component Hardware Group Inc., model number P46-1010 or equal installed as shown in elevations. Door pulls to be NSF and ADA compliant.

G. Interior shelves shall be solid, non-removable 16-gauge stainless steel, with ends and backs provided with a 1-1/2" high turn-up against the body of the fixture and welded to the same.

Front edge is to be turned down 1-1/2" and under 1/2", at the bottom shelf, beyond the edge of the base to prevent sagging and vermin collection.

H. Under shelves on open tables shall be constructed of 16 gauge stainless steel, flanged down 90 degrees ½". The corners shall be welded to the legs. Under shelves shall be 10" from the floor. Backs shall be turned up 2".

I. Elevated shelves shall be constructed of 16 gauges stainless steel with edges turned down in a square edge, and back 1/8"; except where shelves are adjacent to walls or other fixtures, where they shall be turned up 2". Corners shall be spherical, mounted on 14 gauge stainless steel support brackets.

J. Sinks and drain boards shall be constructed of 14 gauge stainless steel. The working edge of the sink shall be provided with 5/8" radius sanitary rolled edge in one piece with rounded corners. The drain boards shall be made as an integral part of the sink; all vertical and horizontal corners shall be rounded with 5/8" radius; and the working front edges shall be maintained at one level, taking up the pitch of the drain boards by dropping the sink to allow for same. Depth of sink bowl shall be determined from the top bowl. Sinks shall be provided with back and end splashes with top edge flanged back 2-1/4" at 45-degree angle, and attached to the building wall with "zee" clips. Splash back of sinks and drain boards shall be grained in the same direction. Suitable openings shall be cut for hot and cold water supplies and waste outlets. All surface plumbing trim as called for on the drawings and herein specified shall be provided. Bottom of each sink bowl with center drain connection shall be fitted with a 2" lever type action waste valve mounted into the sink and made absolutely watertight. Sink bowls and drain boards shall have 1/8" of sound-deadening material underneath, spray-applied.

K. Rivets, bolts and screws shall not be permitted in any exposed location.

L. All welding shall be of the heliarc method with welding rod of the same composition as the parts welded. Welds shall be complete, strong, and ductile with excess metal ground off and joints finished smooth to match adjoining surfaces. Welds shall be free of mechanical imperfections and shall be continuously welded so that the fixture shall appear as one-piece construction. Butt welds made by spot solder and finished by grinding are not acceptable.

M. All exposed joints shall be ground flush with adjoining material and finished to harmonize therein. Whenever material has been sunk or depressed by welding operation, such depressions shall be suitably hammered and peened flush with the adjoining surface and, if necessary, again ground to eliminate low spots. In all cases, the grain of rough grinding shall be removed by successive fine polishing operations.

N. All exposed welded joints in stainless steel construction shall be suitably coated with an approved metallic-based paint.

O. After galvanized steel members have been welded, all welds and areas where galvanizing has been damaged shall have a zinc dust coating applied.

P. Seams shall be continuous welds flush and ground smooth:
1. Field Joints: Flush welded, ground smooth and polished on the job, solder or rivets not allowed.
2. Counter Tops: Field joints in stainless steel counter tops and drain boards butt welded with welds ground flush and smooth and polished to match original finish.
3. Pass windows: Provide a complete all welded seamless counter from inside area to the outside ledge at each pass window location. Mechanical joints, butt joints or lap joints will not be accepted.

2.4 ELECTRICAL REQUIREMENTS

A. Standard UL listed materials, devices and components shall be selected and installed in accordance with NEMA Standards and recommendations and as required for safe and efficient use and operation of the Food Service Equipment without objectionable noise, vibration, and sanitation problems.

B. Motors up to and including ½ HP are to be wired for 120 volt, single phase. Fixtures totaling more than 1000 watts are to be wired for 208 volt, single phase. Fixtures having multiple number of heating elements, can be wired for three phase with the load balanced as equally as possible within the fixture.

C. Heating elements having a connected load of up to and including 1000 watts are to be wired for 120 volt, single phase. Fixtures totaling more than 1000 watts are to be wired for 208 volt, single phase. Fixtures having multiple number of heating elements can be wired for three phase with the load balanced as equally as possible within the fixture.

D. Equipment where applicable shall be furnished with three-wire cord and plug.

2.5 PLUMBING TRIM, SINKS

A. All vegetable and pot washing sinks or other 14" deep sinks shall have Fisher Mfg. Co. Model 22209 series (2" drain size) quick opening drain. Fisher Mfg. Co. Model 60100 splash mounted faucet shall be mounted over each partition as shown on the drawings.

B. All cook sinks, pantry sinks or other 10" or 12" deep sinks shall have Fisher Mfg. Co. Model 22209 series (2" drain size or as shown on the drawings) quick opening drain. Fisher Mfg Co. Model 57649 faucets mounted as shown on the drawings.

C. All Fisher Mfg., Co. faucets to be furnished as stainless steel to comply with AD1953 Standards and conform to NSF 61 Standard 9.

D. Provide gas pressure regulators for installation by the Plumbing Contractor.

E. Fire Suppression Gas Shut Off Valve: Gas valve to be furnished by the Foodservice Equipment Contractor and furnished to the Plumbing Contractor for installation. Foodservice Equipment Contractor is to verify with plumbing division for gas line size. Valve to be located in an accessible location and if necessary with access panel.

2.6 HARDWARE

A. Elevated shelf brackets shall be as shown on the Drawings.

B. Drawer and door handles shall be as shown on the Drawings.

C. Hinges for all metal doors shall be Klein Hardware Co. 7870 series, finished in satin chrome.

PART 3 INSTALLATION

3.1 COORDINATION

A. Coordinate work with mechanical, electrical, plumbing, interiors and other trades whose work is in conjunction with equipment specified herein.

3.2 POSITIONING OF EQUIPMENT

A. Installation procedure, details and scheduling shall be so arranged that the work of other contractors may progress without unnecessary delay, interference or damage.

B. The Contractor shall do all fitting, joining, fastening, scribing, caulking and adjusting necessary to install any fixed item of equipment in its designated location; and shall locate and/or store portable, non-fixed items as directed by the Architect and/or Consultant with due regard for the security and protection from damage of the items involved.

3.3 WORKMANSHIP

A. Commencement of work shall constitute agreement with and acceptance of all conditions as found.

B. Equipment shall be installed as shown on the plans. Where abutting, curved or irregularly shaped angles or projecting corners of walls occur, equipment shall be made to conform. Where several pieces of equipment are to be assembled in a group, the group shall be complete as whole, with all necessary filler or connecting pieces as may be required to make a complete, sanitary and vermin-proof group.

C. Welded parts shall be non-porous and free of imperfections. Welds on galvanized metal shall be ground smooth, sandblasted and sprayed with molten zinc or 1200 degrees F to a thickness of .004". Tinning of welds will not be acceptable. Welds of stainless steel shall be ground and polished to the original finish and all grained in the same direction.

D. All fixtures, unless made of stainless steel, shall be finished in sprayed lacquer in color as chosen by the architect; or if specifically stated, in “plastic laminate”; in pattern and/or color as selected by the Architect.

3.4 POST INSTALLATION PROCEDURES

A. Prior to being offered for final acceptance, all equipment shall be thoroughly cleaned. This shall include removal of all stains, paint spots, protective wrapping and coatings, tapes, grease, oil, plaster, dust, polishing compounds, etc. and cleaning of floors in food service areas (broom clean) and signed off by the General Contractor with a copy to the Architect and/or Consultant.

B. After installation at least ten (10) days prior to offering for acceptance, all equipment shall undergo a "Start-up" procedure by a Factory Authorized service dealer. Equipment is to be inspected, tested, calibrated and adjusted for normal operation conditions. If inspection or testing indicated defects, such defects shall be corrected and the inspection and test repeated to insure a perfect operation of all equipment, prior to final acceptance and for a period ninety days after final acceptance.

C. Upon completion of the project, the Contractor shall furnish the Owner PDFs of dimensional prints, data sheets, spare parts lists and operating manuals for each piece of mechanical equipment; each set shall be neatly bound in a loose leaf binder, each set shall be complete with and index of equipment and with a complete list of service contracts with said agencies to perform these services. In addition to this list. The contractor shall submit for review of the Architect and/or Contractor and submittal to the Owner for his files, copies of service contracts with said agencies to perform these services. It shall be the responsibility of this contractor to fill out forward and all warranty forms as required.

D. This contractor shall arrange demonstrations of the operation and maintenance of all buy-out” equipment by competent instructors. These demonstrations to take place within ten (10) days prior to the acceptance of the kitchen. All instruction periods shall be scheduled

with the Architect and/or Consultant fourteen (14) days prior to commencement of same, and at times convenient to the Architect and/or consultant and Owner.

PART 4 SCHEDULE

4.1 FOOD SERVICE EQUIPMENT LIST AND DESCRIPTION

A. Fabricated Equipment: Wherever the term “Fabricated Assembly” is used within the list noted below and description of Food Service Equipment, it shall be presumed to be followed by the phrase, “constructed to the configuration, dimension, detail and design as shown on the drawings and specifications and with workmanship and materials as specified above” and shall meet the fabrication detail requirements of the latest edition of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA), and National Sanitation Foundation (NSF Standard 2).
   1. Approved Manufactures:
      a. American Stainless Steel Corp. (303) 783-0005.
      b. Walk-in refrigerator / freezers approved manufactures: RMI, Arctic Industries, Thermalrite.
      c. Remote refrigeration approved Manufactures: Omni Temp, Cooltec, ColdZone.

B. All food service equipment shall comply with the standards of The California Administration Code, Title 24, Part No. 2.

C. All food service equipment shall comply with the current California Energy Commission Appliance Efficiency Regulations.

D. Equipment in the following schedule is listed by Item Numbers shown on Drawings.
   1. Scheduled Items Main Kitchen:

DRY STORAGE SHELVING	QTY:	5	OFCI

Manufacturer: Cambro
Model: Camshelving

1. Dry storage shelving, sizes and locations per floor plan. Each unit to include (4) vented polypropylene shelf plates, (4) composite posts with leveling feet installed, pre-assembled post connectors & wedges, (8) traverses and (4) bags of 8 dovetails (4 each A&B), brushes graphite.
2. Provide each unit with model CSFF Seismic fee and model CSWF wall fasteners to make approved seismic approved installation.

HAND SINK	QTY:	1	CFCI

Manufacturer: Advance Tabco
Model: 7-PS-75

1. Wall mount hand sink, with welded splash guards with wall mount gooseneck faucet. Refer to plumbing drawings.

ICE MACHINE AND BIN	QTY:	2	OFCI

Manufacturer: Manitowoc
Model: IYF0500N

1. Remote refrigerated cube-style ice maker, air cooled. 550 lbs production capacity.
2. 115 volt.
3. Provide with model D970 ice bin with 882 ice capacity.
4. Provide with K00461 external scoop holder.

5. On 6” adjustable legs.
6. Provide with K00470 bin adapter.

REACH-IN REFRIGERATOR	QTY:	1	OFCI

Manufacturer: Victory
Model: VEFSA-2D-HD-HC

1. Reach-in freezer, two-section, self-contained, four half-height solid doors (hinged right/left), on locking casters. 115 volt.

S/S SERVING TABLE	QTY:	3	CFCI

Manufacturer: Custom
Model: Custom

1. S/S serving table, size and shape per plan, coordinate with transaction windows. See elevations drawings.

THREE COMPARTMENT SINK	QTY:	1	CFCI

Manufacturer: Refer to Plumbing Drawings
Model: Refer to Plumbing Drawings

1. S/S 3-tub pot sink, size and shape per plan, with splash at rear, with (3) 15” x 24” x 14” deep sinks with center drains and lever waste assemblies, s/s legs and cross bracing.

WARMING CABINET	QTY:	1	OFCI

Manufacturer: Metro
Model: C539-HDC-4

1. Heated holding cabinet, red, 120 volt, on locking casters.

CONDENSING UNIT – ICE MACHINE	QTY:	1	OFCI

Manufacturer: Manitowoc
Model: JCF0500-161

1. Remote condensing unit, 115 volt, single phase.
2. Provide with RT35R404 35 ft. tubing kit.

WATER FILTER – ICE MACHINE	QTY:	2	CFCI

Manufacturer: Everpure
Model: EV932401

1. Water filter for ice machine.
2. Provide with the following replacement cartridges: (2) EV961222, (1) EV961726, (1) EV960651, and (1) EV953426.

S/S WORKTABLE	QTY:	1	CFCI

Manufacturer: Custom
Model: Custom

1. 96”x36”x36” S/S island worktable, size and shape per plan, with s/s legs and undershelf.

HOT DOG STEAMER	QTY:	1	OFOI

Manufacturer: OMCAN USA
Model: FW-CN-0100-H

1. (43216) Hot Dog Steamer, countertop, side by side hot dog steamer/bun warmer, (100) hot dogs & (48) buns capacity,8 quart water reservoir 85° to 175° (30° to 80°C) temperature range, tempered glass windows, stainless steel construction, 1.3kW, 120v/60/1-ph, cord, NEMA 5-15P, ETL-Sanitation

POPCORN POPPER	QTY:	1	OFOI

Manufacturer: GOLD MEDAL
Model: 2001

1. Citation 16 oz. Popper, electric, countertop, LED illuminated dome, extra working space, forced-air crisping system, 1920 watts, 120v/60/1-ph, NEMA 5-20P, cULus, NSF

FOOD TOPPING WARMER	QTY:	1	OFOI

Manufacturer: SERVER ESSENTIALS
Model: 81140

1. SUPREME™ MERCHANDISING TOPPING WARMER WITH PUMP & SPOUT WARMER, rethermalizing, water-bath warmer, with temperature sensing thermostat and wrap-around heating element, spout warmer (opposite instrument panel side) ensures safety when dispensing potentially hazardous foods like cheese sauce, a full portion yields 1 oz. servings, which can be reduced in 1/8 oz. increments with provided collars, includes magnetic merchandising signs for "Hot Fudge", "Caramel" and "Cheese Sauce", accepts #10 food can, stainless steel jar (94009) or 48 oz. pouched packaging (requires Can2Pouch™ Conversion Kit 81184), food containers, kit and jar sold separately, stainless steel pump, 517 watts, 120v/60/1-ph, 4.3 amps, cord, NEMA 5-15P, cULus, NSF

MICROWAVE OVEN	QTY:	1	OFOI

Manufacturer: AMANA COMMERCIAL
Model: RMS10DSA

1. Amana® Commercial Microwave Oven, 0.8 cu. ft. capacity, 1000 watts, low volume, single stage cooking, (1) power level, lighted control dial, 6-minute max cooking time, interlock safety switch, audible end of cycle signal, side hinged door with tempered glass, LED lighted interior, stainless steel interior & exterior, 120v/60/1-ph, 13.0 amps, 15 MCA, 1500 watts (total), cord, NEMA 5-15P, cETLus, ETL-Sanitation

COFFEE BREWER	QTY:	1	OFOI

Manufacturer: BUNN
Model: 23001.0006

1. CWTF15-APS Airpot Coffee Brewer, automatic, brews 3.8 gallons per hour capacity, digital circuitry with timer function operated by front panel switches, hot water faucet, plastic funnel, accommodates (1) 1.9 to 3.0 liter airpots (sold separately), stainless decor, 120v/60/1-ph, 1370w, 11 amps, NEMA 5-15P

SODA ICE & BEVERAGE DISPENSER	QTY:	1	OFOI

Manufacturer: CORNELIUS
Model: ENDURO 150

1. Ice & Post-Mix Beverage Dispenser, countertop, (6) UFB-1™ push-button valves, 150 lbs. ice capacity, built-in drip tray, timed ice agitation, key switch, TotalFlex™ beverage manifold, 10" cup clearance, generic graphics, stainless steel cabinet, 115v/60/1-ph, 3.0 amps, cULus, NSF, CE

PIZZA DISPLAY WARMER	QTY:	1	OFOI

Manufacturer: ADMIRAL CRAFT
Model: HDRP-158

1. Countertop, full-service, 4-tier rotating rack with chrome-plated shelves, holds (4) 18" pizzas, 25-1/4"W, 23-5/8"D x 27.6"H, digital temperature controls & display, adjustable temperature and humidity, LEDinterior lighting, 1.7kW, 115/60/1-ph, 14.2 amps

END OF SECTION

SECTION 11 66 43 ELECTRONIC SCOREBOARD

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Single-sided LED matrix display.

B. Reference Standards:
   1. Standard for Electric Signs, UL 48.
   2. Standard for CSA C22.2 #207.
   3. Federal Communications Commission Regulation Part 15.
   4. National Electric Code.

1.3 SUBMITTALS

A. Product data: Submit manufacturer’s product illustrations, data and literature that fully describe the scoreboards and accessories proposed for installation.

B. Shop drawings: Submit mechanical and electrical drawings.

C. Maintenance data: Submit manufacturer’s installation, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

A. For outdoor use.

B. Source Limitations: Obtain each type of scoring equipment and electronic displays through one source from a single manufacturer.

C. ETL listed to UL 48.

D. NEC compliant.

E. FCC compliant.

F. ETLC listed to CSA 22.2 #207.

1.5 WARRANTY

A. Provide 5 years of no cost parts exchange including standard shipping on electronics parts and radios due to manufacturing defects.

B. Provide toll-free service coordination.

C. Provide technical online and phone support during Daktronics business hours.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Product delivered on site.

B. Scoreboard and equipment to be housed in a clean, dry environment.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Daktronics, Inc., 201 Daktronics Drive, P.O. Box 5128, Brookings, SD 57006-5128 or equal approved.

2.2 PRODUCT

A. Daktronics LVX-3000-240X432-16MT-25 Video Display, LVX displays show live and recorded video clips, real-time scores/stats, animations, graphics, and text messages. Modules feature SMD (3-in-1) LED packages with 10 mm row and column spacing.

2.3 SCOREBOARD

A. General information:
   1. Dimensions: 13'-1 1/2" (4.00 m) high, 25'-0" (7.62 m) wide, 0'-11" (281 mm) deep.
   2. Base weight: 3450 lb (1565 kg) – options may increase weight.
   3. Base power requirement: 19338 W – options may increase wattage.

B. Construction:
   1. All-aluminum construction.
   2. Cabinet withstands high-velocity impact from air-filled sports balls without the need for protective screens.

C. Display Capabilities:
   1. Color Capacity: 16 bit (281 trillion colors)
   2. LED Refresh Rate: 4800 Hz as defined by the number of times per second the LED image is repainted in intensity
   3. Display has signal redundancy allowing for signal path both forward and backwards through modules allowing for loss of only 1 module vs. rows or blocks of multiple modules or panels in case of failure.

D. Viewing Characteristics
   1. Module Intensity: 8000 nits (adjustable)
   2. Brightness Control: 256 levels (manual, scheduled or automatic)
   3. Suggested Viewing Angle: 160° horizontal and +10°/-65° vertical

E. Pixel Characteristics
   1. Each pixel consists of one RGB 3-in-1 surface-mount device LED.
   2. Pixel spacing measurement must be measured from the center points of neighboring physical pixels, rather than neighboring physical and virtual pixels.

F. LED Module Characteristics
   1. Module shall be for outdoor use.
   2. Module shall have anti-reflective paint or coating applied to display face. Black state across all modules shall exhibit a Delta E color variation of no more than .4.
   3. Modules shall have horizontal louvers running between LEDs or pixels.
   4. Modules shall be able to be removed and installed from both the front and rear of the display.
   5. It is not necessary to remove or insert screws in order to remove or install modules.

6. Module shall be silicon potted on face beneath louver and rear, providing a 100% waterproof seal, regardless of module, cabinet or panel construction.

G. Video Processing
1. Video Frame Rate: 50/60 frames per second
2. Graphic Frame Rate: 30 frames per second
3. Processing Architecture: 22-bit distributed
4. System Architecture: 100% digital
5. Video Enhancement: Color space conversion, adjustable gamma correction, proprietary sharpening technology and enhancement algorithms for optimal picture quality

H. LED Quality
1. Quality Control: Sorted by intensity and color wavelength
2. LED Lifetime: 100,000 hours of operation as defined by time at which display intensity has decreased to 50 percent of the original intensity

I. Calibration
1. Pixel-to-pixel and module-to-module optical color calibration must be performed at the factory. The manufacturer must also provide easy-to-use calibration software that allows individual modules and pixels to be independently adjusted while in the display.
2. If modules should need replacement during the life of the display, the calibration software must match newer modules' brightness levels to older modules' levels to preserve picture quality and maintain a uniform display appearance.

J. Display Interface
1. The full-color video display must be able to interface and display real-time data from the control system without the need for a duplicate or redundant input.

K. Horn:
1. Vibrating horn mounted inside the scoreboard cabinet behind the face.
2. Sounds automatically when period clock counts down to zero.
3. Sounds manually as directed by operator.

L. Accessory Equipment:
1. Vinyl striping applied around the clock and scoreboard face.
2. Two 17" (432 mm) high, 21" (533 mm) wide aluminum panels in upper corners with vinyl logo/sponsor decoration.
3. Standalone Time of Day (scoreboard acts as a clock when control console is unplugged/off).
4. Advantage time option for wrestling mode – PLYR and FOUL digits reversed.
5. Different sounding 12 VDC horn in place of buzzer horn.
6. Hardware for suspension installation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that mounting structure is ready to receive the display. Verify that placement of conduit and junction boxes are as specified and indicated in plans and shop drawings. Verify concrete has cured adequately according to specifications.

3.2 INSTALLATION

A. All power and control cables to display will be routed in conduit. Power to the display as well as raceways shown on electrical plans by the Electrical Contractor. Display control wiring including conduit will be the responsibility of the contractor assigned the display equipment.

B. Install display to beams in location detailed and in accordance with manufacturer's instructions. Verify unit is plumb and level.

3.3 INSTALLATION—CONTROL CENTER

A. Provide boxes, cover plates and jacks in locations per plans.

B. Test the operation of the display, controller and all control jacks; leave control unit and other loose items with owner's designated representative.

C. Conduct operator training on the display/controller operation.

D. Manufacturer must supply all required signal conversion hardware to allow for direct wire control of electronic display.

END OF SECTION 11 66 43

SECTION 11 68 00-PLAYING FIELD EQUIPMENT AND MATERIALS

PART 1 – GENERAL

1.1 SCOPE OF WORK

The Prime Contractor shall furnish all the necessary skilled labor, materials, apparatus, tools, equipment, transportation, temporary construction, shop drawings, and special or occasional services as required to install all sports equipment and materials.

1.2 SUBMITTALS

A. The following information shall be submitted before the installation of the specified work.

1. Standard print specifications and diagrams or shop drawings depicting installation directions and dimensions for in-ground sports equipment.
2. Material safety data sheets on products, as necessary.
3. Manufacture Product shop drawing data sheets.

1.3 QUALITY ASSURANCE

A. The Prime Contractor shall only accept bids from those vendors or manufacturers that have been pre-approved or identified as approved equal.

PART 2 – PRODUCTS

2.1 IN-GROUND STADIUM FIELD EVENT EQUIPMENT

A. The Prime Contractor is fully responsible for all the cost and installation of all permanent, in-ground field event equipment as specified by these specifications and as shown on the project contact design documents.

1. Pole Vault Boxes and Concrete Pole Vault Bar Slabs: (NFHS)
   a. Pole vault planting boxes & covers plugs. Supplied by Sportsfield Specialties, Inc.

   COMPONENTS:

   PVBCAW - White Cast Aluminum Pole Vault Box:
   1. Cast Aluminum Construction
   2. White Super Durable Powder Coated Finish
   3. 30° Reverse Bend at Pole Vault Box Entryway
      i. 7-7/8” (0.2m) Long
   4. Rounded Upper Edges
   5. Concrete Set Wings to Reduce Floating During Installation
   6. Meets or Exceeds NFHS, NCAA, and IAAF Rules and Regulations for Size and Shape

2. Adjustable High Jump Standards: (NFHS)
   a. HJS0208 - 2’-8’ High Jump Standards Set Supplied by Sportsfield Specialties, Inc.

   COMPONENTS:

   1. (2) Steel Base Assemblies: Each Fabricated of 7-Gauge Steel Sheet
      a. Each Contains (4) Leveling Feet for Adjustment
   2. (2) Mounting Stubs: Each Fabricated of 7-Gauge Steel Sheet
      a. Mounts Upright to Base Assembly
   3. (2) Uprights: Each Fabricated of a Custom Aluminum Extrusion
      a. Height: 53.50”
      b. Contains Metric and English Scales

4. (2) Riser Assemblies: Each Fabricated of (1) 1.50” Square Aluminum Tube with (2) Welded 3/8” x ¾” Crossbar Rest Mounting Blocks and (1) Welded ¼” x 1” Clamping Knob Mounting Block
    a. Travels Inside of Uprights to Raise and Lower Crossbar Rests
5. (4) Crossbar Rests: Each Fabricated of 0.125” Aluminum Sheet
6. Super Durable Powder Coated Finish: Black, Red and Silver Standard or Custom Available Upon Request.
7. Installation Package Consisting of the Following Components:
    a. Hardware Kit
    b. Installation Instructions

3. Take-Off Boards: (NFHS)

LTJTOB8 - 8’ Long and Triple Jump Take-Off Board System Supplied by Sportsfield Specialties, Inc. Refer to the playing field layout plan for the number of take-off boards required.

COMPONENTS:

LTJTOB8 - 8’ Long and Triple Jump Take-Off Board System:

a. White Synthetic Polyboard with Textured Surface
    i. Dimensions: 8” x 48” x ¾” (0.75”)
    ii. Grooved Edges for Slide-on Assembly, No Exposed Fastening Hardware

b. Extruded Aluminum Insert/Spacer
    i. 0.120” Wall Thickness
    ii. Designed to Accommodate Slide-on Board Assembly
    iii. ½” (0.5”) Recess to Accept Synthetic Track Material by Others

c. 16 Gauge (0.60”) 304 Stainless Steel Tray

Includes 1” PVC Drain Stub (Oriented at Either End) to Ensure Positive Connection to Subsurface Drainage System by Others

2.1 IN-GROUND FOOTBALL EQUIPMENT

A. The Prime Contractor is responsible for the cost of providing and installation of all permanent, in-ground goalposts as specified by these specifications and as shown in the project contact documents design.

1. Field Goal Posts:

COMPONENTS:

a. Goal Post Model: Adjustright® Football Goal Posts, 8’ gooseneck, High School Adjustable: By Sportsfield Specialties, Inc. or approved equivalent manufacturer.

b. Powder Coat Finish: Color as approved by the School District: Blue

c. Adjustable High School/College Base Plate Mount Football Goal Post

d. Access Frame Kit: model by Sportsfield Specialties Inc.

e. Install turf cover per manufacturer recommendations.

f. Round Goal Post Protective Padding: Color to be approved by the School District.

2. Field Goal Post Foundations:

a. The Prime Contractor shall be fully responsible for all costs associated with the structural engineering design, local building permitting, and installation for the proposed field goal post foundations.

3. Football Game Clocks:

COMPONENTS:

a. (2 EA) Electro-Mech Scoreboard Company or equivalent manufacturer.

b. 4'x'4' (2 EA) game clocks, mounting system, and protective padding. The Prime Contractor shall be fully responsible for all costs associated with the structural engineering design, local building permitting, and installation for the proposed football game clocks post foundations. Protective padding color to be approved by the School District.

c. MP-Series Scoreboard Control Console: Electro-Mech or approved equivalent manufacturer. Final control console to be approved by the School District.

d. Football Delay of Game Clock Mounting System: (2 EA)
Model: GPDOGCMS By Sportsfield Specialties, Inc. or approved equivalent manufacturer.

2.2 SOCCER GOAL EQUIPMENT

A. The Prime Contractor is responsible for the cost of providing and assembling both soccer goals. As reflected in these specifications.

a. SG824RE 8' x 24' Regulation Size Portable European Round Post Soccer Goals and Accessories - 8'H x 24'L x 3'B x 8'D Provided by Sportsfield Specialties, Inc. or equivalent manufacturer.

COMPONENTS:

1. Crossbar, Uprights, and Rear Ground Bar Fabricated of 6061 T6 Aluminum Pipe, 3.5" Schedule 40 Round (4" O.D.), Having the Following Attributes:
    a. Inside Width: 24'
    b. Inside Height: 8'
    c. Super Durable Powder Coated White Finish with Enhanced Resistance to UV and Fade
    d. Welded Aluminum Net Clips, Guaranteed for Life

2. Rear Net Stays Fabricated of 1" Schedule 40 Aluminum Pipe (1.315" O.D.), Having the Following Attributes:
    a. Length: 3'
    b. Super Durable Powder Coated Black Finish with Enhanced Resistance to UV and Fade

3. Additional:
    a. Removeable SGWKL4 Levered External Wheel Kit
    b. 5mm Braided, Knotless White High Tenacity Polypropylene Soccer Net with Rope Bound Perimeter and 4" Square Mesh – 8'H x 24'L x 3'B x 8'D
    c. Model Specific Hardware Kit and Installation Instructions
    d. Five (5) Year Limited Manufacturer's Product Warranty

2.4 IN-GROUND THROWING EVENT EQUIPMENT

A. The Prime Contractor responsible for the submission of the following shop drawings, all labor and costs for providing and the installation of all permanent, in-ground field events, throwing cage, and concrete flat work as specified by these specifications and as shown on the project contact design documents.

1. Hammer Throwing Cage / Shot Put / Discus Systems: (NFHS)

   COMPONENTS:

   a. DCHS (TFDCHS) High School Discus Cage with Backup Net System (1 EA): Provided by Sportsfield Specialties, Inc. or equivalent manufacturer.

   b. V366 Shot Put Aluminum Circle with Cross Bracing (2 EA) Provided by Sportsfield Specialties, Inc. or equivalent manufacturer.

   c. SPTBCARHS - High School Shot Put Toe Board Recessed Concrete Pad Installation (2 EA) Provided by Sportsfield Specialties, Inc. or equivalent manufacturer.

   d. V367 Discus / Hammer Aluminum Circle with Cross Bracing (1 EA) Provided by Sportsfield Specialties, Inc. or equivalent manufacturer.

   e. High School Discus Ground Sleeve Layout Plan: Provided by Sportsfield Specialties, Inc. or equivalent manufacturer.

   f. The Contractor shall refer to the playing field construction documents for size and locations of these field events. The Contractor is fully responsible for all concrete foundations, slabs, and obtaining all local building department permits, inspections, and permit fees.

PART 3 – EXECUTION

3.1 INSTALLATION OF EQUIPMENT AND MATERIALS

A. The Prime Contractor shall install all in-ground sports equipment in accordance with the product manufacturer and/or vendor’s recommendations for synthetic turf applications.

B. Shop drawings and testing data must be submitted and approved by the Architect and School District before ordering and installation of any in-ground equipment and specialty soccer, field events, and football product materials.

C. The Prime Contractor is responsible for providing the signed and sealed shop drawings prepared by a licensed State of California professional structural engineer for the field goal posts, game clocks, and field event foundations and obtaining all local building department permits, inspections, and permit fees.

END OF SECTION- 11 68 00

SECTION 13 12 05 PERMANENT GRANDSTANDS

PART 1 - GENERAL

1.01 SYSTEM DESCRIPTION

A. Provide labor, material, equipment and supervision necessary to complete installation of permanent steel grandstand, including the following:

1. Steel Substructure
2. Decking System
3. Concrete Foundation
4. Press Box Support Structure
5. Press Box

1.02 QUALITY ASSURANCE

A. AISC Certification: All structural steel shall be fabricated in an AISC certified plant that is certified “BU” – Certified Building Fabricator at the time of bid.
The manufacture bidding the project shall be listed on the AISC website as a certified fabricator prior to bidding.

B. Manufacturer Qualifications: Obtain required products from a single manufacturer with a minimum of 20 years of experience in the design and manufacture of permanent grandstands.

C. Installer Qualifications: Installer must be acceptable to or licensed by the manufacturer of products being installed.

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

E. Pre-installation Conference: Prior to installation of work of this section, conduct a meeting at the project site to discuss quality assurance requirements. In addition to the Contractor and the installer, arrange for the attendance of the following:
1. Other installers affected by the work of this section.
2. Manufacturer's representative.

F. Welders: AWS certified.

G. All material and workmanship shall be in accordance with AISC Manual of Steel Construction, Load & Resistance factor Design, 2nd Edition.

H. Installer Experience: Installer shall have a minimum of 5 years of demonstrated experience in the installation of permanent steel grandstands of similar scope and complexity.

1.03 SUBMITTALS

A. Manufacturer's Product Data: Submit manufacturer's descriptive product data for project.

B. Shop Drawings: Manufacturer to submit shop drawings sealed by a registered engineer and shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the applicable code and relevant laws.

C. Certificates:

1. Insurance Certificate
2. Bid Bond

D. Product Sample: Submit one 18-inch seat sample.

E. Color Sample: If applicable, submit sample.

1.04 SITE CONDITIONS

A. Field Site:
1. Owner to make site accessible.
2. Owner to verify site locations, benchmarks.

B. Underground Utility Line: Owner to clearly mark all underground utilities and obstructions and Owner to relocate all that conflict with grandstand.

C. Soil Test: Furnished by Owner.

1.05 BUILDING CODES

A. Must meet or exceed all State and Local applicable codes and in compliance with the International Building Code adopted by the jurisdiction and CABO/ANSI A117.1 Barrier Free Subcode.

1.06 WARRANTY

A. Permanent Grandstand shall be under warranty for a period of one (1) year beginning at Date of Substantial Completion for Projects installed by Manufacturer. The warranty will provide for repair or replacement of failed components due to defect in materials and workmanship of installation for the specified period. This warranty excludes any other defects resulting from abnormal use in service, vandalism, weathering, oxidation, accidental or intentional damage or any occurrences beyond Manufacturer's control.

1.07 MAINTENANCE

A. Owner is to conduct annual inspection and required maintenance of grandstand to assure safe conditions. It is also recommended that a professional engineer or registered architect perform inspections biennially.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Southern Bleacher Company (800) 433-0912. Horizontal Beam Design.

1. Alternate manufacturers seeking to be pre-approved to bid must submit product literature and references (with contact names/numbers) to the owner/architect, 14 days prior to bid date, for five (5) similar sized DSA approved projects completed within the past 2 years.
2. Each manufacturer is required to develop and submit their own engineered submittal drawings and calculations. Southern Bleacher's drawings and calculations are for their exclusive usage.
3. Alternate manufacturers shall be responsible for obtaining DSA approval for their product and all costs associated (including additional architect and DSA fees) shall be borne by the manufacturer/contractor, and not by the owner or design team.

4. No time extensions to the schedule will be granted awaiting DSA approval of submittals and liquidated damages apply per the contract documents.

2.02 PERMANENT STEEL GRANDSTAND

A. Product Description

1. Home- Elevated Horizontal Beam Design: Net seating capacity of 3123, 18 rows, and 331'-6" long.
   Press Box Support Structure: 30' x 8'.
   Press Box: 30' x 8'.
   Visitors- Elevated Horizontal Beam design: Net seating capacity of 995, 10 rows, and 174' long.

2. Vertical columns are placed 18' on center laterally and as required and shown in plans front to back.

3. Horizontal beams are wide flange beams.

4. Traverse bays are free of cross bracing the total length of the grandstand.

5. Stringers are wide flange with steel angle rise and depth fabrication and are placed 6' on center.

6. Front Walkway/Crosswalk:
   a. Home- Width 7'-4".
      Visitors- Width 6'-2"
   b. Home- Elevated 4' and 9' (at tunnel) above grade at benchmark.
      Visitors- Elevated 2'-6" above grade at benchmark.

7. Entry stairs to be firmly anchored to uniformly poured concrete bases.
   a. Stair rise: 6" minimum with aluminum closure and contrasting aluminum stair nose.
   b. Stair tread depth: 11".
   c. Guardrails: As required by code.
   d. Stairs to have handrail extension. The handgrip portion of handrails shall not be less than 1 ½" or more than 2" in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. The top of handrails and handrail extensions shall be placed not less than 34" or more than 38" above the nosing of treads and landings. Where handrails are not continuous between flights, the handrails shall extend horizontally at least 12" beyond the top riser and continue to slope for the depth of one tread beyond the bottom riser. Ends shall be returned or shall terminate in newel posts or safety terminals.

8. Aisles:
   a. Aisles with seating on both sides to have discontinuous mid-aisle handrails. The handrails shall be discontinuous with breaks at intervals not to exceed five rows. These breaks shall have a clear width of at least 22" and not greater than 36" horizontally.
   b. Anodized aluminum handrails with rounded ends to be provided with an intermediate handrail below the main handrail.
   c. Aluminum tread nosing of contrasting color on aisle steps.
   d. Halfsteps shall be provided for riser heights above 8 inches.

e. Halfsteps shall provide equal rise and run throughout aisle. Each shall have aisle nosing with non-skid black powder coated finish or other paint system meeting AAMA 603.8-92 specifications with a hardness rating of 2H and riser closure with clear anodized finish.
f. Aisles with a riser height of non-uniformity shall be indicated with distinctive markings as required by code.

9. Decking:
   a. Home: Rise per row 12” in lower sections and 14” in upper sections, depth per row 26”.
      Visitors: Rise per row 12”. Tread depth 25”
   b. Each seat 17” above its respective tread.
   c. Texture Coat Aluminum Decking Arrangement. (Mill finish will not be accepted).
      (1) Home: INTERLOCK Aluminum Decking System.
          Visitors: Tongue and Groove Aluminum Decking System.
   d. Seating Selection
      (1) Anodized Aluminum Bench Seat
          (a) 2” x 10” (standard), Die #7758 with height of 1 1/2".

10. Guard railing: To be at all sides of bleacher, entry stairs and ramps, and landings. Railing to be anodized aluminum with end plugs at ends of straight runs and/or elbows at corner. All guardrails shall be secured to angle rail risers by galvanized fasteners. Railing shall be at heights as required by code for its location on the grandstand. Guard railing shall include intermediate railing.

    Home: Black polyvinyl coated chain link fencing fastened in place with galvanized fasteners and aluminum ties with 2” mesh for front guard railing and ramp/stair railings. “No climb” 1” mesh black polyvinyl coated chain link fencing fastened in place with galvanized fasteners and aluminum ties on the sides and rear of the grandstand and the viewing area on top of the press box.
    Visitors: Black polyvinyl coated chain link fencing fastened in place with galvanized fasteners and aluminum ties with 2” mesh for front guard railing, ramps, and stairs. 1” “no climb” black polyvinyl coated chain link is required for the rear and side guard rails.

11. Ramps:
    a. Slope: 1 in 12.5.
    b. Guardrails: As required by code plus toe board.
    c. Handrail: Ramps to have handrail extension. The handgrip portion of handrails shall not be less than 1 ½” or more than 2” in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. The top of handrails and handrail extensions shall be placed not less than 34” or more than 38” above the ramp surface. Where handrails are not continuous between runs, the handrail shall extend horizontally above the landing 12” minimum beyond the top and bottom ramps. Ends shall be returned or shall terminate in newel posts or safety terminals.

12. Handicap provision:
    a. Home- 34 wheelchair spaces.
       Visitors- 12 wheelchair spaces.
       b. Riser areas adjacent to the wheelchair spaces are to have intermediate construction so a 4” sphere cannot pass through opening.

B. Materials/Finishes

1. Substructures:
   a. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
   b. Shop connections are seal welds.
   c. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.
   d. Painted steel finish is unacceptable.

2. Extruded Aluminum:
   a. Seat Planks, riser Planks, and railing are extruded aluminum alloy, 6063-T6 with clear anodize finish.
      (1) Clear anodized 204R1, AA-M10C22A31, Class II finish
   b. Tread planks are extruded aluminum alloy 6063-T6 texture coat finish. Mill finish will not be accepted.
   c. Railing: Extruded aluminum alloy, 6063-T6 clear anodized 204R1, AA-M10C22A31, Class II.
   d. Riser board façade on the Home and Visitors grandstands is Durkyn finish in owner/architect selected colors.
      (1) Factory applied, baked-on Kynar or Hylar/acrylic resin based paint coating, Dur-Kyn, as manufactured by the Valspar Corporation. Dur-Kyn meets or exceeds the physical and performance properties of AAMA 2603.

3. Accessories:
   a. Channel End Caps: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.
   b. Hardware:
      (1) Bolts, Nuts: Hot-dipped galvanized or mechanically galvanized.
      (2) Hold-down Clip Assembly: Aluminum alloy 6005A-T6, mill finish.
      (3) Structural Hardware: Equal to or greater than hot-dipped galvanized ASTM-A307. No connections utilizing high strength bolts are classed as slip critical.
   c. Aisle Nose and Stair Nose: Aluminum alloy, 6063-T6, non-skid black powder coated finish or other paint system meeting AAMA 603.8-92 specifications with a hardness rating of 2H.

C. Fabrication:
1. Design Load:
   a. Tread and Seat Area: 100 psf uniform live load.
   b. Seat (Vertical): 120 lbs/lf.
   c. Seat (Horizontal Sway): 24 lbs/lf parallel and 10 lbs/lf perpendicular to seat.
   d. Handrail and Guardrail: 50 lbs/lf in any direction.
   e. Handrail and Guardrail: 200 lbs concentrated in any direction.
   f. Snow Loads: As per State adopted code.
   g. Wind Loads: As per State adopted code.
   h. Seismic Loads: As per State adopted code.

2. All manufactured connections to be shop welded.
   a. Manufactured by certified welders conforming to AWS Standards.

2.03 PRESS BOX WITH METAL STRUCTURE

A. Product Description: Type II Construction

1. Press Box Support Structure: Independently supported but connected to rear of grandstand. Support Structure to be 30' long x 8' deep with landings and walkway in the rear.

2. Press Box Dimensions: 30' wide x 8' long.

3. Filming Area/Observation Deck located on Press Box roof.

4. Press Box to be of open construction, allowing inspection of electrical wiring, switches and other components without destructive disassembly.

B. Materials/Finishes

1. Press Box Support Structure:
   a. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
   b. Shop connections are seal welds.
   c. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.

2. Press Box: All materials shall be new and shall comply with ASTM specifications.
   a. Floor
      (1) Main support to be a galvanized steel floor frame sized to support structure and 29 ga metal belly pan for support of insulation.
      (2) Floor to be INTERLOCK Aluminum Decking System, extruded aluminum alloy 6063-T6, mill finish. Attach Decking System to steel floor frame with mechanical fasteners at end of plank and at intermediate supports. (Tongue & Groove or Standard extrusion is not acceptable.)
      (3) Insulation: Formaldehyde-free fiberglass building insulation R-13 (minimum), 3 ½" thick. Batt or roll as manufactured by Johns Manville, or equal.

   b. Wall Structure
      (1) 4" x 4" x 11 ga square tubing with maximum span of 14' on front wall and maximum span of 6' on back wall and 4" x 2 ½" x 14 ga steel "cees" with maximum spacing of 5' for all walls with siding. Spans greater than these require engineered calculations for design.
         a) Steel framing shapes to meet one of the following ASTM's, A500 Grade A or B 45 ksi, A36 50ksi, A1011 CS Type B.
      (2) Insulation: Formaldehyde-free fiberglass building insulation R-13 (minimum), 3 ½" thick. Batt or roll as manufactured by Johns Manville or equal.
      (3) Interior Finish
         (a) ½" or 5/8" vinyl coated gypsum panels. Color- Caledonia Cotton
         (b) Cove Base: Vinyl 4" x .080. color – Medium Gray
      (4) Exterior Finish
         (a) 26 ga prefinished R-Panel paneling as manufactured by MBCI, Signature 200 and Signature 300 color series, or equal.
         (b) Wall panels are attached with #12 TEK screws - 6" O.C. at the top, midpoint and bottom of the panels.

(c) Lap screws are placed at each end of the panels, at the intermediate supports, and at the midpoint between supports (TEK #14).
(d) All fasteners are factory painted same color as exterior paneling.

c. Roof Structure
(1) 4" x 4" x 11 ga square tubing with maximum spacing of 6' on center and 4" x 2 ½" x 14 ga steel "cees" with maximum spacing of 2' on center.
(2) Roof: 1/8" four way steel plate roof, continuous welded seams coated with acrylic metal primer as manufactured by Coronado and 36 mils of acrylink roof coating as manufactured by Isothermal Protective Coatings, or equal. Plate is welded on one side of rafters not located at seams and both sides of rafters located at seams with 2" long ½" fillet weld on 12" centers.
(3) Insulation: Formaldehyde-free fiberglass building insulation, R-19 (minimum) 6" thick. Batt or roll as manufactured by Johns Manville or equal.
(4) Cornice: 26 ga steel prefinished to match metal siding.
(5) Ceiling: 24" x 24" x 5/8" acoustical lay in ceiling tile with removable tiles, per 2025 CBC, applicable category for seismic zone. ref. DSA IR 25-2.

d. Exterior Door(s)
(1) Full flush steel construction with hollow or polystyrene core. 18 ga skin sheets. Dimensions: 3' x 6'-8". Color: Coordinated with press box siding color.
(2) Steel door frame (16 ga) complete with ½" threshold and weather-stripping.
(3) Exterior Hardware: Yale 546F Exterior Trim, or equal. Handles shall be lever type that allow operation without tight grasping or twisting of the wrist. Keyed alike locks.
(4) Interior Hardware: Yale 2100 Exit Device, or equal. Handle shall be panic bar that allows for opening without any grasping, twisting or turning.

e. Interior Door
(1) Interior Solid Core Birch Unit. Dimensions: 3' x 6'-8".
(2) Hardware: Handles shall be lever type that allow operation without tight grasping or twisting of the wrist.

f. Interior Walls (Optional)
(1) Framing to be steel galvanized studs (25 gauge) 1 ¼" x 3 5/8", maximum 2' on center.
(2) Finishes to be consistent with all other interior finishes.

g. Windows
(1) Frame: Extruded aluminum single hung, vertical sliding unit**,** thermal break.
(2) Sash: Tilt toward inside for easy cleaning.
(3) Glazing: Insulated tempered panes.
(4) Dimensions of each unit: Dependent on compartment size. At interior wall locations or structural support locations the dimension between windows shall be no greater than 6 inches.
(5) Finish: Electrostatically applied acrylic enamel.

h. Work Bench
   (1) 1" thick x 21" wide clear anodized aluminum work bench supported by 4" x 2 ½" x 14 ga steel. Countertops heights shall be constructed to allow wheelchair usage at all locations.

i. Painting: Materials equal to Coronado, or equal.
   (1) Surfaces: Exterior Door(s), Door Frame(s)
      (a) Primer: Applied by Door Manufacturer.
      (b) Finish: 2 coats acrylic Exterior semi-gloss enamel applied by press box manufacturer.
   (2) Surfaces: Interior Doors (if applicable)
      (a) Primer: Applied by Door Manufacturer.
      (b) Finish: 2 coats Interior/Exterior semi-gloss enamel applied by press box manufacturer.

   (3) Surfaces: Exterior Siding
      (a) Primer: Applied by Siding Manufacturer.
      (b) Finish: Applied by Siding Manufacturer.
      (c) Touchup: If applicable
   (4) Surfaces: Wall and Roof Structure
      (a) Primer: metal primer applied after welding.

j. Caulking: Sonneborn NP1 – Polyurethane sealant, All temperature, UV resistant, or equal. Silicone products are not acceptable.

k. Electrical
   (1) Submittal drawings shall indicate devices and circuitry.
   (2) Fixtures: LED lay-in design. Fixtures shall be located above countertop and be maximized to full length of compartment space.
   (3) Wiring to be in EMT, flexible metal conduit or surface raceway. N.E.C. breaker panel to be 100 amp flush or surface mounted on wall with 1 ¼" conduit stubbed out bottom of press box or 2" rigid conduit to be stubbed out at back wall of press box ready for service line to be connected. (Service line to Press Box is responsibility of Owner).
   (4) Electrical outlet(s) installed per NEC shall be standard duty. All outlets shall be surface or flush mounted.
   (5) Sound, Telephone, Clock, Field Communication: Empty single or double outlet boxes (as required) per N.E.C. with 3/4 inch conduit stubbed out bottom of Press Box for use of Owner. Outlet boxes to be flush mounted into wall. Any wiring completed on-site will be responsibility of such contractor for inspections. Quantity. Two will be provided. Owner shall indicate additional boxes needed.
   (6) Filming Area/Observation Deck: Weathertight outlet box for cameras. Quantity: One. Owner shall indicate additional outlets needed.

l. Filming Area/Observation Deck
   (1) Access
      (a) Interior: Roof hatch with OSHA-rated aluminum ladder mounted to an interior back wall.
   (2) Roof guard railing to be 42" above walking surface around perimeter of deck attached to 5/8" galvanized studs to be welded to roof support structure. The guard railing is anodized aluminum with 9 ga black polyvinyl coated chain link fencing with 1" "no climb" mesh fastened in place with galvanized fasteners and aluminum ties.

2.04 WARRANTY

A. The Press Box shall be under warranty for a period of one (1) year beginning at Date of Substantial Completion for projects installed by Manufacturer. The Press Box is warranted to be free from defect in materials and workmanship during manufacture. This warranty excludes any other defects resulting from abnormal use in service, accidental or intentional damage or any occurrences beyond manufacturer's control.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All work performed by technicians experienced in bleacher seating installation.

B. Project as per approved shop drawings.

3.02 FIELD QUALITY CONTROL

A. Foundation: Footings for the grandstand shall provide sufficient bearing area at bottom to support all loads of the grandstand. Depth and design of footings shall be determined by Owner supplied soil test. Hot-dipped galvanized anchor bolts shall be secured in the concrete footings. Concrete shall attain working strength of 3,000 psi.

3.03 CLEAN-UP

A. Clean up all debris caused by work of this section.

B. The Owner, Architect and Contractor acknowledge and accept that mill finish aluminum as specified may have water stains present from transportation and storage during installation. Removal of these stains is not part of this contract.

C. Stand to be broom cleaned at completion.

SECTION 22 00 00 PLUMBING

PART 1 GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions, Section 23 00 00, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
1. Sanitary sewer system.
2. Domestic water system.
3. Storm drain system.
4. Fuel gas system.
5. Drain system (including condensate drain).
6. All equipment as shown or noted on the drawings or as specified.
7. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, braces, housekeeping pads, supports and related items no longer required.
8. Lead Free: All equipment, fixtures, valves and fixture stops providing water for human consumption installed after January 1, 2010, must meet the “Lead Free” requirements for the State of California.

B. Work Specified Elsewhere:
1. Line voltage power wiring, disconnect switches and installation of all starters are included in the Electrical Section unless otherwise noted.
2. Concrete and reinforcing steel unless specifically called for on the drawings or specifications.
3. Painting unless specifically called for in the drawings or specifications.
4. Carpentry.
5. Control of domestic hot water circulating pump.

PART 2 PRODUCTS

2.1 PIPING MATERIALS:

A. Sanitary Sewer:
1. Soil, Waste and Vent Piping (Non-Pressurized):
a. Inside Building and Within Five Feet of Building Walls to Civil P.O.C.: Standard weight coated cast iron pipe and fittings. Plain end, CISPI 301, ASTM A888, or hub end with rubber gaskets, ASTM A74, ASTM C564. ABI, Tyler, Charlotte. Couplings shall be heavy-duty shielded couplings, Type 304 stainless steel, with neoprene gasket, ASTM C-1540. Husky HD 2000, Clamp-All 80, Mission HeavyWeight. MG Couplings are also acceptable. 2" and smaller exposed to view shall be galvanized steel, ASTM A53, with coated cast iron recessed drainage fittings, ANSI B16.12. Fixture and equipment drains exposed to view in kitchens shall be DWV copper, recessed drainage fittings, 95-5 solder.
Where required by soil conditions, as determined by the method described in ASTM A74-09, Appendix X2, below grade cast iron pipe

and fittings shall have 8 mil (minimum) Polyethylene Encasement (Poly Wrap), Per ANSI/AWWA C105/A21.5.

2. Cleanouts: Comparable models of Josam, Wade, Mifab or Zurn are acceptable. Grease plug prior to installation. Floor Cleanouts: Smith 4023 with nickel bronze top in finished areas; Smith 4223 in utility areas. Wall Cleanouts: Smith 4532 with stainless steel cover and screw. Pipe Cleanouts: Iron body with threaded brass plug. Site cleanouts more than 5' outside building may be PVC with PVC plug.
3. Cleanout Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.

B. Storm Drain (Including Rain Water Leader, RWL) -Inside Building and Within Five Feet of Building Walls to Civil P.O.C.: Same as Soil, Waste and Vent Piping, except as otherwise noted on drawings. Where exposed to view on exterior of building, piping shall be galvanized steel with recessed drainage fittings.

C. Water and Gas:
1. Hot and Cold Water Piping: Materials used in the water system, except valves and similar devices, shall be of like material, except where otherwise approved by Engineer and Authority Having Jurisdiction, prior to start of work. For existing water systems of galvanized steel or copper, materials shall match existing.
   a. Inside Building, Within Five Feet of Building Walls to Civil P.O.C., and All Above Grade: Hard temper seamless copper, ASTM B88. Wrought copper fittings, ANSI B16.22. Type L with brazed joints (1100F, min.). 1-1/2" and smaller above grade may be soldered, lead-free solder. All nipples shall be red brass (85% copper). Above grade fittings may be copper (1/2" to 2") or bronze (2-1/2" to 4") press fittings, ASME B16.18 or ASME B16.22. EPDM O-rings. Installation shall be in accordance with the manufacturer's installation instructions. ProPress, Apollo, Mueller Streamline.
2. Gas Piping:
   a. Inside Building and All Above Grade: 2" and Smaller: Schedule 40 galvanized steel pipe, ASTM A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3, ANSI B31.8. 2-1/2" through 4": May be screwed pipe as above or welded pipe as below. Welded: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9.
   b. Inside Building - Below Grade to Five Feet Outside Building: Same as Inside Building and All Above Grade. Provide sleeves and vents acceptable to administrative authority.
   c. Outside Building - Below Grade: Polyethylene pipe and fittings, ANSI B31.8, ASTM D2513, where allowed by administrative authority, Driscopipe 6500, Dupont Aldyl "A", Plexco. Otherwise, piping shall be coated schedule 40 steel, ASTM A53.
3. Valves and Specialties:
   a. Valves:
      (1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Kitz, Milwaukee, Nibco, Stockham, Walworth or Watts are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer. Use ball valves for 2" and smaller domestic water valves above grade. Butterfly valves may be substituted for 2-1/2" and larger gate valves above grade; see specification below.
      (2) Gate Valve: 2" and Smaller: All bronze. Non-rising stem. Threaded bonnet. Wedge disk. Malleable iron handwheel. 200 psi CWP. Nibco T-113-LF. 2-1/2" and Larger: Iron body, bronze mounted. Non-rising stem. Resilient wedge disk. 200 psi CWP. Flanged or

AWWA hub end as applicable. Nibco F-619-RWS. Underground valves shall have square operating nut.

(3) Butterfly Valve: Ductile iron threaded lug body. Aluminum bronze disk. EPDM molded-in liner and seals. 416 stainless steel shaft. 6" and smaller valves shall have multi-position lever handle. 8" and larger valves shall have gear operator. Provide 2" extension neck at insulated pipes. Nibco LD-2000.

(4) Ball Valve: Full port. Lead free brass body, cap, stem, disk and ball. Screwed connection. Lever handle. PTFE seat and stem packing. Min. 400 psi CWP. CSA-US and UL listed. Nibco T-FP-600A-LF.

(5) Check Valve: 2" and Smaller: Lead-free bronze swing check, regrinding. 200 psi CWP. Nibco T-413-Y-LF. For vertical applications use lead-free bronze, spring-loaded, lift-type. Nibco T-480-Y-LF. Check valves for air systems shall be the spring- loaded, quick-closing type, Stockham B-322-TS.

(6) Plug Valve: Valves in gas piping systems must be UL or CSA listed for gas distribution. 4" and Smaller: Eccentric bronze or nickel plated semi-steel plug. Semi-steel body. Bronze bushings. Buna-N-rings. 175 psi WOG. KeyPort Valve Series 400. 2" and smaller above grade may be listed full port ball valves, except in publicly accessible locations. Apollo, Jomar, Nibco.

(7) Valve Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.

b. Instruments:

(1) Thermometer: 3" dial. Stainless steel case. Back or bottom connected as required. 1/2" NPT. 20F-240F, 2F divisions for hot water. 25F-125F, 2F divisions for chilled water. 2" insertion length. Allowance to be made for insulation thickness. For installations over 7 feet above finish floor, provide digital thermometer with remote reader. Marshalltown, Moeller, Taylor, Tel Tru, Winters.

(2) Thermometer Well: Brass well. Suitable for thermometer above. Provide 2" extension at insulated pipes.

c. Miscellaneous Specialties:

(1) Temperature and Pressure Relief Valve: ASME rated fully automatic, reseating combination temperature and pressure relief valve sized in accordance with energy input. Sensing element immersed within upper 6" of tank. Watts.

(2) Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi. Unions for copper piping shall be copper or lead free cast bronze. Anvil. Size 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. EPDM gasket, NSF 61 rated. Victaulic Style 77, Gruvlok.

(3) Dielectric Coupling: Insulating union or flange rated for 250 psig. Wilkins DUXL Series.

(4) Shock Absorber: Multiple bellows. All stainless steel construction. Designed and applied in accordance with PDI WH201. Amtrol, Smith, Wade, Zurn.

(5) Gas Pressure Reducing Valve: Capacity and pressure ratings as indicated on drawings. American Meter.

D. Drain Piping (including Condensate): Same as inside building cold water piping.

1. Condensate Drain Piping for Condensing Gas Fired Equipment: Solid wall schedule 40 CPVC piping with solvent weld fittings.

E. Flue and Intake Piping (Condensing Gas Fired Equipment): Schedule 80 CPVC piping with Schedule 80 CPVC solvent weld fittings. Install per equipment manufacturer's instructions.

F. Miscellaneous Piping Items:
   1. Pipe Support:
      a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendation. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Anvil, Unistrut.
      b. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco, Superstrut.
      c. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.
   2. Flashing: Vent flashing shall be 4 lb/ft2 lead, 16" sq. flange, length sufficient to be turned down 2" into vent. Oatey. Flashing for other piping through roof shall be prefabricated galvanized steel roof jacks with 16" sq. flange. Provide clamp-on storm collar and seal water tight with mastic. For cold process built-up roof, material shall be 4 lb/ft^2 lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer's recommended flashing material.

2.2 PIPING INSULATION MATERIALS:

A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Pre-Molded Fiberglass Heavy density sectional pre-molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-F at a mean temperature of 50F. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. For hot water piping to 140°F, thickness shall be 1" for pipe sizes less than 1"; 1-1/2" thickness for pipe sizes 1" and 1-1/2"; 2" thickness for 2" and larger. See Title 24, Part 6 "California Energy Code" for temperatures above 140°F. Knauf, Johns-Manville, Owens-Corning.

C. Fiberglass Blanket: Unfaced. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-F at a mean temperature of 50F. 1-1/2" thickness. Knauf, Johns-Manville, Owens-Corning.

D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.

E. Stretchable Glass Fabric: Reinforcing mesh. 10 X 20 continuous filament glass yarns per inch. Johns-Manville.

F. Vapor Barrier Coating: Childers CP-30, Foster 30-25.

G. Lagging Adhesive: Childers CP-50A, Foster 30-36.

H. Aluminum Jacketing: Aluminum pipe and fitting jacketing. 0.016" thickness for straight pipe. 0.024" thickness for fittings. Stucco-embossed finish. Integral moisture barrier. Provide pre-fabricated aluminum strapping and seals by same manufacturer. Childers.

I. Outdoor Mastic: Childers CP-10, Foster 65-05.

J. Insulating Tape: Ground virgin cork and synthetic elastomeric. Black, odorless, and non-toxic. K factor 0.43 Btu-in/hr-ft2-F or less. Non-shrinking. For outdoor use, provide protective finish by same manufacturer. Halstead.

K. Molded Closed Cell Vinyl (Piping Insulation Under Lavatories and Sinks): Fully molded closed cell vinyl, 1/8" thick, minimum. Thermal conductivity shall not exceed 1.17 BTU-in/hr-ft2-ºF at an average temperature of 73ºF. Weep hole in cleanout nut enclosure. Hinged cap over valve to allow access for servicing. Out of sight nylon fastening system and internal ribs on drain insulation to provide air gap (Lav-Guard Only). Truebro Lav-guard, McGuire Pro Wrap, Plumberex.

2.3 FIXTURES:

A. General: Provide rough-in for and install all plumbing fixtures shown on drawings. Except in equipment rooms, all trim, valves and piping not concealed in wall structure, above ceiling or below floors, shall be brass with polished chrome plate finish, unless noted otherwise. All enameled fixtures shall be acid resisting. Standard color is white unless otherwise noted.

B. Schedule: Refer to Plumbing Fixture Schedule on the drawings for list of fixtures and trim. Manufacturer's model numbers are listed to complete description. Equivalent models of American Standard, Haws, Just, Kohler or Zurn are acceptable. For drainage fixtures, equivalent models of Josam, Mifab, Smith, Wade or Zurn are acceptable.

C. Stops and P-Traps: All fixtures shall be provided with stops and P-Traps as applicable. Wall mounted faucets, valves, etc. shall have integral stops or wall mounted stops.
1. Stops: All hot and cold water supplies shall be 1/2" FIP inlet ¼ turn ball angle stops with loose key, lock shield, and chrome plated copper riser (3/8" for 2-1/2 gpm and less, otherwise 1/2"). BrassCraft, Dahl, McGuire.
2. P-Traps: Semi-cast brass, ground joint. 17-gage. Clean-out plug. Unobstructed waterway. California Tubular, McGuire.

D. Caulking: Caulk fixtures with white G.E. "Sanitary SCS1700", mildew resistant silicone sealant with EPA listed anti-microbial.

2.4 EQUIPMENT:

A. General Requirements:
1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
3. Ratings:
   a. Gas: Gas burning equipment shall be furnished with 100% safety gas shut off, intermittent pilot ignition, and shall be CSA (US) or AGA certified.
   b. Electrical: Electrical equipment shall be in accordance with NEMA standards and UL or ETL listed where applicable standards have been established
4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment

requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.

5. Electrical:
   a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be manual reset, and shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
   b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
   c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip-proof, NEMA B design on pumps, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction, unless otherwise noted. Design shall limit starting inrush current and running current to values shown on drawings. Motors 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. Vertical motors with exposed fans shall have rain caps.
   d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.
   e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.
   f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.

B. Electric Drinking Fountain: Wall hung with bottle filler. Provide steel mounting brackets. Stainless steel basin. Removable grid drain. Chrome plated brass bubbler with automatic flow regulator and self-closing valve. Nonferrous evaporator. Lead solder shall not be used. Hermetic compressor with automatic reset overload protection. Air cooled condenser. Adjustable thermostat. UL listed. ARI certified. Elkay, Haws, Sunroc.

C. Water Heater: Natural gas fired. Minimum 92% thermal efficiency. Shall be design certified by CSA for 180°F application. Tank shall be lined with Vitraglas® vitreous enamel and shall have a bolted hand hole cleanout. Tank shall have four extruded magnesium anode rods installed in separate head couplings. Water heater shall be equipped with stainless steel cold water inlet, Hydrojet® Sediment Reduction System. Heater shall be insulated with Non-CFC foam. Water heater shall be equipped with an electronic ignition system, an ASME rated T&P relief valve and a premix closed combustion system for direct venting using either 3" or 4" CPVC vent pipe. Factory assembled and tested. Water heater shall be approved for zero inch clearance to combustibles. A digital LCD display shall be integrated into the front and be an adjustable electronic thermostat to any temperature up to 180°F. A recycling Energy Cut Off (E.C.O.) shuts off all gas in the event of an overheat condition. Certified at 300 PSI test pressure and 150 PSI working pressure. Design certified by CSA

International, ANSI standard Z-21.10.3, for up to 180°F application as an Automatic Storage Heater. Neutralizing kit. Bradford White.

D. Circulating Pump: In line centrifugal. 3-speed motor. Body: Lead Free bronze body, brass impeller. Mechanical seals. Bronze sleeve bearings. Integral thermal overload protection. Bell and Gossett/Xylem, Taco. -OR- Body: Aluminum housing. All parts exposed to fluid, stainless steel. Water lubricated ceramic shaft and bearings. Epoxy encapsulated windings. Grundfos.

PART 3 EXECUTION

3.1 PIPING INSTALLATION:

A. General:
1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted.
2. Joints:
   a. Threaded: Pipe shall be cut square and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
   b. Welded or Brazed: Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100F. Welding or brazing shall be performed by a Certified Welder or Brazer as certified by an organization/institution that uses standards recognized by the American Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
   c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
   d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.
3. Fittings and Valves:
   a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
   b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
   c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
   d. Valves: All valves shall be full line size. Provide shut-off valve for each building and each equipment connection. Provide shut-off valve at each point of connection to existing piping. At equipment connections, valves shall be full size of upstream piping, except that gas valves within 18" of the point of connection to the equipment may be the same size as the equipment connection.
   e. Valve Accessibility: All valves shall be located so that they are easily accessible. Valves located above ceilings shall be installed within 24" of

the ceiling. For situations where this is not practical or where valves are greater than 10' above the floor, chain wheel operators shall be provided. Chain shall extend down to 7' above the floor. All such installations must have prior review by the Engineer.

4. Pipe Support:
   a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction. Support individual pipes with pipe hanger. Copper piping systems which protrude through a surface for connection to a fixture stop or other outlet shall be secured with a drop ell, Nibco 707-3-5, to a Holdrite Model #SB1 bracket; nipple through surface shall be threaded brass.
      (1) Pressure Pipe:

Pipe Size (Inches)	Maximum Spacing* Between Supports (ft.)		
	Copper	Sch. 40 steel	Plastic
1/2	6	6	4
3/4	6	8	4
1	6	8	4
1-1/4	6	10	4
1-1/2	6	10	4
2	10	10	4
2-1/2	10	10	4
3	10	10	4
4	10	10	4
6	10	10	4

*Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings. Plastic piping shall be supported per the manufacturer's recommendations. Seismic requirements may reduce maximum spacing.

      (2) Gravity Drain Pipe: Piping shall be supported at each length of pipe or fitting, but in no case at greater spacing than indicated above for pressure pipe.
   b. Hot and Cold Water Piping: All hot and cold water piping shall have isolating shield; no portion of this piping shall touch the structure without an isolating shield except at anchor points for fixture rough-in.
   c. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.
5. Miscellaneous:
   a. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings, or floors in finished areas.
   b. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and smaller, otherwise 2" annular clearance.
   c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of 2025 CBC Section 714.
   d. Thermometer Tap: Provide tee for instrument well. Minimum size of pipe surrounding well shall be 1 1/2". Mount on side of pipe.
   e. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.

B. 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. Bell and spigot piping shall be installed with barrel on sand bed; excavate hole for bell.
   2. Cleanouts: Install cleanouts at ends of lines, at changes of direction greater than 45 degrees, and at not greater than 100 foot intervals. Locate interior cleanouts in accessible locations and bring flush to finished surface.
   3. Vents: Vents shall terminate not less than 6" above the roof nor less than 12" from any vertical surface nor within 10' of any outside air intake. Install horizontal vent lines at 1/4" per foot pitch. Offset vents 2' minimum from gutters, parapets, ridges and roof flashing.

C. Storm Drain (Including Rain Water Leader, RWL): Similar to Sanitary Sewer. Piping with less than 24" of cover outside building walls shall be cast iron.

D. Water Piping: Connections to branches and risers shall be made from top of main. Supply header in fixture battery shall be full size to last fixture, reducing in size only on individual connections to each fixture in battery. Minimum pipe size shall be 1/2", unless otherwise noted. Exposed fixture stops and flush valves shall be installed with brass nipples for copper piping and galvanized nipples for galvanized piping. Nipples are to extend from outside of wall to fitting at header or drop behind finish wall surfaces. Pipe nipples shall be same size as stop or flush valve. Provide shut off for each building and each connection to equipment. Shock absorbers shall be installed in a vertical position as indicated on drawings.

E. Gas Piping: Installation shall comply with CPC and NFPA 54 (National Fuel Gas Code). Shall be pitched to drain to drip legs at low points where other than dry gas conditions exist. No unions shall be installed except at connections to equipment. Provide shutoff and dirt leg (sediment trap) at each equipment connection. Only equipment mounted on vibration isolators shall be connected with flexible connectors. Under floor piping shall be sleeved and vented. Plastic pipe and fittings shall be joined in accordance with manufacturer's recommendations. Metal to plastic transition fittings shall be installed at all transitions. Provide 14 gage insulated tracer wire secured to pipe at 10' intervals with nylon ties. Terminate tracer 6" above grade at both ends.
Odor Fade Warning – The odorant in propane (LP) and natural gas is colorless and the intensity of its odor can fade under some circumstances. Contact the utility company for more information.
Submit installer training certification from polyethylene piping manufacturer certified trainer, include copy of trainer’s certification. Training shall have been completed no more than 6 months prior to starting work.

F. Drain Piping (Including Condensate): Install with constant pitch to receptacle, 1/4" per foot where possible, otherwise 1/8" per foot minimum. Provide TEE with clean-out plug at all changes of direction. Provide trap at each air handling unit to prevent air leakage. Only equipment mounted on vibration isolators shall be connected with flexible connection. Piping not concealed in wall structure, above ceilings or below floors shall be chrome plated brass, except in equipment rooms, piping shall be galvanized steel. P&T relief and water heater drain piping shall be galvanized steel. Provide secondary drain piping where required.

G. Plastic Piping: Shall be cut square and assembled prior to solvent weld. Apply primer per manufacturer's recommendations. Coat male joint fully with solvent, make joint before solvent dries and wipe exterior clean.

H. Flue Piping: Flue piping shall be installed in accordance with its UL listing and the manufacturer's instructions.

3.2 PIPING INSULATION INSTALLATION:

A. Domestic Hot Water:
   1. General: All domestic hot water piping, fittings and accessories shall be insulated.
   2. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied pressure sealing tape.
   3. Fittings and Valves:
      a. Wrap all fittings and valves with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket in accordance with manufacturer's recommendations. Solvent weld. Seal all joints with factory supplied pressure sealing vapor barrier tape with 1-1/2" (min.) overlap on both sides of joint. Insulate valves to stem. Do not insulate unions, flanges or valves unless water temperature exceeds 140F or the piping is exposed to weather.
      b. For miscellaneous fittings and accessories for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the fiberglass blanket with stretchable glass fabric, one coat of lagging adhesive and a final coat of vapor barrier coating. All exposed ends of insulation shall be adequately sealed.
   4. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of PVC jackets.

B. Cold Water Piping-Freeze Protection: All cold water piping exposed to weather or other areas subject to freezing (i.e. ventilated attics, uninsulated exterior soffits, etc.) shall be insulated same as hot water piping. Cover with aluminum jacketing where exposed to weather. Short lengths of pipe and valves may be wrapped with insulating tape, 50% overlap. Cover valves to stem. Apply at least two coats of protective finish where exposed to weather.

C. Piping Insulation Under Lavatories and Sinks: Exposed water piping, water stops and drain piping under lavatories and sinks shall be insulated with 1/8" thick molded closed cell vinyl. Installation shall be in accordance with manufacturer's instructions.

3.3 FIXTURE INSTALLATION:

A. Fixture Height: Shall be as indicated on Architectural drawings.

B. Floor Drains or Floor Sinks: Shall be placed parallel to room surfaces, set level, flush with floor, and adjusted to proper height to drain. Cover openings during construction to keep all foreign matter out of drain line.

C. Wall Hung Fixtures: Shall be provided with proper backing and hanger plates secured to wall. Fixtures mounted on carriers shall bear against stop nuts, clear of wall surface. Caulk fixtures against walls with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).

D. Floor Mounted Fixtures: Shall be provided with proper support plates. Caulk floor mounted fixtures with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).

E. Other Connections: Rough-in and connection for trim or fixtures supplied by others shall be included in this specification section.

3.4 EQUIPMENT INSTALLATION:

A. General: It shall be the responsibility of the equipment installer to ensure that no work done under other specification sections shall in any way block, or otherwise hinder the equipment. All equipment shall be securely anchored in place.

B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

3.5 TESTS AND ADJUSTMENTS:

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested. Tests may be made in sections, however, all connections between sections previously tested and new section shall be included in the new test.

B. Gravity Systems:
1. Sanitary Sewer: All ends of the sanitary sewer system shall be capped and lines filled with water to the top of the highest vent, 10' above grade minimum. This test shall be made before any fixtures are installed. Test shall be maintained until all joints have been inspected, but no less than 2 hours.
2. Drains (Including Condensate): Similar to Sanitary Sewer.
3. Storm Drain: Similar to Sanitary Sewer.

C. Pressure Systems:

1. General: There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made.
2. Domestic Hot and Cold Water Piping: Maintain 100 psig water pressure for 4 hours.
3. Gas Piping: Maintain 100 psig air pressure for 4 hours.

3.6 DISINFECTION:

A. Disinfect all domestic water piping in accordance with 2025 CPC Section 609.10, and in accordance with administrative authority. Disinfection process shall be performed in cooperation with health department having jurisdiction and witnessed by a representative of the Architect. During procedure signs shall be posted at each water outlet stating, "Chlorination Do Not Drink". After disinfection, one set of water samples shall be collected by Contractor for bacteriological analysis in presence of Inspector. If the water fails the bacteriological test, Contractor shall disinfect the piping again and pay for any retesting required, at no additional cost to owner. Bacteriological testing results shall be obtained by Contractor and delivered to the Owner through the Architect before project completion. Contractor shall include copy of Bacteriological Test Results at closeout with operation and maintenance manuals.

END OF SECTION 22 00 00

SECTION 23 00 00 GENERAL MECHANICAL PROVISIONS

PART 1 GENERAL

1.1 GENERAL CONDITIONS:

A. The preceding General and Special Conditions and Divisions 00 and 01 requirements shall form a part of this Section with the same force and effect as though repeated here. The provisions of this Section shall apply to all of the Sections of Divisions 21, 22 and 23 of these Specifications and shall be considered a part of these sections.

1.2 CODES AND REGULATIONS:

A. All work and materials shall be in full accordance with current rules and regulations of all applicable codes. Nothing in these Drawings or Specifications is to be construed to permit work not conforming to these codes. Should the Drawings or Specifications call for material or methods of construction of a higher quality or standard than required by these codes, the Drawings and Specifications shall govern. Applicable codes and regulations include, but are not necessarily limited to, the following:

1. California Code of Regulations (CCR):
    a. Title 8, Industrial Relations
    b. Title 24, Part 1, Administrative Regulations, 2025 Edition
    c. Title 24, Part 6, California Energy Code, 2025 Edition
    d. Title 24, Part 11, California Green Building Code, 2025 Edition
2. California Building Code - CBC - 2025
3. California Mechanical Code - CMC - 2025
4. California Plumbing Code - CPC - 2025
5. California Fire Code - CFC - 2025
6. California Electrical Code - CEC - 2025
7. Air Diffusion Council - ADC
8. Air Movement and Control 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. Cast Iron Soil Pipe Institute - CISPI
16. National Electrical Manufacturers Association - NEMA
17. National Fire Protection Association - NFPA
18. National Sanitation Foundation - NSF
19. Occupational Safety and Health Act - OSHA
20. Plumbing and Drainage Institute - PDI
21. Sheet Metal and Air Conditioning Contractors National Association - SMACNA
22. Underwriters' Laboratory - UL

1.3 PERMITS AND FEES:

A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required. All charges are to be included in the work. Permits for equipment connected to a particular system are to be considered as part of the work included under each system. All charges or fees for service connections, meters, etc. shall be included in the work.

1.4 COORDINATION OF WORK:

A. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. Some work may be shown offset for clarity. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc. shall be carefully planned prior to installation of any work in order to avoid all interference with each other, or with structural, electrical, architectural or other elements. Verify the proper voltage and phase of all equipment with the electrical plans. If discrepancies are discovered between drawing and specification requirements, the more stringent requirement shall apply. All conflicts shall be called to the attention of the Architect and the Engineer prior to the installation of any work or the ordering of any equipment. No work shall be prefabricated or installed prior to this coordination. No costs will be allowed to the Contractor for any prefabrication or installation performed prior to this coordination.

B. Mandatory Coordination and Shop Drawings:

1. Prepare or have prepared high level detailed Shop Drawings in plan view, with cross-sections as necessary, indicating the proposed installation plan for all HVAC, mechanical, fire sprinkler, and plumbing installations for the project. These Drawings should depict actual elevations and linear dimensions, as well as all routing changes, transitions, major offsets, deck and structural attachments deemed necessary to accomplish the installation. Individual Shop Drawings may be prepared for each trade working within the designated space or area; however, the coordination of the consolidated installation shall remain the responsibility of the Contractor. These Shop Drawings shall be provided to each Subcontractor having Work in each area for coordination. Any fittings, offsets or other changes due to coordination shall be at no additional cost to Owner.
2. Whereas the Drawings are diagrammatic, showing only the general arrangement of the systems, Contractor shall have responsibility for the fitting of materials and equipment to other parts of the equipment and structure, and to make adjustments as necessary or required to resolve space problems, preserve service room, and avoid architectural and structural elements and the Work of other trades. Contractor may be required to identify certain areas to relocate installations within the spaces depicted on the Drawings, e.g., ductwork and/or piping may be shifted within the space shown to accommodate other systems. Such functional relocations shall not be deemed a change to the requirements of the Contract. In the event a major re-routing of a system appears necessary, Contractor shall prepare and submit for approval, Shop Drawings of the proposed rearrangement.
3. Because of the diagrammatic nature and small scale of the Drawings, all necessary offsets, adjustments, and transitions required for the complete installation are not shown. Contractor shall carefully investigate the conditions affecting all the Work and shall arrange such Work accordingly, furnishing such fittings, equipment, valves, accessories, offsets, etc., as may be required, regardless of size or cost, to meet such conditions, at no additional cost to the Owner.
4. Coordination changes are not design changes and shall be provided at no additional cost to Owner. Coordination changes are not design changes and shall be provided at no additional cost to Owner. Any guidance, drawing or clarification issued by the Architect or Engineer to assist the Contractor or their sub-contractors in their coordination during construction are not design changes and shall be provided at no additional cost to Owner.
5. Resolve differences or disputes between subcontractors and materials suppliers concerning coordination, interference, or extent of work between sections. The Contractor's decisions, if consistent with the Contract Documents, shall be final. The Architect and their Consultants are not required to coordinate work between sections and will not do so. Any changes required that affect the design intent shall be presented to and approved by the Architect and Engineer of Record.

6. The coordinated Shop Drawings must be signed off by HVAC, Plumbing, Fire Sprinkler, Electrical, Framing, Ceiling Installation, and Data and Low Voltage Subcontractors.
7. The signed off Shop Drawings shall be submitted to the Owner's Representative for review and approval prior to commencement of installation.
8. Provide reviewed Shop Drawings to each Subcontractor having Work in each area.

1.5 GUARANTEE:

A. Guarantee shall be in accordance with the General Conditions. These Specifications may extend the period of the guarantee for certain items. Where such extensions are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the certificate of guarantee shall be furnished to the Owner through the Architect. Equipment that is started and operated prior to acceptance shall have the guarantee extended to cover that period. Owner guarantee shall start at acceptance.

1.6 QUIETNESS:

A. Piping, ductwork and equipment shall be arranged and supported so that vibration is a minimum and is not transmitted to the structure.

1.7 DAMAGES BY LEAKS:

A. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping systems prior to completion of work and during the period of the guarantee, and for damages caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

1.8 EXAMINATION OF SITE:

A. The Contractor shall examine the site, compare it with Plans and Specifications, and shall have satisfied himself as to the conditions under which the work is to be performed. No allowance shall subsequently be made in his behalf for any extra expense to which he may be put due to failure or neglect on his part to make such an examination.

1.9 COMPATIBILITY WITH EXISTING SYSTEMS:

A. Any work which is done as an addition, expansion or remodel of an existing system shall be compatible with that system.

1.10 MATERIALS AND EQUIPMENT:

A. Materials and equipment shall be new unless otherwise noted. Materials and equipment of a given type shall be by the same manufacturer. Materials and equipment shall be free of dents, scratches, marks, shipping tags and all defacing features at time of project acceptance. Materials and equipment shall be covered or otherwise protected during construction as required to maintain the material and equipment in new factory condition until project acceptance.

1.11 SUBMITTALS:

A. Shop Drawings: Within 30 days of contract award, the Contractor shall submit six copies of shop drawings for all materials, equipment, etc. proposed for use on this project (this includes deferred approval items). Material or equipment shall not be ordered or installed until written review is processed by the Engineer. Any item omitted from the submittal shall be provided as specified without substitution.

All shop drawings must comply with the following:

1. Shop drawings are required for all material and equipment items and shall include manufacturer's name and catalog numbers, dimensions, capacities, performance curves, and all other characteristics and accessories as listed in the specifications or on the drawings. Descriptive literature shall be current factory brochures and submittal sheets. Capacities shall be certified by the factory. FAX submittals are not acceptable.
2. All shop drawings shall be submitted at one time in a neat and orderly fashion in a suitable binder with title sheet including Project, Engineer and Contractor, table of contents, and indexed tabs dividing each group of materials or item of equipment. All items shall be identified by the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on drawings.
3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be high-lighted, circled or underlined on the shop drawings. Calculations and other detailed data indicating how the item was selected shall be included for items that are not scheduled. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled or detailed.
4. Drawings shall be submitted in both hard copy and electronic form, electronic files shall be in their native format (i.e. DWG for AutoCAD, RVT for Revit, etc).
5. Electronic Submittals: Where allowed by Division 01, electronic submittals are acceptable providing the following requirements are met:
    a. Submittal shall be a single file in PDF format, with bookmarks for table of contents and each tab, and sub-bookmarks for each item.
    b. All text shall be searchable (except text that is part of a graphic).
    c. Submittal shall include all items noted in 1 through 3 above, except a binder is not required.
    d. Electronic submittals shall be processed through normal channels. Do not submit directly to the Engineer unless the Engineer is the prime consultant for the project.
    e. Contractor shall provide Owner and Owner’s Representative with hard copies of the final submittal. Coordinate exact number required with Owner through Architect/Engineer.

    Electronic submittals which do not comply with the above requirements will be rejected.

B. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and features desired (where equipment is scheduled on the drawings, any equipment submitted other than scheduled equipment is considered a substitution). 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. At the Engineer's request, furnish locations where equipment similar to the substituted equipment is installed and operating along with the user's phone numbers and contact person. Satisfactory operation and service history will be considered in the acceptance or rejection of the proposed substitution.

C. Review: Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of the Contractor to provide all materials, equipment and installation in accordance with the drawings and specifications. The Contractor shall agree that shop drawing submittals processed by the Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor

understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall agree that if deviations, discrepancies or conflicts between shop drawings and design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed. If a resubmittal is required, submit a complete copy of the Engineer's review letter requiring such with the resubmittal.

1.12 MANUFACTURER'S RECOMMENDATIONS:

A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of the particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance. Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

1.13 SCHEDULING OF WORK:

A. All work shall be scheduled subject to the review of the Architect, Engineer and the Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work contracted for as rapidly as possible consistent with good work, and shall cause no delay to other Contractors engaged upon this project or to the Owner.

1.14 OPENINGS, CUTTING AND PATCHING:

A. The locations and dimensions for openings through walls, floors, ceilings, foundations, footings, etc. required to accomplish the work under this Specification Division shall be provided under this Division. Except as noted below, the actual openings and the required cutting and patching shall be provided by other Divisions. Coring through existing concrete or masonry walls, floors, ceilings, foundations, footings, etc., and saw cutting of concrete floors or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Patching of these surfaces shall be provided by other Divisions. Cutting or coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Architect.

1.15 EXCAVATION AND BACKFILL:

A. General: Barrel of pipe shall have uniform support on sand bed. Sand shall be free from clay or organic material, suitable for the purpose intended and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve. Unless otherwise noted, minimum earth cover above top of pipe or tubing outside building walls shall be 24", not including base and paving in paved areas.

B. Excavation: Width of trenches at top of pipe shall be minimum of 16", plus the outside diameter of the pipe. Provide all shoring required by site conditions. Where over excavation occurs, provide compacted sand backfill to pipe bottom. Where groundwater is encountered, remove to keep excavation dry, using well points and pumps as required.

C. Backfill:
1. 6" Below, Around, and to 12" Above Pipe: Material shall be sand. Place carefully around and on top of pipe, taking care not to disturb piping, consolidate with

vibrator. Native soil may be used where allowed by Geotechnical (Soils) Report. Where native soil is used, trenching for gravity drain pipe shall be done using a laser-level and trencher.

2. One Foot Above Pipe to Grade: Material shall be sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed to proper moisture and compacted to required density. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to review by Engineer.

D. Compaction: Compact to density of 95% within building and under walkways, driveways, traffic areas, paved areas, etc. and to 90% elsewhere. Demonstrate proper compaction by testing at top, bottom and one-half of the trench depth. Perform these tests at three locations per 100' of trench.

1.16 PROTECTIVE COATING FOR UNDERGROUND PIPING:

A. All 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. Johns-Manville. Protective coating shall be extended 6" above surrounding grade.

1.17 ACCESS DOORS:

A. Provide access doors as required where equipment, piping, valves, ductwork, etc. are not otherwise accessible. Access doors shall match the wall or ceiling finish and fire rating as indicated on the Architectural drawings. 16-gage steel frame and 14-gage steel door with paintable finish, except in ceramic tile, where door shall be 16-gage stainless steel with satin finish. Continuous hinge. Key and cylinder lock (except quick-opening type for Emergency Gas Shutoff Valve). Deliver doors to the General Contractor for installation. Milcor. Unless otherwise noted, the minimum sizes shall be as follows:

1 valve up to 1-1/2"	12" x 12"
1 valve up to 3"	16" x 16"
Fire damper, VAV box, coil	20" x 24"

1.18 HOUSEKEEPING PAD:

A. Housekeeping pads shall be 6" high concrete, 3000 PSI strength, unless otherwise noted. Pad shall extend 6" beyond the largest dimensions of the equipment, unless otherwise noted. The top edge of the pad shall have a 3/4" chamfer. The pad shall have #4 reinforcing bars at 12" on center, each way, located at the mid-depth of the pad. If not poured at the same time as the floor slab with pad rebar tied to floor rebar, the pad shall be anchored as follows: Drill 1" diameter, 4" deep hole in floor. Fill hole with "Por-Rok", then insert 8" long, #4 rebar into hole. Provide a minimum of 4 of these anchors per pad, but no more than 4 feet apart in either direction. Anchor points shall be 12" from the edge of the pad.

1.19 CONCRETE ANCHORS:

A. Steel bolt with expansion anchor requiring a drilled hole - powder driven anchors, adhesive anchors and concrete screws are not acceptable. Re-use of screw anchor holes shall not be permitted. Minimum concrete embedment shall be 4-1/2 diameters. Minimum spacing shall be 12 diameters center to center and 6 diameters center to edge of concrete. Post-installed anchors in concrete used for component anchorage shall be pre-qualified for seismic application in accordance with ACI 355.2 and ICC-ES AC193. Post-installed

anchors in masonry used for component anchorage shall be pre-qualified for seismic applications in accordance with ICC-ES AC01. Maximum allowable loads for tension and shear shall be as determined by Calculation in compliance with ACI 318-19, Chapter 17, and the anchor's ICC or IAPMO evaluation report. Hilti, Powers, Red Head.

1.20 EQUIPMENT ANCHORING:

A. All equipment shall be securely anchored in accordance with ASCE 07-22, Chapter 13, as amended by CBC Section 1617A.1. All equipment mounted on concrete shall be secured with a concrete anchor as specified above at each mounting point. All air handlers shall be mounted on spring isolators. Secure base plate as indicated above.

1.21 SEISMIC SUPPORT AND RESTRAINT DESIGN SERVICE:

A. All mechanical systems (equipment, ductwork, piping, etc.) shall be provided with supports and seismic restraints in accordance with with ASCE 07-22, Chapter 13, as amended by CBC Section 1617A.1. Brace spacing shall be reduced by 50% for cast iron, plastic, no-hub, or other non-ductile piping. A copy of this manual shall be kept on site at all times during construction.

B. Contractor shall obtain the services of a Seismic Design service to provide engineered seismic supports and restraints for the project **(for Design Team Review Only, Not a DSA Deferred Approval)**. Mason Industries, or pre-approved equal. **Note: Use of the "12 inch rule" does not exempt Contractor from this requirement.**

1.22 ASBESTOS CONTAINING MATERIALS AND ASBESTOS REMOVAL:

A. No materials or material coatings containing asbestos shall be allowed on this project.

B. All asbestos removal shall be by Owner. Asbestos is to be removed before the work is started. If the Contractor discovers asbestos which has not been removed, the Contractor shall immediately cease work in that area and promptly notify the Owner.

1.23 SYSTEM IDENTIFICATION:

A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by pre-printed markers or stenciled marking, and include arrows to show direction of flow. Pre-printed markers shall be the type that wrap completely around the pipe, requiring no other means of fastening such as tape, adhesive, etc. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floors, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portions of lines. Marking of short branches and repetitive branches for equipment connections is not required.

B. Below Grade Piping: Bury a continuous, pre-printed, bright-colored, metallic ribbon marker capable of being located with a metal detector with each underground pipe. Locate directly over buried pipe, 6" to 8" below finished grade.

C. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-4) and identifies the area or space served by the equipment. Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the exterior of the unit.

1.24 CLEANING:

A. Progressively and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work. This includes but is not limited to building surfaces, piping, equipment and ductwork, inside and out. Surfaces shall be free of dirt, grease, labels, tags, tape, rust, and all foreign material.

B. At the end of each work day, the Contractor shall cover all open ends of piping and ductwork with protective plastic.

1.25 ACCEPTANCE TESTING:

A. All acceptance testing as required by California Code of Regulations, Title 24, and as noted on the Certificate of Compliance form, (where applicable), shall be performed and documented by an Acceptance Test Technician (ATT). These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP). The Contractor shall submit a copy of the documentation to the Engineer for review (hardcopy or electronic), prior to submitting to Administrative Authority.

1.26 OPERATION AND MAINTENANCE INSTRUCTIONS:

A. Printed: Three copies of Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts list for all faucets, trim, valves, etc. shall be submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. AC-3). All Wiring Diagrams shall agree with reviewed Shop Drawings and indicate the exact field installation. All instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. Pumps, Fans, Motors, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included. **Electronic O & M's shall comply with the Electronic submittal requirements in this Section.**

B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The controls contractor shall present that portion of the instructions that apply to the control system. The Engineer's office shall be notified 48 hours prior to this meeting.

1.27 RECORD DRAWINGS:

A. The Contractor shall obtain one set of blue line prints for the project, upon which a record of all construction changes shall be made. As the work progresses, the Contractor shall maintain a record of all deviations in the work from that indicated on the drawings. Final location of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, i.e. building, curbs, walks. In addition, the water, gas, sewer, underfloor duct, etc. within the building shall be recorded by offset distances from building walls. As part of the Contractor's overhead expense, request a full set of reproducible drawings to transfer the changes, notations, etc. from the marked-up prints to the reproducible drawings. The record drawings (marked-up prints and reproducibles) shall be submitted to the Engineer for review.

PART 2 PRODUCTS (not used)

PART 3 EXECUTION (not used)

END OF SECTION 23 00 00

SECTION 23 00 01 HEATING, VENTILATING AND AIR CONDITIONING

PART 1 GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions, Section 23 00 00, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
1. Air distribution system.
2. All equipment as shown or noted on the drawings or as specified. Furnish motor starters except where motor control centers are used. Coordinate with Division 26.
3. System energy balance.
4. Coordinate with Section 23 09 23 (Direct Digital Control and Energy Management System) regarding location and installation of system sensors and to provide simultaneous start-up.
5. Refrigeration system.
6. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, ductwork, braces, supports, housekeeping pads, temperature controls and related items no longer required.

B. Work Specified Elsewhere:
1. Line voltage power wiring, motor starters in motor control centers, disconnect switches and installation of all starters are included in the Electrical Section, unless otherwise noted.
2. Connection of gas, condensate drains and domestic water to equipment.
3. Concrete and reinforcing steel unless specifically called for in the drawings or specifications.
4. Painting unless specifically called for in the drawings or specifications.
5. Carpentry.
6. Direct Digital Control and Energy Management System (DDC/EMS).

PART 2 PRODUCTS

2.1 PIPING MATERIALS:

A. Refrigerant Piping: Hard drawn Type ACR copper, dried and capped, ASTM B280. Wrought copper fittings, silver alloy brazed, 1100ºF, Silfos.

B. Miscellaneous Piping Items:
1. Pipe Support:
a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendations. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Anvil, Unistrut.
b. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco.

c. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.

2. Flashing: Flashing for piping through roof shall be prefabricated galvanized steel roof jacks with 16" square flange around pipe. Provide clamp-on storm collar and seal water tight with mastic. Maintain dielectric separation between copper and galvanized materials. For cold process built-up roof, material shall be 4 lb/ft^2 lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer's recommended flashing material.

2.2 PIPING INSULATION MATERIALS:

A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.

C. Aluminum Jacketing: Aluminum pipe and fitting jacketing, 0.016" thickness for straight pipe. 0.024" thickness for fittings. Integral moisture barrier. Stucco-Embossed finish. Provide pre-fabricated aluminum strapping and seals by same manufacturer. ITW or RPR.

D. Metal Jacketing Sealant: Childers CP-76, Foster 95-44.

E. Insulating Tape: Ground virgin cork and synthetic elastomeric. Black, odorless, and non-toxic. K factor 0.43 Btu-in/hr-ft^2-ºF or less. Non-shrinking. For outdoor use, provide protective finish by same manufacturer. Halstead.

F. Foamed Plastic: Rubber based elastomeric preformed pipe insulation. Thermal conductivity shall not exceed 0.27 Btu-in/hr-ft^2-ºF at a mean temperature of 70ºF. 1/2" thick. Provide adhesive by same manufacturer. Armacell Armaflex.

2.3 DUCTWORK MATERIALS:

A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50. Shall comply with 2025 CMC.

B. Metal Ductwork: Metal ductwork shall be galvanized sheet steel, lock forming quality, ASTM A-653, with gage and construction to match SMACNA Standard for pressure required (26 gage minimum).

C. Flexible Ductwork: Insulated flexible ductwork. One pound per cubic foot glass fiber insulation, 1-1/2" thick (R-6), 2" thick (R-8) where ductwork is outside the building thermal insulation envelope. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft^2-ºF at a mean temperature of 75ºF. Seamless metalized reinforced polyester vapor barrier jacket. Continuous internal liner bonded to galvanized steel wire helix. Duct shall be capable of continuous operation at 1-1/2" of positive water static pressure and 4,000 ft/min air velocity. Duct shall comply with NFPA 90A. JP Lamborn.

D. Duct Sealants: All Joints Exposed to Weather: Sealant shall be water based, Foster 32-19/32-17, Childers CP-146/148, United Duct Sealer WB or G.E. "SilPruf" SCS2000 silicone sealant. Joints Not Exposed to Weather: Fiber reinforced. White in color. Foster 32-17, Childers CP-148, Design Polymerics DP1030, Hardcast Versa-Grip 181, Hardcast CCWI-

181. Spiral Wound Joints Not Exposed to Weather and Exposed to View in Finished Areas: Non fibrated. Gray in color. Foster 32-19, Childers CP-146, Design Polymerics DP 1010, or United Duct Sealer WB.

2.4 AIR TERMINALS AND DUCT FITTINGS:

A. Grilles: (Grilles, Registers, Diffusers and Louvers)
1. Information on Drawings: Refer to Grille Schedule on the drawings for the list of grilles. Manufacturer's model numbers are listed to complete the description Titus. Equivalent models of Anemostat or Krueger are acceptable. Refer to the floor plans for neck size, CFM, air diffusion pattern and fire damper, if required.
2. Performance: Submit complete performance data (throw, pressure drop, noise level, etc.) for all grilles proposed, other than those scheduled. Testing shall be in accordance with ANSI/ASHRAE 70-1991. If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactorily, the units shall be reselected by the Contractor for the proper diffusion, spread, pressure drop, throw and noise level.
3. Frame and Accessories: Supply, return, and exhaust grilles shall not have an opposed blade volume control damper unless otherwise noted. All surface mounted grilles shall have a perimeter gasket and flanged edge. All grilles shall have frames suitable for mounting in the surfaces designated by the architectural drawings. Key or screwdriver operated, no slide bars.
4. Finish: All ceiling and wall grilles and all louvers shall have a paintable white finish unless otherwise noted. Interior components (everything behind the face plate) shall be flat black. Floor grilles shall have an anodized aluminum finish unless otherwise noted.

B. Branch Duct Volume Damper: Volume control damper (VCD) in rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16-gage blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gage channel frame, actuating rod and linkage out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1" less than branch width. All branch dampers shall have regulator with stamped steel handle, spring loaded shaft nut, cast body and serrated self-locking die cast core. Regulator for horizontal ducts overhead shall be mounted on sides or bottom of ducts. Secure a 12" length of brightly colored plastic ribbon to handle for ease of location. Where rectangular or round ductwork is insulated, slit insulation to allow handle to protrude. Ventlok 641 (with 607 end bearing for round ducts).

C. Extractor: Curved blade turns in adjustable position rigid frame. Tuttle and Bailey Deflectrol.

D. Turning Vanes: Double wall, hollow metal, air foil shape. Spacing in accordance with manufacturer's recommendations. Aero Dyne HEP.

E. Flexible Connection: UL listed neoprene coated 30 ounce fiberglass cloth. 3" metal, 3" fabric, 3" metal. Ventglas.

2.5 DUCTWORK INSULATION MATERIALS:

A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Fiberglass Blanket: **Installed** thermal resistance at a mean temperature of 75ºF shall meet or exceed indicated value. 3/4 lb/ft^3 or 1 lb/ft^3, **R-6** where ductwork is within the building thermal insulation envelope. 3/4 lb/ft^3 **R-8** where ductwork is outside the building thermal

insulation envelope and/or above the roof. Faced with glass reinforced foil laminated to Kraft paper. Certainteed, Knauf, Johns-Manville, Owens-Corning.

C. Acoustic Lining: Glass fiber. **Installed** thermal resistance at a mean temperature of 75ºF shall meet or exceed indicated value. One side coated to prevent fiber erosion up to 6000 ft/min. Average noise reduction coefficient of 0.80. 1.5 lb/ft^3 density. 1" thick (**R-4.2**) where ductwork is within the building thermal insulation envelope. 2" thick (**R-8**) where ductwork is outside the building thermal insulation envelope and/or above the roof. Certainteed, Knauf, Johns-Manville, Owens-Corning.

D. Bonding Adhesive: Design Polymerics DP2501, Foster 85-60.

2.6 EQUIPMENT:

A. General Requirements:
1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where Architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
3. Ratings - Electrical: Electrical equipment shall be in accordance with NEMA Standards and UL or ETL listed where applicable standards have been established.
4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
5. Electrical:
   a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be manual reset, shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
   b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
   c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip proof, NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction unless otherwise noted. Design shall limit starting inrush current and running current to values shown on drawings. Motors 1 horsepower and larger shall be the premium efficiency type, tested according to IEEE Standard 112, Method B. Motors exposed to weather shall be TEFC. Motors in a fan air stream shall be TEFC or

TEAO. Vertical motors outdoors shall be ODP or TEFC and shall have rain caps.

d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.

e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.

f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.

6. Fan Selection:

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 toward 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 is completed and prior to acceptance.

b. Filter Media: 2" media. MERV-13. Clean filter resistance 0.41" water at 500 fpm. Throw-away frame. Class 2. Camfil AP-Thirteen.

8. Screens: All duct or louver openings to the outside shall be covered with 1/2", 16-gage, galvanized wire mesh screen.

9. Mixing Dampers: Opposed blade, 16-gage. Six-inch maximum blade width, 48" maximum length. Nylon or oil impregnated bronze bearings. One-half inch diameter pin shaft. 16-gage channel frame. One percent maximum leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod out of air stream. Arrow.

10. Sound Ratings: Shall be in accordance with ASHRAE 36 - 72. Sound ratings shall not exceed scheduled values.

11. Drives: Unless noted as direct connected, drives shall be V-belt, rated at 150% of motor horsepower. Multiple drive belts shall be matched set. Drive sheaves shall be dynamically balanced, adjustable, range +/- 10%, selected at mid range. Adjustable relative movement shall be lockable to shaft. Belts shall be aligned within 1-1/2 degrees at all times. Open drives shall be provided with OSHA approved open mesh belt guards. Belt guards exposed to weather shall be weatherproof enclosure with louvered face for adequate ventilation. Driving motor shall be mounted on adjustable rails. T.B. Woods, Browning. Submit RPM range of driven machine with drive selection.

B. Packaged Heat Pump:

1. General: Self-contained heat pump designed for outdoor installation. Factory assembled and tested. Refer to Paragraph 2.6A for general requirements. Provide all starters and relays required for operation. 24-volt control circuit from integral

transformer. Weatherproof cabinet, galvanized steel with enamel finish. Indoor air section fully insulated. Outside air inlet. Drain pan. Multivane centrifugal supply fan. ARI certified. Aaon, Carrier.

2. Refrigeration: Sealed hermetic compressor with internal vibration isolating mount. Crankcase heater, high/low pressure switch, recycling timer. Suction line accumulator. Air cooled condenser with propeller fan. Non ferrous finned coil. Low ambient control to 35 degrees. 5 year extended warranty on compressor(s).
3. Controls: Compressor and fan motors shall have both thermal and current sensitive overload devices. Automatic defrost control (only if required) every 90 minutes for a period of not more than 10 minutes.
4. Accessories: Electric resistance heater, nichrome elements, over temperature and overcurrent protection. Emergency heat control to allow heater operation if compressor is inoperative.

C. Exhaust Fan:
1. General: All exhaust fans shall be tested according to AMCA Standard 210 in an AMCA registered laboratory. Fans exposed to weather shall have ventilated weatherproof housing over motor and drive assembly. Refer to Paragraph 2.6A for general requirements. All direct drive fans shall be provided with unit mounted speed controllers, unless otherwise noted. All motors 1 horsepower and larger shall be the premium efficiency type.
2. Roof Fan (Direct Drive): Spun aluminum, roof mounted, direct driven, downblast centrifugal exhaust ventilator. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have continuously welded curb cap corners for maximum leak protection. Discharge baffle shall have a rolled bead for added strength. An integral conduit chase shall be provided through the curb cap and into the motor compartment to facilitate wiring connections. Motor shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. An aerodynamic aluminum inlet cone shall be provided for maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed bearings and furnished at the specified voltage, phase and enclosure. Backdraft damper. Greenheck.
3. Ceiling Fan (Direct Drive): Direct driven, centrifugal exhaust fan. Fan wheel housing and integral outlet duct shall be galvanized steel or injection molded from a specially engineered resin exceeding UL requirements for smoke and heat generation. Outlet duct shall have an aluminum backdraft damper with continuous aluminum hinge rod. Inlet box shall be minimum 22-gauge galvanized steel. Motor shall be isolation mounted to a one piece galvanized stamped steel integral motor mount/inlet. Provide a field wiring compartment with disconnect receptacle. Provide an adjustable prepunched mounting bracket to accommodate different ceiling thickness. Provide a powder painted white aluminum egg-crate grille. Unit shall be designed with provision for field conversion from ceiling to in-line. Wheel shall be centrifugal forward curved type, galvanized steel or injection molded of polypropylene resin. Motor shall be open drip proof type with permanently lubricated sealed bearings and include impedance or thermal overload protection and disconnect plug. Greenheck.

D. Indoor/Outdoor Unit:
1. General: Refer to Paragraph 2.6A for General Requirements. Completely assembled and factory tested. Provide all starters and relays required for operation. All components by same manufacturer. Carrier.

2. Outdoor Unit:
   a. Compressor: Sealed hermetic rotary compressor with vibration isolator mountings. Crankcase heater, suction line accumulator, recycling timer. High and low head pressure/temperature protection. Motor overload protection, low ambient feature to 20F cooling mode. High and low side service valves. Recycling timer. Single phase start assist kit. 5-year extended warranty.
   b. Fan and Coil: Finned tube non-ferrous coil. Propeller type fan, 1200 RPM maximum, direct drive. Totally enclosed motor, overload protected, permanently lubricated, resiliently mounted.
   c. Cabinet: Weatherproof, factory paint.
3. Indoor Unit:
   a. Supply Fan: Direct drive, multi-speed forward curve, centrifugal fan, resiliently mounted. Thermally protected motor.
   b. Indoor Coil: Copper tube, aluminum fin, DX coil.
   c. Electric Heaters: Integral part of unit, complete with all operational and safety controls, single point wiring terminal, 5-year factory warranty, UL listed as a complete unit.
   d. Condensate Pan: Install under complete coil area with drain connections.
   e. Filter: Washable media. Class 2 or better.
4. Controls: Microprocessor control containing temperature selection, room temperature indication, automatic heating/cooling changeover, malfunction alarm, power failure automatic restart safety, and emergency operation function. BACnet interface card.

E. Fly Fan: See Equipment Schedule on Mechanical Drawings.

PART 3 EXECUTION

3.1 PIPING INSTALLATION:

A. General:
1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Lines shall be adequately braced against vertical and lateral movement. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted. Pipe sizes shall not decrease in direction of flow, unless otherwise noted.
2. Joints:
   a. Threaded: Pipe shall be cut square, and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
   b. Brazed: Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100ºF. Welding or brazing shall be performed by a Certified Welder or Brazer as certified by an organization/institution that uses standards recognized by the American

Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.

c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.

3. Fittings and Valves:
   a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
   b. Reducers: Pipe size reduction shall be made with bell reducer fittings (eccentric bell for steam service). Bushings shall not be used.
4. Pipe Support:
   a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below (based on straight lengths of pipe with couplings only). Provide additional supports for equipment, valves or other fittings. Seismic requirements may reduce maximum spacing. Actual spacing requirements will depend on structural system. Refer to drawings for additional requirements and attachment to structure. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction.
   b. Refrigerant Piping: Support insulated refrigerant line with construction channel and sheet metal support saddle or Cooper B-Line Armafix clamps. 5' spacing. Use isolation shield for uninsulated pipe. When using pre-charged tubing, all changes of direction shall be made with bending tools producing neat uniform bends. Free hand bends will not be accepted.
   c. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.
5. Miscellaneous:
   a. Escutcheons: Provide chrome plated escutcheons where piping penetrates walls, ceilings, or floors in finished areas.
   b. Pipe Sleeves: All piping passing through concrete or concrete block shall be provided with pipe sleeves. Allow 1" (nominal) clearance between sleeve and pipe or pipe insulation. Piping through walls below grade shall be sealed with Link-Seal.
   c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of 2025 CBC Section 714.

B. Refrigerant Piping: Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted and erected before brazing. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation shall not be less than 70ºF. After evacuation, fill with dry nitrogen to 250 psi and maintain for two-hour period without additional charge. After nitrogen test, purge with refrigerant charged through dryer and maintain holding charge in system and equipment. Refrigerant piping below grade shall be run in 4" (min.) PVC conduit with long radius ells. Seal ends of conduit watertight.

3.2 PIPING INSULATION INSTALLATION:

A. Refrigerant Piping: Cover piping with foamed plastic insulation. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendations. Cover all fittings, unions, valves and connections. Piping exposed to view shall be covered with PVC jacketing. Piping exposed to weather shall be covered with aluminum jacketing, install all joints and seams to prevent water entry, seal with 1/8” bead of gray metal jacketing sealant.

3.3 DUCTWORK INSTALLATION:

A. General:
1. Standards: Unless otherwise noted, all ductwork shall be constructed and installed in accordance with current SMACNA Standards. Ductwork shall be built to a pressure classification equal to or greater than the maximum operating pressure at that point in the ductwork. A copy of these standards shall be maintained at the job site at all times. Duct work and accessories shall be installed in a manner to prevent vibration and rattling.
2. Access: Provide duct access doors as required to adjust equipment and dampers. Provide wall or ceiling access panels, or remote actuators as required where equipment and dampers are not otherwise accessible. Ventlok 666 concealed remote actuator with zinc finish on cover.
3. Flexible Connections: Connection of ductwork to any vibrating equipment shall be with 3" (min.) flexible connection. Install with ample slack and uniform gap. There shall be no metal to metal contact across flexible connection. Flexible connections exposed to weather shall have a protective sheet metal cover.
4. Flanges and Escutcheon: Where ductwork penetrates walls, ceilings, or floors, furnish and install flange or escutcheon of same material as duct.

B. Low Velocity-Low Pressure (up to 2,000 ft/min and up to 2.0 in water):
1. Sheet Metal Ductwork:
a. Ells: Ells with less than standard radius and square ells shall be fitted with turning vanes.
b. Tees: Tees in supply ductwork shall be straight tap-in with extractor or 45 degree take-off as shown on drawings. Grilles or branches in supply ductwork shall be a minimum of 8 duct diameters downstream of tees.
c. Duct Joints and Seams: All joints and seams which are not exposed to weather shall be sealed airtight with duct sealant. All joints and seams exposed to weather shall be sealed air and water tight with silicone sealant. (See Part 2 of this Specification). All joints on spiral wound metal ductwork not exposed to weather shall be sealed air tight with grey duct sealant.
d. Dampers: Install volume control damper and damper regulator in all branch ducts.
2. Flexible Glass Fiber Ductwork: The use of flexible duct is limited to the last 5 feet of each branch duct (i.e. one 5 foot section of flexible duct may be used to connect the grille to the sheet metal branch duct). No joints are permitted in this 5' length. Hangers shall be 4" wide metal straps spaced to prevent sagging, 42" spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. Joints shall be installed with stainless steel or nylon draw bands, Duro Dyne Dyn-O-Tie. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius of duct centerline not less than 1.5 times the duct diameter).

3.4 AIR TERMINALS AND DUCT FITTINGS INSTALLATION:

A. General: Unless otherwise noted, all air terminals and duct fittings shall be installed in accordance with current SMACNA Standards. Terminals and fittings shall be installed in a manner to prevent vibration and rattling. Metal surfaces exposed to view behind grilles and registers shall be painted flat black.

3.5 DUCTWORK INSULATION INSTALLATION:

A. General: Insulate all sheet metal supply, return and outside air intake ductwork except as noted below. Insulation shall be continuous through walls and floors except at fire dampers.

B. Where Insulation Is Not Required: Do not insulate factory-insulated ducts or casings, acoustic lined ducts, fibrous glass ducts, underground ductwork, supply or return ductwork exposed to view in the space that it serves, or exhaust ductwork.

C. Concealed Ductwork: Wrap concealed ductwork including outside air intakes with fiberglass blanket lapped 2" minimum. Secure with staples 4" on centers maximum on straight runs and 3" maximum at elbows and fittings. Insulation on bottom of ducts wider than 36" shall also be secured with mechanical fasteners at 24" on center.

D. Acoustic Lining: Unless otherwise indicated, all supply and return ductwork in equipment rooms, all ductwork exposed to weather and other ducts as indicated on drawings, shall have acoustic lining. Do not acoustic line outside air intakes, evaporative cooling ductwork or ductwork downstream of high efficiency filters. Where acoustic lining is installed, increase each sheet metal dimension to accommodate lining and maintain clear inside duct dimensions shown on drawings. Apply lining with bonding adhesive in accordance with manufacturer's recommendations and also secure with mechanical fasteners in accordance with SMACNA Standards. Seal exposed edges of lining with bonding adhesive.

3.6 EQUIPMENT INSTALLATION:

A. General: It shall be the responsibility of the equipment installer to ensure that no work done under other specification sections shall in any way block or otherwise hinder the equipment. All equipment shall be securely anchored in place. All equipment shall be installed level.

B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

C. Equipment Platforms: Shall be as shown on drawings and as follows: Flashing and platform cover shall be 22 gage (min.) sheet metal. All joints and seams shall be soldered with 2" (min.) overlaps. Provide 3/4" gap around perimeter between roofing and platform cover to facilitate re-roofing. Extend drip lip down 3" (min.). Provide 30# felt under platform cover.

3.7 TESTS AND ADJUSTMENTS:

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested.

3.8 SYSTEM ENERGY BALANCE:

A. Scope: Provide the services of an independent test and balance agency to test, adjust and balance, retest and record performance of the system to obtain design quantities as specified. The agency must prove that they have no affiliation with any equipment manufacturer, design engineer, installing contractor, or any other party which might lead to a conflict of interest, in order to provide an unbiased, third party system balance and report.

B. Qualifications: Prior to commencing work, the agency shall be reviewed by the Engineer and shall be certified by the Associated Air Balance Council, National Environmental Balancing Bureau or Testing, Adjusting and Balancing Bureau. The agency shall provide documentation of having successfully completed at least five projects of similar size and scope.

C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be available for examination. Application of instrumentation shall be in accordance with AABC, NEBB or TABB standards.

D. Submittals: Include in shop drawings copies of forms to be used for testing and balancing showing all data which is to be recorded. Three copies of completed balance report shall be submitted to and reviewed by the Mechanical Engineer prior to the final mechanical construction review.

E. Procedure - General: Procedure shall be in accordance with Associated Air Balance Council's "National Standards for Field Measurements and Instrumentation - Total System Balance", Volume Two, No. 12173, or equivalent NEBB or TABB standards. System shall be in full, continuous operation during test. Balanced quantities shall be plus 10%, minus 0% of design quantities. All nameplate data, manufacturer, model and serial numbers shall be recorded for each item tested.

F. Extended Warranty: The test and balance agency shall include an extended warranty of 90 days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck or resetting of any item or items in test report. The agency shall provide technicians to assist the Engineer in making any tests he may require during this period of time.

G. Verify that the Controls Contractor has commissioned and documented their work before the TAB work begins.

H. Air Balance Procedure (For Each Air Handling System):
1. All air filters shall be clean when air balance is performed.
2. Provide a sketch of the equipment showing exactly where all pressure readings were taken.
3. Adjust blower RPM to design requirements.
4. Record motor full load amperes.
5. Make pitot tube traverse of main supply and return ducts and obtain design CFM at fans.
6. Record system static pressures, inlet and discharge.
7. Record filter quantity, size(s) and pressure drop across filter(s) at each filter bank.
8. Adjust system for design CFM recirculated air.
9. Adjust system for design CFM outside air.
10. Record entering air temperatures. (DB heating, DB and WB cooling.)
11. Record leaving air temperatures. (DB heating, DB and WB cooling.)
12. Adjust all main supply and return air ducts to design CFM.
13. Adjust all zones to design CFM, supply and return.
14. Adjust all diffusers, grilles and registers to plus 10%, minus 0% of design requirements.
15. Adjust CFM at all exhaust fans, make-up units, etc. (high and low speed, where applicable). Record applicable data from items 1 through 11 above.
16. Each grille, diffuser and register shall be identified as to location.
17. Verify proper diffusion pattern for all ceiling grilles and that all sidewall grilles are set for 5 degrees upward deflection unless otherwise noted. Make a notation of any that are not set properly.
18. Size, type and manufacturer of diffusers, grilles, registers and all tested items shall be identified and listed. Manufacturer's ratings shall be used to make required calculations on all items.
19. Readings and tests of diffusers, grilles, and registers shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.

20. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified. Testing agency shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.
21. All diffusers, grilles and registers shall be adjusted for required air patterns and to minimize drafts.
22. As a part of the work of this contract, THE AIR CONDITIONING CONTRACTOR shall make any changes in pulleys, belts and dampers or the addition of dampers required for correct balance as recommended by air balance agency, at no additional cost to Owner.
23. Set, test and adjust packaged heating/cooling unit economizer operation in cooperation with controls contractor. Record minimum and maximum outside and exhaust airflows.

END OF SECTION 23 00 01

SECTION 23 09 23 DIRECT DIGITAL CONTROL AND ENERGY MANAGEMENT SYSTEM

PART 1 GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions of Section 23 00 00 shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. General: The direct digital control and energy management system (DDC/EMS) includes control panels, control devices, valves, actuators, all line and low voltage control and interlock wiring (including wiring to controllers, switches, timers, relays, etc.) and conduit and related equipment, as required for proper operation of all equipment. Provide all equipment, programming, labor, materials and services necessary for a complete, lawful and operating DDC/EMS as shown or noted on the drawings and as specified herein. All control wiring, line and low voltage shall be installed in conduit. Power wiring, power to DDC/EMS control panels and disconnect switches are included in the Electrical Specifications, except that power wiring for control devices such as controllers, valves, etc., is included in the control system. Electrical work shall be in accordance with Electrical Specifications. Set, test and adjust the system for proper operation.
The controls system shall be direct digital control/electric. **Johnson Metasys, without substitution, to match existing. Provided and installed by Bedard Controls, 559-271-8990, No Exceptions.** Except as otherwise noted, the control system shall consist of all Ethernet Network Controllers. The system shall be BACnet protocol and shall be compatible with existing district-wide system. The system shall communicate over the District's Ethernet LAN/WAN, and shall include the latest upgrading (software and firmware) during the warranty period. **All existing network controllers on District School sites shall have their software upgraded to the same revision as that installed at this site.** The data wiring shall have an Ethernet connection at the DDC/EMS panel and at the onsite workstation.
If the District's current Graphical User Interface is server based, the GUI must be integrated into the District's current GUI server. The design of the total installed system shall be based on such systems, which are the District standards. Coordinate with Section 23 00 01, Heating, Ventilating and Air Conditioning and with Division 26.

1. Provide access to hardware and software or onsite technical support required to assist the TAB effort. The hardware and software or the onsite technical support shall be provided at no cost to the TAB Firm.

B. Contractor Qualifications: All controls shall be furnished and installed by a Contractor who is licensed, certified or contracted by the controls manufacturer for design, installation, start-up and service of their product. The Contractor must have factory supplied training and support. The Contractor must have sufficient personnel to respond to a trouble call at the site within four hours. The Contractor's local manager shall have a minimum of five years' experience in the design, installation, start-up and service of similar systems. The Contractor shall submit a list of at least five projects which are similar in size, scope and contract value to this project. This list shall include the Owner's contact person, phone number and controls contract value.

C. Submittals: Within 60 days of contract award, submit eight (8) copies of shop drawings showing the following aspects of the DDC/EMS system (CAD file with DXF format if required of floor and site plans can be secured from the Architect).

1. All termination points, terminal cabinets, and cabling.
2. Schedule of input and output points.
3. Locations of all visible DDC/EMS system components (i.e. interior and exterior sensors, terminal strips, panels, trench and pull boxes, etc.), identifying specifically any exposed conduit.
4. Complete written sequence of operation.
5. Descriptive literature for all material and equipment items shall include manufacturer's name and catalog numbers, dimensions, capacities, and all other characteristics and accessories as listed in the specifications or on the drawings.
6. Submit copies of forms to be used for testing and verification showing all data which is to be recorded. Three copies of complete report shall be submitted for review.

D. Utility Interfacing: Coordinate interface, via equipment modem and District Ethernet connections furnished by Supplier to Owner's dedicated telephone line or Ethernet network. The DDC/EMS Contractor shall interface with the PG&E electric meter to allow DDC/EMS monitoring and logging of electricity usage, and pay any costs to the utility for such as to comply with PG&E installation requirements.

E. Installation and Operation Manuals: Furnish Installation and Operating Manuals for all components. These manuals shall contain full documentation which shall include, without being limited to, the following:
1. General description and specifications.
2. Installation and initial checkout procedures.
3. Principles and theory of operation.
4. Complete trouble-shooting procedures and diagrams.
5. Complete alignment and calibration procedures for all components.
6. Program source file on CD or 3-1/2" disk (ASCII text file) and hard copy.
7. Detailed schematics and assembly drawings.
8. Complete recommended spare parts lists including unit prices.

1.3 SYSTEM ARCHITECTURE

A. DDC/EMS Equipment: The main controller shall contain the network communications and information management programs providing integrated global control, trend logging, local and remote alarming and fully menu driven user interface. It may be equipped with at least 64 local controllers on each network. The local controller is an intelligent, stand-alone microprocessor based controller which can have a variety of configurations based on their application.

B. Campus-Wide Data Transfer System: The DDC/EMS shop drawings shall indicate where all equipment items are to be located for input and output to complete the system. The conduit/cabling system shall inter-tie these points as required to complete one system to meet the design criteria herein. System high speed communication (LAN) shall be hardwired using a Belden shielded cable as recommended by DDC manufacturer and shall communicate at 10M baud with peer to peer communication. System communication between master controller and local controllers (field bus) shall be at 19.2K baud minimum with a two wire shielded RS-485 cable. See Drawings for exterior lighting circuits to be controlled by contactors at panels.

C. User Interface Communication: The user may communicate with the DDC/EMS system with a workstation located at the District Office over the WAN, with a remote workstation via a telephone modem, with an On-Campus Operator Workstation, and with a Lap-Top computer (Service Tool). The system shall be configured to allow the Service Tool to access data and program any controller on the system from any room sensor service port. Alternatively, a conveniently located service port shall be provided in each building

that allows access to data and programming of any controller on the system, if the room sensor service port is limited to only the controller to which the sensor is connected.

D. Standard Network Support: All Master Controllers, Workstation(s) and File Server shall be capable of residing directly on the owner's Ethernet TCP/IP LAN/WAN. Furthermore, the Master Controllers, Workstation(s) and File Server shall be capable of using standard, commercially available, off-the-shelf Ethernet infrastructure components such as routers, switches and hubs. With this design the owner may utilize the investment of an existing or new enterprise network or structured cabling system. This also allows the option of the maintenance of the LAN/WAN to be performed by the owner's Information Systems Department as all devices utilize standard TCP/IP components.

PART 2 PRODUCTS

2.1 GENERAL:

A. The Electronic Microprocessor Based Direct Digital Control and Energy Management System (DDC/EMS) shall monitor the data environment and perform control functions in relation to a programmed strategy and the status of the data environment. The system shall use solid state computer based digital and analog technology. The system shall be standard with the manufacturer to insure ongoing parts availability and trained technical support. The DDC/EMS shall be of the user programmable type requiring no special computer education for operation. All necessary instruction manuals and user orientation training shall be supplied by the manufacturer or agent thereof. The DDC/EMS shall be UL listed as a Direct Digital Control and Energy Management System. The programmable control requirements of the DDC/EMS shall include, but not be limited to:

OPTIMUM START/STOP (BASED ON HISTORICAL DATA)
TIME OF DAY ROUTINES
SCHEDULED OCCUPANCY ROUTINES INCLUDING HOLIDAYS
CUSTOM TAILORED REPORTING
ACCUMULATING RUN TIME
CRITICAL CONDITION ALARMING
FLUID FLOW SWITCH AND CONTROL ALARMING
PID CONTROL ON ANALOG OUTPUTS
HOT WATER RESET
DAY/NIGHT SETBACK
ECONOMIZER/PURGE
CUSTOM TAILORED REPORTING
ACCUMULATING RUN TIME
SEPARATE MODES AS REQUIRED BY CONTROL SEQUENCE

B. Environment: The DDC/EMS shall operate in an environment of 40 120 degrees F and 10 95% relative humidity. Sensors and control elements shall operate under the temperature, pressure, humidity, and vibration conditions normally encountered in the installed location. The DDC/EMS shall maintain accuracy as follows:
1. +/ 0.5 F for the space temperatures in the 0 F 130 F range.
2. +/ 0.5 F for duct temperatures in the 40 F 130 F range.
3. +/ 1.0 F for outside air temperatures in the 30 230 F range.
4. +/ 1.0 F for water temperature in the 30 230 F range.
5. KWH and KW monitoring within 1.0%.

C. Battery Backup: The system shall be tolerant of power failure and hold memory for a minimum of 12 hours. On power restoration, the system shall automatically and without operator intervention of execution of manual restart procedures:

1. Come On Line.
2. Update all monitored functions.
3. Resume operation based on current time and status.
4. Implement special building start up strategies as required.
5. Log time of power outages and start ups.

D. Program Storage: The system shall also be capable of interfacing with a mass storage (tape or disc) device, for use in uploading and downloading programs to the DDC/EMS.

E. Protocol: Protocol shall be BACnet.

2.2 SYSTEMS DESCRIPTION:

A. Modular Design/Expandability: The DDC/EMS shall be of a modular design providing distributed processing capability, and allowing future expansion of both input/output points and processing/control functions. System size shall be expandable from 4 input points and 4 output points to unlimited. Expansion shall be in modules. The modular DDC/EMS shall be configured on the main/local concept. The main controller shall have the capability of adding local controllers and the local controllers shall be capable of adding I/O modules.

B. Main (Master) Description: The master shall function as the overall system coordinator, accept control programs, perform automated energy management functions, control peripheral devices and perform all necessary mathematical calculations. The master shall be a microcomputer of modular design. The word size shall be 16 bits or larger, with a memory cycle time less than 1 microsecond. All chips shall be second sourced. The master shall have the following:

1. Protected Access: Key lock protected access to output override switches and internal circuitry.
2. Memory: The master shall have at least 2 MB of user available memory, in addition to memory required for systems operation and diagnostics or MCP software. Minimum requirements for system operation are as follows: A minimum of 4MB of RAM shall be provided for masters with expansion up to 8MB. The 8MB versions shall include a floating-point math co-processor.
3. Real Time Clock: The master shall have a battery backed uninterruptable "Real Time Clock". The accuracy shall be within ten seconds per day. The RTC shall provide the following information: Time of Day, Day, Month, Year, and Day of Week. The system shall be programmed to automatically correct the clock for day light savings time and leap years.
4. Power: The master shall operate from 120 VAC +/- 20%, 60 Hz. Line voltages below the operating range of the system shall be considered outages. The master shall have over voltage surge protection, and require no additional AC power signal conditioning.
5. Parallel Processing: The master shall be capable of parallel processing, executing separate control programs simultaneously. Any control program may affect control of another program if desired. Each program shall have full access to all I/0 facilities of the processors.
6. Communications Processor: Each master shall provide communication to both the Workstation(s) (LAN) and the field buses (RS-485). In addition, each master must have at least 3 other communications ports that support a telephone modem, portable service tool, serial printer and connection to third party controllers such as a chiller control panel or Variable Frequency Drives. On a LAN/WAN system the master(s) shall be provided with a 10Mbps plug-in Ethernet TCP/IP network interface card (NIC).
7. Uninterruptable Functions: Control functions shall not be interrupted due to program entry or other user communications.

C. Local Controller Units: The local units function as a stand-alone controller and as an Input/Output interface of the DDC/EMS and the Data Environment.
   1. Monitoring: Local units shall be used to connect the data environment to the system and contain all necessary Input/Output functions to read field sensors and operate controlled equipment based on internal instructions or instructions from the Master. The units shall be fully supervised to detect failures. The units shall report the status of all points in its data environment at the rate of at least once every second. Local units shall connect directly to the Master with a twisted pair shielded RS-485 interface. All local units can run independently in the event of a central unit failure.
   2. Unit Failure: Upon failure of the unit (including transmission failure), the unit shall automatically fail off or to a predetermined state for three-way valves. A message shall be transmitted by the unit indicating a local unit failure.
   3. Power: The unit shall operate from 120 VAC, +/-20%, 60 Hz, 220 VAC, +/-20%, 50 Hz or 24 VAC +/- 20%, 50/60 Hz power. For voltages below the operating threshold the unit shall totally shutdown and de energize its outputs.
   4. LAN and/or Field Bus: Each unit shall communicate with any unit through the RS-485 interface LAN and/or field bus.
   5. Auxiliary Port: Each unit shall be equipped with an auxiliary port to allow local interrogation of input and output values, and keyboard override of outputs through laptop.

2.3 INPUT/OUTPUT CAPABILITY:

A. Inputs: The DDC/EMS shall accept information in the form of a temperature, voltage, digital signal (on off) or pulse counter.
   1. Analog Inputs: The Analog Input (AI) function shall monitor each analog input, perform A/D conversion, and hold the digital value in a buffer for interrogation. The A/D conversion shall have a minimum resolution of 10 bits. Input ranges shall be within the range of 0 10 VDC.
   2. Digital Inputs: The Digital Input (DI) function shall accept dry contact closures and voltage level or resistance level (5VDC reference voltage) transitions. A voltage level below 1 volt or a resistance below 500 ohms shall be read as ON (closed), a voltage level above 3 volts or a resistance above 1400 ohms shall be read as OFF (open).
   3. Pulse Accumulator Inputs: The pulse accumulator function shall have the same characteristics as the DI, except that, in addition, a buffer shall be included to totalize pulses between interrogations. Each input shall accept pulses at a minimum of 2 per second.
   4. Temperature Inputs: Temperature inputs originating from a thermistor shall be monitored and buffered as an AI, except that, automatic conversion to degrees F shall occur without any additional signal conditioning.
   5. Input Wiring: All analog inputs shall be two wire devices, with shielded wire for accurate operation.

B. Outputs:
   1. Master and local controllers - Form C relay outputs rated at 5 amp, 24 VAC/DC or 2 amp, 30 VAC for on/off or Pulse Width Modulation for maintained operation of field devices. Output pulse width shall be selectable between 0.1 and 3200 seconds with a minimum resolution of 0.1 seconds. Isolation and protection against voltage surges shall be provided. Central plant controllers shall be equipped with an ON/OFF/AUTO switch to manually obtain either output state. Manual overrides shall be reported to the master at each update. An LED shall be provided to indicate the state of each digital output.

2.4 SOFTWARE:

C. User Software: Provide software for On-Campus workstation, Laptop Computer (Service Tool) and District office workstation (required upgrades and programming only if software is already existing on District office workstation).

D. Software Features:

1. Mathematical Requirements: The DDC/EMS shall have a math package capable of addition, subtraction, multiplication, division, square root, greater than and less than functions, minimum and maximum selection functions, and up to five levels of parenthesis for computation of variables. Control commands may be executed based on these calculated variables which are available to the program on a global basis. Math expressions may be used in action and exit commands of control program. The mathematical software shall be capable of mixed mode arithmetic, utilizing Boolean logic statements in combination with basic arithmetic to provide conditional mathematical computations.
2. Passwords: The DDC/EMS shall have multiple levels of user programmable passwords in addition to a master password, for programming security. Separate passwords may be user programmed. Level of password will define user's access level and ability to change system.
3. Trend Logging: The DDC/EMS shall trend log variables. Any system variable (inputs, outputs, numerals, can be trend logged.
4. Messages: The DDC/EMS shall provide alarming, preventative maintenance and status reporting messages.
5. Look Up Tables: The DDC/EMS shall have preprogrammed "LOOK UP" tables for the conversion of voltage inputs into dew point temperature and water vapor pressure values for the computation of relative humidity and enthalpy.
6. Documentation Format: The programming language of the DDC/EMS shall be plain English based such that a printout of the control program shall serve as the primary documentation for the system.
7. Micro Processor Integrity Checking: Each DDC/EMS microprocessor shall continuously monitor and check itself and produce error messages in the event of a malfunction.
8. Data Plotting: The DDC/EMS shall provide plots of values of system variables on a graph. Graphs may consist of combinations of up to 3 system variables at a time from the history logs.

E. Color Graphics Requirements Provide color graphics which allow user to access and change (based on user access level) all schedules and setpoints (including damper or control valve positions) directly through the user graphics. Real time data shall continuously be updated. Navigation between the screens (forward and backwards) shall be accomplished with the use of a mouse. The minimum graphic screens shall include the following:

1. Site lay-out locations of all equipment being controlled, control component locations, and spaces served. Provide multiple screens-minimum of 1 screen per building plus site and others as needed for clarity. By "clicking" mouse on the desired equipment area a flow diagram will be displayed for the related equipment (as described below - Item 2). By "clicking" the mouse on a conditioned space, a graphic display of the zone conditions (as described below - Item 3) will be displayed.
2. Flow diagrams shall be provided for each HVAC system, such as air-handling system, chilled water system, hot water system, condenser water system, package unit system, brine system with all inputs and outputs dynamically displayed.
3. Each temperature control zone shall have a screen providing set points, temperatures, and related HVAC system status data.

4. Scheduling screens allowing On/Off times to be set for all of the following:
   a. Pre-determined individual days
   b. Pre-determined blocks of days (From/To)
   c. Schedules for "Routine" school sessions
   d. Schedules for "Special" school sessions

F. Software Manual: The software manual shall describe programming and testing, starting with a system overview and proceeding to a detailed description of each software feature. The manual shall instruct the user on programming or reprogramming any portion of the system. This shall include all control programs, variables, set points, time periods, messages, passwords and other information necessary to load, alter, test and execute the system. The manual shall include commands, editing and writing control programs, printouts and logs, mathematical calculations, and instructions on modifying any control point, verifying error status, changing passwords, and initiating or disabling control programs.

G. Software Licenses: The owner shall be named the license holder of all software associated with any and all incremental work on the project(s). Owner shall receive ownership of all job-specific software configuration documentation, data files, and application-level software developed for this project. This shall include all custom, job-specific software code and documentation for all configuration and programming that is generated, and any related LAN/WAN/Intranet and Internet connected routers and devices. Any and all required IDs and passwords for access to any component or software program shall be provided to the Owner.

2.5 USER INTERFACE:

A. Character Code: Communication with the DDC/EMS shall be ASCII format, or manufacturer's management communication program.

B. External Communication Interface: In addition to the LAN/WAN communication capabilities specified in paragraph 1.3, C, each master unit shall communicate through an EIA RS232C serial port. Communication may be accomplished with any RS232C compatible terminal. Baud rate shall be selectable from 300 to 19.2 baud. The master shall also provide a spare RS232C serial port for communication to an alarm printer. The software shall provide the ability to direct alarm messages and text reports to either the District workstation and On-site workstation via the LAN/WAN, the spare port or the primary communication port based on time of day, type of alarm, etc.

C. Direct Computer Communication: The DDC/EMS shall have a computer compatible communication mode for communication with other intelligent devices, which performs data integrity checking, with automatic retransmission of data when errors are detected.

D. On-Campus Operator Workstation: Hardware shall be furnished by District. Install DDC/EMS software on workstation, and furnish Software license for workstation to District. Coordinate hardware requirements with District.

E. Laptop Computer (Service Tool): Hardware shall be furnished by District. Install DDC/EMS software on laptop, and furnish Software license for workstation to District. Coordinate hardware requirements with District.

2.6 SYSTEM COMPONENTS:

A. Control Components:

1. Wall Switches: Plates for all wall switches and timers shall match those specified in Division 26.
2. Labels: All labels, signs, etc. shall be engraved, laminated plastic, white on black background, 1/8" high lettering, minimum.
3. Temperature Sensors:
    a. Sensor Type: All temperature sensors shall be made of a highly stable, precision thermistor material accurate to within +/- 0.36 Degrees F. Identify each temperature sensor with a "Lamicoid" label keyed to the control system as-built drawings.
    b. Room Sensor: Room temperature sensor shall have Executive Decorator housing with programmable visible temperature indication. Housing shall include an occupancy override, temperature setpoint adjustment and a service tool jack. Units as detailed on drawings shall have integral CO2 sensor similar to ‘4’ below.
    c. Vandal Resistant Room Sensor: Where noted, shall be a blank stainless steel wall plate with the sensing element bonded to the back side. The plate back shall be insulated to reduce wall temperature influence.
    d. Duct Sensor: Duct temperature sensor shall be a probe type element with 9 inch insertion length. Element shall be installed where air mixture provides a true temperature indication. Where adequate mixing is not practical, the duct temperature sensor shall have an averaging type thermistor element, installed across the entire cross section of the duct.
    e. Outdoor Air Sensor: Outdoor air temperature sensor shall be a probe type element mounted in a ventilated, treated white PVC sun shield to minimize radiant energy effects. The sensor and sun shield shall be mounted on a weatherproof outlet box for outdoor installation.
    f. Low Differential Air Pressure Applications (0" to 5" W.C.): The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points. Non-interactive zero and span adjustments, adjustable from the outside cover. (0.00 - 1.00" to 5.00") W.C. input differential pressure ranges. 4-20 mA output. Maintain accuracy up to 20 to 1 ratio turndown. Reference Accuracy: +0.2% of full span.
4. Carbon Dioxide Sensor: Wall mounted CO2 sensor, specially designed for demand controlled ventilation. Non-dispersive IR (NDIR) sensor. Five-year recommended calibration interval. Push-button calibration. Features as specified below. Kele KCD Series.
    a. Range: 0-2000 ppm CO2
    b. Accuracy +/- 3% of reading or ±40 ppm
    c. Response time: < 1 min.
    d. Output signal: 0-10 VDC or 4-20 mA (500 ohm max) depending on model
    e. Power supply: Nominal 24 VAC/DC
    f. Warm-up time: 3 min.
    g. Operating temp: 32° to 122°F (0° to 50°C)
    h. Operating humidity: 0% to 95% RH (noncondensing)
5. Temperature Control Panels: Each panel and each control device or readout on the front of the panel shall be identified with a laminated plastic label with 1/4" high engraved lettering, white on black background. Pilot lights shall be the push to test type.
6. Smoke Detectors: Furnished and installed by Division 26. Power and fire alarm wiring by Division 28. Control wiring by Division 23. Coordinate with Division 26.
7. Status Sensor: Current sensing status sensor (with sensitivity adjustment for belt loss detection).
8. Control Valves:

a. General: Equal percentage or linear flow characteristics. Unless otherwise noted, select for 2-4 psi pressure drop across the valve at the specified flow. Belimo. 2" and smaller shall be screwed connection, globe or ball valve. 2-1/2" and larger shall be flanged connection globe valve.
b. Ball Valve: Stainless steel ball and stem, teflon seat and O-rings. 400 psi WOG. Packing shall be reinforced teflon seal washer and stuffing box ring. Stem packing gland screw shall be adjustable for wear. Factory flow characterization disk.
c. Globe Valve: Contoured plugs for linear control. 316 stainless steel stem, replaceable seat and adjustable operating range. Packing shall be molded BUNA-N. Valves controlling terminal units or above ceilings shall be of the packless type with bellow seal, or spring loaded teflon requiring no packing maintenance. 2" and Smaller: Bronze body, 250 psi WOG. 35 psi maximum working pressure differential. 2-1/2" and Larger: Cast iron body, 125 psi WOG. 25 psi maximum working pressure differential.

9. Electric Actuators:
a. General: Fully modulating, UL listed. Visual position indicator, manual override and clear weather shield where exposed to weather. 24 volt. Belimo.
b. Valve Actuators: Provide with factory mounting brackets and linkage to the control valve. Capable of shutting off against a 50 psi differential.
c. Damper Actuators: Positive position feedback and spring return. OSA dampers shall be spring return closed. Actuators shall be direct mounted onto the damper control shaft without linkage. Damper actuators shall be sized to provide a minimum of 5 in-lbs torque per square foot of damper face area.

B. Lighting Contactors: Lighting contactor with metal enclosure will be furnished, installed, and wired to the lighting panel by the electrical contractor. See electrical contract documents for location. The DDC/EMS Contractor shall provide low voltage relay(s) required at the contactor panel and wire to the contactors to complete the DDC/EMS side of the lighting control. DDC/EMS Contractor shall provide required photo cells. Relays shall be suitable for up to 277 volts.

C. Lightning Arrestor and Surge Suppressors: Shall be provided as approved and/or manufactured by the DDC/EMS equipment manufacturer.

D. Conduit: Conduit to be a minimum 1" diameter, and to have at least 25% spare capacity, except drops to room sensors may be run in ½" conduit. Conduit shall be run in electrical or mechanical trenches wherever possible. Site conduit (building to building) will be installed (and terminated inside the building) by Division 26.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION:

A. General: All electrical work shall be in accordance with the California Electrical Code and the Electrical Specification Sections. All electric/electronic systems shall be hardwired in conduit. Wiring shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed wiring shall run parallel to room surfaces; location shall be approved by the Architect. No structural member shall be weakened by cutting, notching, boring or otherwise. Provide a 120 volt circuit for each device requiring external power. Dedicated circuits shall be provided where required. Any devices or wiring exposed to the weather shall be protected in weatherproof enclosures such as NEMA 3R and weatherproof conduit.

B. Labeling of System: DDC/EMS Contractor shall provide complete labeling of all terminals at all panels or equipment terminal strips and wiring. Equal to Brady marking on wires and number on terminals in sequence corresponding to control diagram.

C. Programming:
1. The Direct Digital Control and Energy Management System (DDC/EMS) operational program shall be provided by the DDC/EMS Contractor. The DDC/EMS Contractor shall be responsible for programming the system and shall coordinate the scheduling (on/off times) with the Owner. Prior to start-up, the DDC/EMS Contractor shall provide any testing program he feels necessary to fully test the operation of the various components.
2. The DDC/EMS Contractor shall load the operational program into the DDC/EMS controller from his office via the system's modem or at the job site via a direct connect cable. Prior to starting up the system, the DDC/EMS Contractor shall:
   a. Confirm that the control system has been connected to the District’s LAN/WAN, a dedicated telephone line, and that the LAN/Wan and the phone line and system modem is working.
   b. Confirm the functionality of the DDC/EMS controllers and all input points by reading the input values, and comparing them with a measured temperature, pressure, voltage, current, or resistance as appropriate. Calibrate all transducers as required.
   c. Confirm the functionality of all digital output points by manual operational of the relay contacts. Use proper discretion in starting and stopping equipment.
   d. Confirm the functionality of all analog output points by manually imposing an adjustable voltage on the appropriate circuit to check proper operation of the controlled device. Calibrate all transducers as required.
   e. The DDC/EMS Contractor shall notify the General Contractor (one week in advance of) when the system will be ready for loading and testing the operational program. The DDC/EMS Contractor's start-up technician shall be present while the program is being loaded and shall communicate with the programmer prior and after program loading to confirm proper operation.

D. Training: Prior to final acceptance, the DDC/EMS Contractor shall provide operational training to the Owner's personnel. The training sessions shall include a complete demonstration of the system. Dates and times of the training sessions shall be coordinated through the Owner not less than one week prior to session. A total of 40 hours of instruction shall be provided - 24 hours initially, and 16 hours to be spread throughout the first year of operation. The DDC/EMS Contractor shall maintain a log of training sessions including dates, times and names/titles of those attending. The DDC/EMS Contractor shall submit a copy of this log on request.

E. Testing and Acceptance: The DDC/EMS Contractor shall furnish a complete and operating system. The DDC/EMS Contractor shall also verify, in the presence of the Owner, the system accuracy and proper function of each controlled device and sensor. The following items shall be successfully demonstrated prior to acceptance by the Owner:
1. All system outputs including controllers, relays, and other control devices shall be addressed and start/stop functions demonstrated.
2. All inputs shall be displayed and all event-initiated functions shall be demonstrated.
3. Demonstrate program integrity and power restore sequence during and after a power failure and restoration.

4. Deliver all Record Drawings, wiring diagrams, equipment specifications, installation and Operation Manuals and other documentation as required to describe the system.
5. Complete operator training in the use, programming, and operation of the system.

F. Start-up of the System:
1. The start-up period starts when the following conditions are met:
   a. The DDC/EMS system and all involved HVAC equipment have been installed, connected to the DDC/EMS system and are ready to operate.
   b. A start-up meeting has been conducted with representative of the General Contractor, Architect/Engineer, maintenance staff, and the DDC/EMS Contractor.
   c. Consensus is reached, by the representatives at the above referenced meeting that it is appropriate for the start-up process to start.
2. The alarm pagers called by the control system during the start-up period shall be the pagers carried by the Mechanical Contractor and/or DDC/EMS Contractor as appropriate. The Mechanical Contractor and DDC/EMS Contractor shall respond to all pages from the control system and work cooperatively to insure that the building environmental standards are maintained.
3. The start-up process shall be completed and the warranty period shall start when the following conditions are met.
   a. All training to be provided as part of the project has been completed.
   b. No "alarm" or "condition reports" are being generated by the DDC/EMS system for seven (7) calendar days (168 hours) due to incomplete or inaccurate installation or programming.
   c. All adjustments and "fine tuning" of the system have been completed.
   d. The phone numbers for the pagers and alarm printer are programmed.

G. Verification: A written testing and start-up report must be submitted for approval before acceptance. In addition to the DDC/EMS Contractor's testing and start-up report, the Owner may independently verify the test results. The report on test results shall include setpoints and operating ranges of all components.

3.2 SEQUENCE OF OPERATION:

A. Heating Pump Unit: (Heating setpoint 72°F, Cooling setpoint 75°F) The unit shall run per the system operation schedule through the DDC/EMS. Room temperature sensor shall be wall mounted. If the bypass button on the room temperature sensor is activated, the heating/cooling unit shall start for two hours (adj.). The unit setpoint shall be adjustable ± 2°F (adj.) from a switch located on the temperature sensor. Unit fan shall run continuously on start by the DDC/EMS. DDC/EMS shall control the heating/cooling unit to maintain setpoints. On call for cooling, the DDC/EMS shall start the unit cooling at 2°F (adj.) above cooling setpoint and run to 2°F (adj.) below setpoint for cooling and then stop the unit cooling. On call for heating, the DDC/EMS shall start the unit heating at 2°F (adj.) below heating setpoint and run to 2°F (adj.) above setpoint for heating and then stop the unit heating. The unit shall be capable of economizer operation. The DDC/EMS shall monitor the unit status with a current sensor and the supply air temperature. A factory furnished static pressure sensor shall be installed in the ceiling to control the power exhauster to maintain a 0.05" W.C. (adj.) setpoint when unit is in economizer operation. Provide a co-axial cable switch plate cover for mounting the room pressure sensing port.

B. Split System Air Conditioner (ODU/IDU): (Heating setpoint 72°F, Cooling setpoint 75°F) System shall be enabled through the DDC/EMS. The system shall run per the system operation schedule through the DDC/EMS. System operation shall be controlled by a

factory furnished controller to be mounted on the wall. The control contractor shall provide the interlock wiring between the controller and the indoor unit, and the interlock wiring between the indoor and outdoor unit. Power wiring between the outdoor unit and indoor unit shall be by others. A wall mounted temperature sensor next to the controller shall monitor room temperature. If the bypass button on the room temperature sensor is activated, the system shall start for two hours (adj.). DDC/EMS shall monitor system status with current sensors (one each for ODU and IDU). On unit failure, the DDC/EMS shall indicate a unit failure alarm.

C. Exhaust Fan: DDC/EMS shall start/stop fan per schedule by Owner, unless noted otherwise on equipment schedule. A current sensor shall monitor fan status to the DDC/EMS. If the exhaust fan is to be running and the current sensor indicates that the fan is not running, the DDC/EMS shall signal an exhaust fan failure.

D. Domestic Hot Water Circulating Pumps (CP-1): DDC/EMS shall start/stop all domestic hot water circulating pumps on a schedule established by the Owner. DDC/EMS shall monitor status of each pump with a current sensor.

E. Outside Lighting: Outside lighting points currently controlled by DDC/EMS shall remain. Provide additional points, if required by the Electrical Drawings. Coordinate with Division 26.

END OF SECTION 23 09 23

SECTION 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

All work under Divisions 26, 27, and 28 is subject to the General, Supplementary, Special Conditions and other Division 1 Specification Sections preceding this section. The Contractor will be responsible for and governed by all requirements. Drawings indicate the general arrangement of the electrical layout and work included. The Contractor will follow these drawings to lay out and check the drawings of other trades to verify locations and spaces in which work will be installed.

1.2 SUMMARY OF WORK

A. This portion of the work includes furnishing of all labor and materials necessary for a complete and operating systems with connections, wiring system, outlets and all equipment shown on the Drawings or covered by this section of the Specifications

B. 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.

C. 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.

D. 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.

E. 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 the SUBSTITUTIONS sections of the Specifications.

1.4 RULES AND REGULATIONS

A. All work and materials shall be in full accordance with the latest rules and regulations of the following:

1. California Electrical Code (CEC), 2025 Edition

2. California Energy Commission, Title 24, 2025 Standards

3. California Fire Code, 2025 Editions

4. National Fire Alarm and Signaling Code NFPA 72, 2025 as per CBC chapter 35 and CFC Chapter 80 reference standards.

5. California Building, Mechanical and Plumbing Codes, 2025 Editions

6. California Code of Regulations

   a. Title 8, Safety Orders

   b. Title 19, Fire and Panic Safety Standard

   c. Title 24, Part 1, Administrative Regulations

7. Occupational Health and Safety Act (OSHA)

8. California State Fire Marshal Rules

B. Where two or more codes conflict, the most restrictive shall apply.

C. Nothing in these Plans and Specifications is to be construed to permit work not conforming to these codes.

D. Before the Final Certificate of Payment will be issued, the Contractor shall deliver to the Owner all Certificates, Permits, Record Drawings and Instructions/Parts Manuals.

1.5 TESTS AND STANDARDS

A. 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).

1.6 EXAMINATION OF DOCUMENTS AND SITE

A. 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.

B. 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.

1.7 IMPLEMENTATION

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.

D. Scheduling: The installations shall be coordinated as to location and time, and interference causing delays and non-acceptable construction shall be avoided. Order equipment in a timely manner to prevent any delays in the construction schedule and he shall bear any penalty by vendors to meet schedules.

E. Collaboration: 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.

F. Materials: All equipment and materials shall be new, UL (Underwriters Laboratories) approved, and of the best quality. When specific trade names are used in connection with materials they are mentioned as standards but, this implies no right upon the part of the Contractor to substitute other materials or methods without prior approval.

G. Excavation: The Contractor shall provide all excavating and backfill required for the proper installation of electrical work, whether or not shown on the Drawings or as specified. This shall be done per the EXCAVATION portion of the Specifications.

H. 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.

I. 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.

J. 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.

K. Earthquake Restraint: All electrical equipment shall have a means to prohibit excessive motion during an earthquake. Equipment that vibrates during normal operation shall have isolators with mechanical stops. All transformers are considered to vibrate during operation. All electrical equipment and connections shall be designed to resist lateral seismic forces equal to value shown on Drawings of equipment weight with allowable working code capacity increased by 1/3 or 1.5 times the same value for the weight yield capacity. Connections shall be the same except the 1/3 increase will not be allowed.

L. Mechanical Equipment and Other Special Equipment:

1. Prior to commencing construction, the Contractor shall arrange a conference with the Mechanical and Plumbing Contractors, and the Equipment Suppliers, to verify type, sizes, locations, requirements, controls and diagrams of all equipment furnished by them. In writing, he shall inform the Electrical Engineer that all phases of coordination of this equipment have been covered. If any unusual conditions or problems arise, they are to be enumerated them at this time.

2. The Contractor shall furnish all electrical line voltage wiring, fused disconnects and conduits, unless otherwise shown.

3. The Contractor shall be responsible for electrical hook-up and connection to all electrical equipment furnished by all Contractors of this Project. This includes all mechanical equipment, plumbing equipment, and special equipment furnished by other contractors.

M. Portable and 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.

1.8 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.

1.9 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. Sport Lighting System and Controls

6. Wiring Devices

7. Fire Alarm, PA / Clock, Data/Comm Special 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.

D. Show wiring as actually installed, connected, and identified for this specific project. Include identification of cables and cable conductors.

E. Shop and instruction drawings shall cover the equipment or device to be installed and not merely the general class of such equipment or device.

1.10 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 the SUBSTITUTIONS section of the Specifications.

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. It is understood that the samples may be subjected to destructive testing and will not be returned.

1.11 GUARANTEE

This Contractor agrees to replace or repair to the satisfaction of the Owner, any part of the installation that may fail due to defective material and/or workmanship, or failure to follow Plans and Specifications for one year after final acceptance. He shall further obtain from the

manufacturers of special equipment (i.e., control systems) their respective guarantees and service manuals and deliver to Owner.

1.12 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

The Engineer's decision will be final on interpretation of the Drawings and Specifications. Whenever "AS MAY BE DIRECTED", "SUITABLE", "APPROVED EQUAL", “AS REQUIRED”, or other words of similar intent and meaning are used which infer that judgment is to be exercised, it is understood that it is the judgment of the Engineer being referred to.

1.13 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.

PART 2 – PRODUCTS

2.1 RACEWAYS:

A. Except where specifically shown otherwise in this section, the Contractor shall furnish and install a complete steel, rigid thread galvanized rigid steel conduit system for all wiring, including control and signal wiring.

B. Galvanized Rigid Steel (GRS)

1. All conduits shall be rigid threaded hot dipped galvanized type.

2. Joints are to be sealed with conductive pipe compound T&B "Kopr-Shield" before making up.

3. Conduits installed below grade shall be wrapped with 3M "Scotchrap #51" corrosion protection tape using half-laps for double thickness. Conduit surfaces are to be clean and dry before wrapping.

C. Steel Electrical Metal Tubing (EMT)

1. EMT may be used within the hollow dry spaces of buildings, minimum 96” above the finished floor. Trade sizes 4" and smaller may be used within hollow dry spaces of the building.

2. EMT conduit shall be Allied True Color E-Z Pull, or equal, with a colored finish specific to the following systems:

a. Natural: 0-150V-to-Ground Power & Lighting

b. Yellow: > 150V-to-Ground Power and Lighting

c. Blue: Copper Data & Communications

d. Orange: Fiber Optic Cable

e. Red: Fire Alarm

3. All raceway fittings, locknuts, couplings, elbows, etc., shall be hot dipped galvanized steel finish with plastic throats or bushings. Cast-type fittings shall not be used.

D. Non-Metallic Polyvinylchloride Conduit (PVC):

1. Rigid nonmetallic PVC, UL labeled and fittings approved for the purpose may be used for electrical systems 0-600V-to-ground under the following conditions:

a. All conduits in earth under buildings or protected by permanent paving may be Schedule 40 PVC. Any conduits running through planters or unprotected are to be encased in 3" of concrete. All raceways above grade are to be steel.

b. Risers shal be blue color, factory PVC coated T&B "Ocal" steel ells. Bends less than 45 degrees and offsets may be field bent.

2. All nonmetallic runs shall have a bond wire for the interconnecting of all conducting portions per Article 250 of the California Electric Code.

3. PVC shall never be used above grade.

E. Liquid-Tight Flexible Metal Conduit (LFMC):

LMFC may be used in lengths not greater than 36" at motors and other machinery to prevent the transmission of vibration. LFMC shall be supported at both ends.

F. Surface raceways and fastenings are to be two-piece steel type, complete with all fittings of the same manufacturer and factory finished in gray. Surface plug-in strips shall be two circuit type with NEMA grounded receptacles every 12" with wiring space provided.

G. The minimum size conduit for lighting, power, and signal wiring shall be 3/4" trade size.

H. Conduits installed underground shall have a minimum coverage of 24" below a finished grade. Provide a magnetically traceable warning tape at 12" below grade. Electrical systems rated greater than 150V to Ground shall have a 3" concrete envelope.

2.2 CONDUCTORS:

A. All conductors shall arrive to the project in their original, unbroken packages plainly marked as follows:

1. Packaging shall indicated underwriter’s labels, size, conductor material,

insulation of wire, names of the manufacturer and the trade name of the wire.

2. Wire or cable shall have factory markings every 24". Markings shall show its maximum allowable voltage, wire size and insulation.

B. All conductors shall be a minimum of 98% conductivity, soft drawn copper, minimum #12 AWG unless shown otherwise. Conductors sized #8 and larger shall be stranded. Conductors sized #10 and smaller shall be solid type, except wiring within fixtures. Insulation shall be 600 Volt, type "THWN."

C. Control circuits for mechanical equipment in locations subject to abnormal temperatures on or under furnaces and heaters shall be Type "RHH" 600 Volt insulation conductors.

D. All branch circuits, fixture wiring joints, splices and taps for conductors #10 and smaller to be made with "Scotchlok" connectors.

E. Two-bolt type solderless connectors or T&B "ColorKeyed" compression lugs shall be used on #8 and larger conductors.

2.3 WIRING DEVICES:

A. Furnish and install wiring devices and plates as shown on the Drawings and described in these Specifications. Where more than one wiring device is mounted in the same location, such devices shall be mounted in a multi-gang plate. Wiring devices shall be specification grade or better.

B. Wiring devices shall be of the color selected by the Architect.

C. Convenience outlets to consist of a specification grade duplex receptacle mounted in an outlet box in the wall, flush with the finished plaster or surface. Outlet rating to be 20 AMPS, 125 Volts, 3-wire, back and side wired.

D. All outlets shown outdoors or in damp locations shall be GFI type, installed in a weatherproof box and cover equipped with rubber gaskets. Surface outlets shall be weatherproof type FS boxes with hubs as required and equipped with rubber gaskets and weatherproof covers.

E. Local switches shall be quiet toggle type, totally enclosed, 20 AMPS, 277 Volts AC rated.

F. Device plates shall be provided for all devices with the number of gangs and openings necessary. They shall be satin brushed 302 stainless steel, unless specified otherwise.

G. Switch plates for all outlets not in sight of a switch shall be labeled with filled etched letters showing locations of the outlet controlled.

H. Pilot lights shall be the type with an indicating neon lamp in a handle.

2.4 OUTLET BOXES:

A. Outlet boxes for concealed work shall be one piece pressed steel knock-out type with zinc or cadmium coating. Boxes shall not be smaller than 4" square nominal size unless otherwise indicated. Provide extension rings, extenders, plaster rings and covers necessary for flush finish. No back-to-back or through-boxes shall be used.

B. Bar hangers shall be used to support outlet boxes in stud or furred partitions and ceilings. Attachment screws, devices, etc., shall be of the proper type to secure boxes to metal studs. Use expansion shields in concrete and masonry. Where used for lighting fixtures, outlet boxes shall be equipped with fixture studs.

C. Provide approved knock-out seals on all unused open knock-out holes.

D. Outlet boxes installed in concrete slabs shall be two-piece concrete boxes, not less than 4" nominal size with a minimum depth of 2 ½".

E. Surface boxes of cast metal threaded hub-type with suitable gasketed covers shall be used for exposed conduit runs less than 5' above finished floor, or where waterproof boxes are required.

2.5 PULL BOXES AND WIREWAYS:

A. Pull and junction boxes shall be installed as shown to ease the pulling of wire and to comply with CEC requirements.

B. Wireways shall be constructed in accordance with UL 870 for wireways, auxiliary gutters and associated fittings. Every component, including lengths, connectors, and fittings, shall be UL listed.

2.6 TERMINAL CABINETS AND CLOSETS:

A. Cabinets and fronts shall be in accordance with NEMA Standard Publication No. PB 1-1971 and UL Standard No. 67. Fronts shall include doors and have flush brushed stainless steel, cylinder tumbler-type locks with catches and spring loaded door pulls. The flush lock shall not protrude beyond the front of the door. All locks shall be keyed like the panelboard locks. Fronts are to be adjustable indicating trim clamps that shall be completely concealed when the doors are closed.

B. Doors shall be mounted by completely concealed steel hinges. Fronts shall not be removable with the door in the locked position. A frame and card with a clear plastic covering shall be provided on the inside of the door. Fronts shall be of code gauge full finish steel with rust inhibiting primer and baked enamel finish.

C. Install finish grade 3/4" plywood board, primed and painted light gray on both sides and the edges, at the interior rear surface of telephone and signal cabinets.

D. Provide solderless box lugs, terminal blocks with a white marking strip for conductors sized #16 and larger. Punch-down terminals shall be used for No. 18 and smaller and shall be used for all public address, intercom and other electrical terminations.

2.7 FLOOR BOXES AND UNDERFLOOR DUCTS:

A. Provide fully adjustable Type 1, Class 1 watertight floor boxes complete with pedestal and wiring device where shown on Plans.

B. Furnish and install a complete duct system as shown on Plans. The system shall consist of separate ducts: No. 2 duct for electrical power service; No. 4 duct for telephone; No. 4 duct for data. Ducts shall have 2" inserts on 24" centers. Furnish and install the necessary junction boxes, couplings, supports, adapters, etc., to form a complete

assembly made watertight with sealing compound.

C. Ducts and junction boxes shall be manufactured from 14 gauge steel. They shall be UL listed and finished with a corrosion resistant coating. The junction boxes must be furnished with the proper depth to accommodate floor finish. Junction box cover plates to have an upward adjustment of 3/8". Cover plates must be leveled flush with the finished cement floor before and after the concrete has hardened.

D. Furnish and install, where shown, telephone, data and power service fittings. All service fittings shall be furnished with receptacles, adapters and no spin locking nipples or supports.

E. Fittings for floor boxes or ducts shall be brushed aluminum finish.

F. Provide carpet flanges of proper size in carpeted or tiled areas.

2.8 CONCRETE PADS, PULL HOLES AND MANHOLES:

A. At the Contractor's option, he shall provide cast-in-place or precast structures.

B. Where applicable, concrete structures shall be submitted to the serving utility for their approval before installation.

C. Cast-in-place concrete shall be per the concrete section of the Specifications.

D. Provide 8" concrete pads under all exterior switchboards, transformers, etc.

2.9 NOISE CONTROL:

A. Outlet boxes at opposite sides of partitions shall not be placed back-to-back or through-boxes employed except where specifically permitted on the Drawings by note to reduce transmission of noise between occupied spaces.

B. Contactors, starters, and similar noise-producing devices shall not be placed on walls that are common to occupied spaces unless specifically called for on the Drawings. Where such devices must be mounted on walls common to occupied spaces, they shall be shock mounted or isolated in such a manner to effectively prevent the transmission of their inherent noise to the occupied space.

C. Contactors, starters, drivers, and like equipment found noticeably noisier than other similar equipment on the project will be deemed defective and shall be replaced at Engineer's request.

PART 3 – EXECUTION

3.1 INSTALLATION - GENERAL:

A. The layout and installation of electrical work shall be coordinated with the overall construction schedule to prevent delay in completion of the project. Checking these Drawings before organizing the electrical work schedule or installing material and equipment shall be obligatory.

B. Dimensions and information regarding accurate locations of equipment and structural limitations and finish shall be verified with other sections.

C. The Drawings do not show all the offsets, bends, special fittings, junction boxes, or pull boxes necessary to meet job conditions and the CEC. They shall be provided as required.

D. Electrical equipment, outlets, junction and pull boxes shall be installed in accessible locations avoiding obstructions, preserving headroom and keeping openings and passageways clear.

E. Minor adjustments in the locations of equipment shall be made where necessary, providing such adjustments do not adversely affect function of the equipment. Major adjustments for the location of equipment shall be approved by the Architect and detailed on the Record Drawings.

F. Structural Fittings: Furnish and install the necessary sleeved, inserts, hangers, anchor bolts and related structural items. Install at the proper time.

G. Openings have been shown on the Architectural and Structural Drawings. Should any additional openings or holes be required for the work of this section, the cost shall be the obligation of this section.

H. Contractors shall inspect and account for existing conditions affecting his work.

I. Sleeves for electrical conduits passing through walls or slabs shall be placed under the work of this section before concrete is poured. Where conduits pass through suspended floor slabs, sleeves shall be standard weight galvanized steel pipe extending 2" above the finished floor level.

J. Sleeves at other locations shall be either light weight galvanized steel pipe or galvanized sheet steel. Clearance between conduits and sleeves shall not be less than ½".

K. Sleeves through outside walls and below grade shall be caulked tight with oakum and the ends sealed with an approved semi-plastic coal tar base compound or shall be of the stuffing box type. Other sleeves shall be packed with glass wood ends sealed with Duxseal and covered with chrome plated escutcheon plates.

L. Conduits entering through floor slabs at grade level will not require sleeves and shall be placed with tops of couplings flush at floor level.

M. Sleeves for electrical conduit passing outside walls below grade shall be the through-wall and floor seal type.

3.2 INSTALLATION OF CONDUITS AND RACEWAYS:

A. Raceways for electrical or signal systems run in earth that are not protected by permanent paving shall be encased in concrete with the encasement extending under the building. Branch circuit and signal system conduits installed underground between outlets, terminals, and panels within the building shall be liquid and gas tight.

B. Conduits shall be concealed unless otherwise shown. All conduit runs exposed to view, except those in attic spaces, shall be installed parallel or at right angles to structural members, walls, or lines of the building.

C. All conduit runs shall be mechanically and electrically continuous from outlet to outlet. Conduit size or type shall not be changed between outlets.

D. No conduits shall be run on the roof unless specifically shown on the roof. They shall be full weight rigid steel on PVC sleepers. Install roof jacks at penetrations.

E. Conduit stubs installed for future extensions shall be rigid steel for at least 5' of a conduit run. The conduit ends shall be terminated with couplings and pipe plugs. The closed end shall be double wrapped with Scotchrap #50 for the last 12". The concrete envelope shall leave 3" of the wrapped conduit exposed for future connection.

F. Conduit for equipment connected permanently to the floor shall be installed with a 6" rigid conduit nipple to a flush coupling to ensure a watertight connection at the floor.

G. All conduits shall be sloping to drain and shall be sealed with JM Clipper "Duxseal" on the high end.

H. All conduit bends shall be carefully made so that the conduit is not flattened, kinked or otherwise compromised. The inner radius of any conduit bend shall be not less than eight times the inside diameter. Where conduits are run exposed in groups, bends of all conduits shall have a common center. Use of standard elbows will not be allowed at these locations.

I. Each run of a conduit shall be finished before concrete, plaster, etc., is installed to ensure against obstruction or omissions. After installation, the ends of all conduits shall be plugged with metal pennies. All conduit systems shall be completed and thoroughly cleaned and dried inside before installation of any conductors.

J. Conduits shall enter at right angles and be connected to all outlet boxes, pull boxes, and cabinets with locknuts and plastic throated grounding bushings, providing a continuous grounding system in accordance with CEC Article 250.

K. Use Erikson couplings where a union is necessary. Running threads will not be permitted.

L. Pull 1/8" stranded nylon pull ropes with 18" coiled at each end in all empty conduits with identification tags indicating source and destination.

M. Furnish and install seal-offs in all conduit runs through areas of different temperature.

N. All concealed conduits shall be installed in as direct a line as possible between outlets. No more than four (4) quarter bends or their equivalent will be allowed between outlets. Feeder conduits shall follow arrangement shown on Plans unless a change is authorized. In general, branch circuit conduits shall follow the arrangement as shown insofar as structural conditions permit.

O. All exposed runs shall parallel buildings, walls, or partitions, and shall be supported on Kindorf Hangers to meet Title 24 Part 6, California Code of Regulations.

P. All telephone, data, and other signal conduits shall be installed with long radius sweeps. No factory ells will be permitted.

Q. Chrome escutcheon plates are to be used on all conduit penetrating walls, floors or

ceilings.

R. Expansion joints shall be provided at building structural expansions or as required due to length of run or difference in temperatures.

S. All fittings exposed or in damp areas shall have sealing glands and proper gaskets. Fittings in hazardous areas shall be of the type approved for the particular hazard.

T. Provide two 1" conduit stubs out of all panels and terminal cabinets to above a hung ceiling or as otherwise shown.

U. Roof Penetrations:

1. Where raceways penetrate roofing or any similar structural area, provide iron roof jacks sized to fit tightly to a raceway for a weather-tight seal with the flange extending a minimum of 9" under roofing on all sides. Completely seal the opening between the inside diameters of the roof flashing and the outside diameters of the penetrating raceways. Coordinate all work with the roofing section of Specifications.

V. Fire Penetration Seals:

1. Seal all penetrations for work of this section through fire rated floors, walls and ceilings to prevent the spread of smoke, fire, toxic gas or water through the penetration before, during or after a fire. The fire rating of the penetration seal shall be at least that of which it is installed so that the original fire rating is maintained as required by CEC Article 300.21.

2. Where applicable, provide OZ Type CFSF/1 and CAFSF/1 fire seal fittings for conduit and cable penetrations through concrete and masonry walls, floors, slabs and similar structures. Apply an approved firestopping system, including wall wrap, partitions, caps and other accessories as required. All manufacturers' instructions and recommendations for installation of sealing fittings and barrier sealing systems.

3.3 CONDUCTORS AND CONNECTIONS:

A. General Requirements:

1. All branch circuit and fixture wiring joints, splices and taps for conductors #10 and smaller shall be made with UL approved connectors listed for 600 Volts. Connector bodies shall consist of a cone shape rotating expandable coil spring inserts insulated with phenolic or plastic shell.

3. Do not install wire in conduits until all work of any nature that may cause injury (including pouring of concrete) is completed. Use care in pulling in wires to prevent damage to wire or insulation. Do not use blocks, tackle or other mechanical means to pull #8 AWG or smaller conductors.

4. Splices are not permitted except in outlet boxes, pull boxes, junction boxes, panelboard gutters and auxiliary gutters. No splices shall be made in underground boxes.

5. Use only wire pulling compounds listed by the UL as a lubricant for pulling

conductors through raceways. The use of cleaning agents that have deleterious effect on conductor coverings are not permitted.

6. Unless otherwise shown on Plans or specified elsewhere, leave at least 12" of free conductors at each connected outlet (outlets connected to equipment or device) and 9" of free conductors and coil neatly in outlet box for future connection.

B. Terminations:

1. Circuit and signal terminations to single screw or push on terminals shall be done with insulated “Sta-Kons” or approved equal terminals.

2. Bolt type solderless connectors shall be torqued with a torque wrench according to the manufacturer's recommendations and then retightened after 24-48 hours before taping. Owners' inspector shall be informed of this procedure during the waiting period and shall witness the act of retightening.

C. Feeders and Branch Circuits:

1. Connectors and lugs for terminating stranded conductors sized #8 and larger shall be machine crimp compression type.

2. All splices shall be taped with Scotch "Super 88" vinyl electrical tape, and "Scotch Fill" tape putty where necessary for a smooth joint. For other than normal temperatures or conditions, Scotch #27 or #2520 shall be used.

3. No splices shall be made below grade in a manhole or pull holes without the Engineer's written approval. When approved, these shall be encapsulated with 3M potting kits per 3M Specifications.

4. Wires in panels, cabinets, pullboxes and wiring gutters shall be squared, labeled, and neatly grouped with Ty-raps and fanned out to the terminals.

5. Support all conductors in hand holes/manholes and label with plastic rope. Tag all conductors with plastic waterproof tags.

3.4 WIRING DEVICES:

A. Wiring devices shall be securely fastened to the outlet box. Where the outlet box covers are back from the finished walls, the device shall be built-out with washers so that it is rigidly held in place to the box. Provide metal extenders in flammable construction per CEC.

B. All device screw slots shall be left in a vertical orientation.

3.5 OUTLET BOXES:

A. Boxes shall be securely fastened in position to the ceiling or walls with screws or bolts. Nails are not acceptable. The Contractor shall set and align all equipment, level, bolt down, or otherwise secure in place. No back-to-back or through-boxes shall be used.

B. Boxes shall be accurately located and set square and true with exposed edges of a box

or plaster ring flush with finished surface of walls or ceiling. All unused boxes shall be equipped with blank covers that shall match existing covers.

C. Boxes shall have no unused openings.

D. Boxes shall be cleaned of all direct plaster, etc., before conductors are installed. Rust spots shall be scraped to bare metal and painted with Rust-Oleum "Cold Galvanizing Compound".

E. Suspended fixture outlets shall be equipped with 3/8" fixture mounting stud bolted to wood backing or metal studs to safely support fixture weight.

F. Make any change in outlet location necessary to all job conditions and rearrange fixtures and equipment as directed.

G. Study all Plans as to relation of spaces surrounding outlets so that this work may be installed at the proper time with others. Fixtures and equipment shall be symmetrically located. Conflicts and discrepancies shall be referred to the Architect immediately and prior to box installation.

3.6 JUNCTION AND PULL BOXES AND WIREWAYS:

A. Boxes shall be installed square and plumb. An engraved nameplate shall be installed indicating the function of each box on the exterior in unfinished areas and on the interior in finished areas. Permanent markers are not acceptable.

B. Pullboxes and wireways shall be concealed or installed flush in finished areas. They shall be surface mounted in machine rooms or unfinished areas.

3.7 TERMINAL CABINETS AND CLOSETS:

A. Install, level and identify per schedule.

3.8 FLOOR BOXES AND PEDESTALS:

A. Floor boxes are to be installed level and plumb. Fill with paper prior to pouring concrete. Re-level after concrete has set, then raise to accommodate the floor finish.

B. The installation of pedestals shall be coordinated with cabinet work.

309 PANELBOARDS:

A. Location:

1. Unless otherwise indicated on the Drawings, install all panels with the top of the trip 6'- 0" above the finished floor.

2. Space permitting, surface mount the panels where they are not visible to the public.

3. Panels to have a protective cover over any electrical panel with overhead water piping. Cover to be 18" by width of a panel.

B. Directory:

1. Mount a typewritten directory behind glass or plastic in a metal holder welded to the inside of each panel door. Directory shall indicated circuit numbers and complete description of all loads on each circuit.

3.10 DISCONNECT DEVICES:

A. Disconnect devices shall be identify the location of the controlled device.

3.11 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 #6B&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.

3.12 IDENTIFICATION

A. Conductors:

1. All power and low voltage systems conductors and cabling shall be identified in accordance with the following schedule:

   a. 120/208 Volts, 3-phase, 4-wire Wye: Red-Black-Blue, Neutral White

   b. 120/240 Volts, 3-phase, 4-wire Delta: Black-Blue for single-phase, Orange for 3-phase stinger, Neutral White

   c. 480/277 Volts, 3-phase, 4-wire Wye: Yellow-Brown-Purple-, Neutral Grey

   d. Bond or grounding conductor (GWG): Green

   e. Special system conductors shall be color coded and labeled

2. Brady Labels shall be used to identify terminals and destination of feeders, branch circuits, signal and control circuits, etc., at all terminations and junction boxes and shall be coordinated with the nameplates in all boxes and equipment.

3. All terminals in the switchboards, panels, relays, switches, devices, starter terminals, etc., shall have Brady Labels for identification to identify both ends of all wiring. Wires #8 and smaller to be terminated on terminal strips squared-type 9080K with white marking strip and screw lugs for wire size.

B. Nameplates: The Contractor shall furnish and install 1" x 3" x 3/32" thick laminated black Nylon nameplates with a white core, unless specifically shown as red with a white core, engraved to produce white letters on black background for all items of electrical equipment including 2-pole and 3-pole circuit breakers, panelboards, starters, relays, time switches and disconnect switches. The plates shall screwed in place with stainless steel screws. Adhesive backed plates are not acceptable.

C. Panels: Panels having single-pole circuit breakers shall be provided with typed schedules mounted in welded metal holders behind plastic.

D. Devices: All devices shall have their branch circuit identified on the back side of device plate with a permanent type black marker, i.e., CKT A-21.

3.13 CONCRETE PADS, PULL HOLES AND MANHOLES:

A. Contractor shall provide a minimum of 3'-6" of sand or base material suitable to receive the manhole. The base material shall be compacted, graded level, and at proper elevation to receive the manhole in relation to the conduit grade or ground cover requirements as designated in the Plans.

3.14 SUPPORTS AND ANCHORS:

A. Provide inserts, anchors, supports, rods, brackets and miscellaneous items to adequately support and secure the electrical systems and equipment.

B. Secure hangers, brackets, conduit straps, supports and electrical equipment to surfaces by means of toggle bolts on hollow masonry. Utilize expansion shields and machine screws or standard preset inserts on concrete or solid masonry. Utilize machine screws or bolts on metal surfaces. Utilize wood screws on wood construction. Wood, fiber plugs, or concrete nails are not acceptable.

C. Power or velocity driven inserts may not be used for any anchorage unless specifically approved by the Engineer and where the use does not affect the finished appearance of work. Under no circumstance shall these be used in pre-stressed slabs, beams, purlins, or precast members in tension.

D. Seismic Requirements: Provide vertical and lateral supporting equipment to resist the application of seismic forces per California Code of Regulations, Title 24 Chapter 16.

END OF SECTION 26 00 00

SECTION 26 40 00 LOW VOLTAGE ELECTRICAL TRANSMISSION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 - Specification sections, apply to work of this section.

B. Section 26 05 00 - Basic Materials and Methods section and other Division 26 sections apply to work specified in this section.

1.2 SCOPE:

A. Work included: Furnishing and installation of a complete electrical service, distribution, and grounding system. Conditions of this section apply to all other 26 40 00 series sections included.

B. Related Work: Refer to other sections, particularly those listed below, so as to properly coordinate work specified herein with that specified elsewhere to produce a finished, workmanlike, fully functioning installation.

C. All other Electrical Sections: Division 26

1.3 QUALITY ASSURANCE:

See Section 26 05 00.

1.4 SUBMITTAL:

A. Product Data: Submit manufacturer's data on service entrance equipment, switchboards, motor control centers and/or individual starters, transformers, panelboards, disconnect switches and grounding components.

B. Trip Curves: When requested, submit trip timing curves for all circuit interrupting devices.

C. Nameplate Schedule: Submit nameplate schedule for approval.

1.5 COMPONENT COORDINATION:

In order to maintain close control and coordinate the various components of the distribution systems, the number of manufacturers shall be kept to a minimum. Equipment manufacturer shall be General Electric or Square D. It shall be the manufacturer's responsibility though the Electrical Contractor to coordinate all components of the system in order to ensure systems that will provide maximum protection of equipment and reliable safe operation.

1.6 NAMEPLATES:

Laminated phenolic plastic, color coded black for 120/208 volt equipment, with white letters. Provide for identification of each transformer, panelboard and motor control center, secure to face with two (2) chrome plated screws each. A schedule of nameplates shall be included with the shop drawings for approval.

1.7 FEEDER CONNECTIONS:

Provide cast, saddle type bolted lugs or hydraulically set compression lugs for all bus connections. Manufacturer shall be Thomas and Betts, Burndy, O.Z. or approved equal. Lugs in which the set of screw embeds directly into feeder conductor shall not be used.

1.8 MISCELLANEOUS:

A. Equipment Bases: Provide appropriately sized concrete housekeeping bases for all floor-mounted equipment.

B. Hoisting Lifting Lugs: Provide on all heavy equipment as required to ensure safe hoisting.

C. Space for Future Protective Device: Provide as indicated on drawings; shall be completely equipped for the future addition of a circuit breaker or fused switch, including all connections.

PART 2 – PRODUCTS

2.1 PANELBOARDS:

A. Panelboards shall be Bolt-down Circuit Breaker type, with voltage, phase, and breakers as specified in panelboard schedules. Panelboards shall be installed flush or surface or specified, at locations as indicated on plans. Panelboards shall be installed in code gauge rust proof steel cabinets with flush door having flush locks all keyed alike and with trim cut square and true.

1. Panelboards: General Electric A-Series and Spectra Series; Square D, type NQ, NQOB, and NF; or approved equal.

B. All panelboards and breakers shall meet the requirements of the indicated available symmetrical short circuit current or have a minimum bus bracing to meet figure shown.

C. All interiors shall be completely factory assembled. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without machining, drilling or tapping.

D. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. A nameplate shall be provided listing panel type and ratings.

E. Unless otherwise noted, full size insulated neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug or each outgoing feeder requiring a neutral connection. A ground bus will be included in all panels.

F. Boxes shall be at least 20 inches wide made from galvanized steel. Provided minimum gutter space in accordance with California Electric Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided.

G. Door hinges shall be concealed. All locks shall be flush, stainless steel, cylinder tumbler type locks with catches and spring loaded door pulls, keyed alike and directory frame and card having a transparent cover shall be furnished with each door.

H. All exterior and interior steel surfaces of the trim shall be properly cleaned, primed with a rust inhibiting phosphatized coating and finish with a gray ANSI 61 paint. Trims for flush panels shall overlap the box for at least 3/4 inch all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools. After installation, trim clamps shall not be accessible when the panel door is closed and locked.

I. All main bus bars shall be cooper or tin plated aluminum sized in accordance with UL standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above an ambient of 40 degrees C maximum.

J. Circuit breakers shall be quick-make, quick-break, thermal-magnetic, trip indicating, and have common trip on all multipole breakers. (Trip indication shall be clearly shown by the breaker handle taking position between ON and OFF when the breaker is tripped). Branch circuit breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the trip rating of the breaker to prevent repeated arcing shorts resulting from frayed appliance cords. Single pole 15 and 20 ampere circuit breakers shall be UL listed as "Switching Breakers" and carry the SWD marking. UL Class A (5 milliampere sensitivity) ground fault circuit protection shall be provided on 120V ac branch circuits as specified on the plans or panel board schedule. This protection shall be an integral part of the branch circuit breaker which also provided overload and short circuit protection for branch circuit wiring. Tripping of a branch circuit breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole circuit breaker with integral ground fault circuit interruption shall require no more panelboard branch circuit space than a conventional slide pole circuit breaker. Connections to the bus shall be bolt on.

2.2 DISCONNECTS:

A. Motor and circuit disconnects shall have an Underwriters' Laboratory label.

B. Disconnect switches shall be suitable for area where they are installed, i.e., weatherproof, and shall be rated heavy duty. Use only 600 volt class with proper number of poles. Switches shall be fused unless indicated on plans. Fuses shall be of type specified on plans.

C. When a disconnect switch is not clearly visible from the control location, provide an operating handle which is lockable in the open position.

2.3 GROUNDING:

A. Clamps, bonds, etc. suitable and as necessary to provide continuous ground system.

B. Ground Rods: "Copperweld" 3/4" diameter 8' long.

C. All grounding conductors shall be copper, sizes not less than that required under CEC Table 250.122.

D. All grounding electrode conductors shall be copper, sizes not less than that required under CEC Table 260.66.

2.4 SWITCHBOARDS:

A. Manufacturer's: Subject to compliance with requirements, provide switchboards of one of

the following:

General Electric Company
Square D Company

B. General: Except as otherwise indicated, provide switchboards of types, sizes, characteristics, and ratings indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for complete installation. Service entrance switchboards shall comply with serving utility requirements.

C. AC Dead-Front Distribution Switchboards: Provide factory assembled, dead-front, metal enclosed, self-supporting secondary power switchboards, of types, sizes and electrical ratings and characteristics indicated; consisting of panel (vertical) units, and containing circuit breakers of quantities, ratings and types indicated. Provide copper or tin plated aluminum main bus and connections to switching devices of sufficient capacity to limit rated continuous operating temperature rise to 54 degrees F, and 90 degrees F for circuit breaker branches; with main bus and tap connections silver-surfaced and tightly bolted for maximum conductivity. Brace bus for short circuit stresses up to maximum interrupting capacity. Prime and paint switchboard with manufacturer's finish and color. Construct units for outdoor, NEMA Type 3R.

D. Enclosures: Construct dead-front switchboards, suitable for floor mounting, with front cable/wire and conduit accessibility as indicated. Provide welded steel channel framework, hinge wireway front covers to permit ready access to branch circuit breaker load slide terminals. Coat enclosures with manufacturer's standard corrosive resistant finish.

E. Bussing: Provide switchboard with sufficient cross-sectional area to fulfill U.L. Standard 891 pertaining to temperature rise.

2.5 MOTOR STARTERS:

A. Manual motor starters to be quick-make, quick break, with overload protection. General Electric cr 101 for 120/240 volt 1 hp or less.

B. Magnetic motor starters shall be across the line unless indicated with control power transformer (120 volt coil) and with overload relay protection. Combination type shall have integral fused switch or circuit breaker as indicated.

2.6 TRANSFORMERS:

A. Transformers, Dry Type: Distribution transformers shall be constructed and tested in accordance with ASA and NEMA Standards, TP-1 minimum, and shall be wound with copper conductors. Performance of transformers shall be equal to or exceed ASA and NEMA published criteria.

B. Transformers shall be self-cooled type with Class H, NEMA, Group 111 insulation and a temperature rise of 150°C under continuous full load conditions with an ambient of 400°C.

C. Transformers supplying voltage to wave altering devices (computers, electronic ballasts, etc.) shall be K3 rated minimum, or as noted otherwise on plans.

D. Transformers shall be equipped with four 2 1/2% taps (2 taps above and 2 taps below normal voltage). Windings shall be of the fire-resistant type, designed for natural

convection cooling through normal air circulation.

E. Core mounting frames and enclosures shall be of welded and bolted construction with sufficient mechanical strength and rigidity to withstand shipping, erection and short circuit stresses.

F. Enclosure cover plates shall be Code gauge sheet steel, captive bolted to the enclosure framework. Enclosure shall have suitable ventilating openings with rodent-proof screens. Enclosure shall be provided with lifting lugs and jacking plates as required.

G. Transformers shall be furnished complete with mounting channels and mounting bolts. Metal parts, except cores and core mounting frames, shall be cleaned, rust-proofed and given a heavy coating of an inert primer.

H. Transformers used indoors shall be “low noise.” They shall be provided with vibration dampers. Size and number of shock mounts shall be in accordance with manufacturer's recommendations.

I. Transformers shall be manufactured by General Electric, Square D, or approved equal.

PART 3 – EXECUTION

3.1 INSTALLATION OF SWITCHGEAR AND SWITCHBOARDS:

A. Install switchgear and switchboards as indicated, in accordance with manufacturer's written instruction, and with recognized industry practices to ensure that switchboards comply with requirements of NEMA and CEC standards, and applicable portions of NECA's "Standard of Installation".

B. Prior to energization of circuitry, check all accessible connections to manufacturer's torque specifications. Subsequent to wire and cable hook-ups, energize switchboards and demonstrate functioning in accordance with requirements.

3.2 INSTALLATION OF PANELBOARDS:

A. Provide mounting brackets, busbar drilling, and filler pieces for unused spaces.

B. Branch circuits shall be connected as shown in line diagrams and/or panelboard schedules, with wires neatly tie wrapped in panel.

C. All distribution panelboards shall have all sub feeders and main breakers marked with 1" x 3" plastic name tags secured with two self tapping screws.

D. All panelboards shall be provided with a 2" x 3-1/2" plastic name tag on the front of the panel door or on the trim, indicating panel designation and distribution panel and circuit feeding above panel, secured with two self tapping screws.

E. Branch circuit panelboards shall have a plastic covered circuit directory card on the inside of each door with all circuit destinations neatly typed.

F. Contractor shall check and tighten all factory made wire or lug connections. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A.

G. Install four (4) spare 3/4" conduits from all panelboards to accessible ceiling space.

3.3 INSTALLATION OF DISCONNECTS:

Install disconnects for all equipment and motors of the size required and as recommended by manufacturer.

3.4 INSTALLATION OF GROUNDING:

A. Scope: Provide grounding system complying with the codes and ordinances specified. Grounding system shall provide continuity through the entire electrical system.

1. Panelboard ground buses.

2. PVC conduit or other raceways.

3. All motors.

4. All lighting fixtures.

5. Grounding terminals of all receptacles.

6. Miscellaneous grounds required by code.

B. Equipment and raceway bonding procedures shall be rigidly maintained and meet all jurisdictional requirements of codes and regulations.

C. Good, electrically continuous, metal to metal contacts shall be made wherever possible at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded round the boxes with a 6 BS gauge, rubber covered, double braided wire with ground clamps.

D. A separate grounding conductor shall be run in all conduit runs from distribution, lighting, and power, etc. panelboards, motor control outlets, etc., back to their respective service or distribution panelboards.

E. Flexible Conduit Grounding: Provide a separate grounding conductor in all flexible conduit runs to include watertight flexible conduit with integral grounding straps. Install ground conductors inside conduit with ungrounded conductors. Extend from nearest panel to device being connected.

F. Receptacle Circuits: Provide a separate grounding conductor in all receptacle circuit conduit runs, back to serving panelboard.

3.5 INSTALLATION OF MOTOR STARTERS:

A. In finished areas, mount motor protection switches flush and install suitable cover plates.

B. Install heaters correlated with full load current of motors provided.

C. Set overload devices to suit motor provided.

3.6 INSTALLATION OF TRANSFORMERS

A. Transformer core frame shall be installed level on shock absorbing pads within the

enclosure.

B. Mounting bolts on floor-mounted transformers shall be extended into pads only and shall not be in direct contact with building structural members.

C. Flexible jumpers shall be installed for grounding continuity from enclosure to conduits.

D. Voltage Check:

1. The Contractor shall set the taps on all transformers (which are a part of this contract) as necessary to provide satisfactory operating voltages with all present loads energized. A check shall be made in the presence of the District Inspector at a panel fed from each transformer and which is the farthest from the transformer. Voltages at the transformers ranging from 118 to 122 volts inclusive, for 120-volt systems and proportionately equivalent for higher voltage systems, are acceptable.

2. The Contractor shall provide all instruments and accessories required to perform the checks. Volt meters shall be accurate within 1% and shall have scales permitting the voltage readings to be made on the upper half of the scale.

3.7 CONNECTIONS TO NEW MANHOLES

Construct concrete-encased duct lines connecting to underground structures to have a flared section adjacent to the manhole to provide shear strength. Construct underground structures to provide for keying the concrete encasement of the duct line into the wall of the structure. Use vibrators when this portion of the encasement is poured to ensure a seal between the encasement and the wall of the structure.

3.8 CONNECTIONS TO EXISTING MANHOLES

For duct line connections to existing structures, break the structure wall out to the dimensions required and preserve steel in the structure wall. Cut steel and bend out to tie into the reinforcing of the duct line encasement. Chip out the structure wall to form a key for the duct line encasement.

END OF SECTION 26 40 00

SECTION 26 50 00 – LIGHTING

PART 1 – GENERAL

1.1 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.

1.2 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.

1.3 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.

1.4 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

2.1 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 the substitution provisions of Sections 002600 and 260500.

2.2 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.

2.3 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.

2.4 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.

2.5 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.

2.5 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

3.1 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.

3.2 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.

3.3 ADJUSTMENT AND CLEANING:

A. Clean interior lighting fixtures of dirt and debris. Clean and remove smudges from lenses and refractors.

B. Protect installed fixtures from damage during remainder of construction period.

END OF SECTION 26 50 00

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SECTION 26 56 68 SPORTS FIELD LIGHTING

PART I - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the bid documents, including general and supplementary conditions apply to this section.

1.02 DESCRIPTION OF WORK

A. The Sports Lighting section includes:
1. Galvanized steel pole and luminaire mounting crossarms
2. LED Luminaires, with appropriate glare/spill light control
3. Remote driver enclosure
4. Pole Foundations
5. Control System

B. The purpose of this specification is to define the performance standards, product values and features, required manufacturer's service responsibilities, and designstandards for Parlier Unified School District High School Ballfields in Parlier, CA.

1.03 SUBMITTALS

A. It has been predetermined that these project specifications are the minimum acceptable criteria for this project. Musco Sports Lighting LLC, Total Light Control – TLC for LED™ technology is the only pre-approved equipment supplier.

B. Manufacturers requesting approval shall provide submittal information as per Section 1.03 D. Submittal information must be received 10 days prior to bid opening, approved manufacturers will be notified by addendum.

C. Submit each item in this article according to the conditions of the contract and specification section. Any deviations to the specification require the manufacturer to list and describe in detail such deviations. Failure to provide this information shall be grounds for immediate rejection.

D. Submittal information required:

1. Light scans as per Section 1.04 of the specification.
2. Spill scans as per Section 1.05 of the specification.
3. Detailed warranty information as per Section 3.01 of the specification.
4. Detail foundation design as described in Section 2.01
5. Provide written information for the automated control system to include monitoring. Also provide examples of system reporting and access for numbers for personal contact to operate the system.
6. The manufacturer must submit evidence in the form of a letter from a California Licensed structural engineer that the manufacturer has the ability to confirm to the California Title 24 structural design requirements. The manufacturer must provide five (5) similar pole submittal project reviews approved by the California Division of State Architecture’s office in the past two (2) years. The examples are to include the D.S.A. file numbers.

7. Lighting Manufacturer will supply certified photometric reports from Independent Testing Lab (ITL) or a Certified Lab along with an aiming angle summary for verification.

1.04 SPORTS LIGHTING PERFORMANCE

A. Illumination Levels and Design Factors: The illumination levels specified shall be based on light levels for 25 years. Light levels shall not drop below specified targeted lighting levels during the specified warranty period. Appropriate light loss factors shall be applied and submitted for the basis of design. In addition to the table below, manufacturer shall ensure that bleachers, bullpens, batting cages, and concourse have adequate lighting per the lighting design plans.

Area of Lighting	Light Levels	Uniformity	# of Points	Size of Area	Grid Spacing
Football Field	50fc	2:1	96	353’ x 225’	30’ x 30’

1.05 SPILL AND GLARE ANALYSIS

A. Submitted spill/glare computer models shall depict the field test stations at 150’ from the field line. The test stations shall be shown every 30’ along the line with the field lights on.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Pole Structural Steel

1. The pole shafts shall be high strength low alloy tapered tubular steel that is equal to current ASTM A595 standards, with galvanized coating inside and out. All connections of pole sections shall be by slip fitting the top section over the lower section by a length of at least 1.5 times the diameters.

2. Steel components of the poles shall be hot dip galvanized t current ASTM A-123. Steel portions of the pole shall be constructed such that all segments of the pole can be readily heated to like temperatures in commercially available galvanizing methods.

3. To avoid problems of galvanize adherence to differing steel alloys, all steel components used for the pole must be of the same type steel.

4. All exposed steel components of the pole shall be at least 18" above the surface of the ground to avoid exposure of the steel to the heavily moisture and oxygen laden air, both above and below the surface. There shall be a cap to cover the top of the pole so that rain will not enter the interior of the pole.

5. To avoid stress corrosion of the pole, there shall be no weld points of the steel portion of the pole within 18" of the ground. The pole shall be galvanized steel.

6. The poles for this project have been designed to withstand winds based upon CBC-C standards. The premise of the wind speed criteria will be the 50 year mean recurrent isotach wind map. Applicable gust factors to be applied per code.

B. Foundation Design

1. The Manufacturer shall provide a stamped foundation design, prepared by a Structural Engineer, licensed in the State of California.

2. The foundation design shall be based upon recommendations contained in the Geotechnical Report furnished by the Owner. If a Geotechnical Report is not provided by the Owner, the foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by the 2025 CBC Table 1806A.2.

3. It is the contractor's responsibility to notify the owner of soil conditions other than the design criteria. The owner shall then be responsible and absorb the additional costs associated with: Providing engineered foundation embedment design by a registered engineer in the State of California for soils other than specified soil conditions. Additional materials required to achieve alternate foundation. No direct burial steel poles allowed.

4. Lightning Protection: Manufacturer shall provide integrated lightning grounding via concrete encased electrode grounding system as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A. If grounding is not integrated into the structure, the Manufacturer shall supply grounding electrodes, copper down conductors and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be not less than 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.

C. LED Sports Lighting Fixtures:

The lens is permanently sealed to keep optics away from harmful environmental elements. Fixture is vented and filtered to adapt to environmental elements. Heat sink with a unique convective air cooling design with high thermal conductivity and corrosion resistant construction. Machine mounted surface for maximum heat transfer of diode assembly and maintains low LED junction temperature during high wattage operation. Custom high power diode package with a metal core printed circuit board. The light control visors are factory aimed. Controls and directs more light onto the field which reduced glare and spill and enhances the on-field playability. Fixture is powder coated gray.

D. Remote Electrical Enclosure:

Remote drivers and supporting electrical equipment shall be mounted approximately 10 feet above grade in aluminum enclosures. Drivers are remote for ease of installation and servicing. The enclosures shall be touch-safe and include drivers and fusing with

indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure.

E. Wire Harness: Spiral wound, abrasion protection sleeve, strain relief, plug-in connections

F. Energy Consumption: The average kWh consumption for the entire facility shall not exceed 10.32kW for the lighting system.

G. Controls and Monitoring System:

1. Factory assembled lighting control cabinet (LCC) – The LCC shall be assembled and wired by a UL listed panel builder. The LCC shall contain Contactors, Monitoring and Control System and door mounted Manual off-on-auto selector switches. The LCC shall arrive at the job site ready to attach to an existing wall, switchgear, or a free standing enclosure.

    a. Control Wire Terminations - The Control Wire Terminationsshall include UL listed terminal blocks mounted on a DIN rail and 250 volt, 16 amp, touch safe type fuse holders.

    b. The ECE shall be constructed of aluminum and shall be powder coated gray. The cabinet door shall utilize a lockable, 3 point latching assembly that provides a NEMA 4 rated seal.

    c. Contactor Modules – Contactors shall be UL listed for lighting applications. They shall be rated at full capacity, be electrically held, utilize a 120 volt coil and be rated for operation in a ambient temperature range from -40 degrees C to +70 degrees C.

    d. Manual off-on-auto Selector Switches – For on site manual control, three position selector switches shall be factory mounted to the ECE door. The switches shall be keyed and maintain position, with make before break contacts. The switches shall be factory wired to control terminal blocks.

    e. Warranty – The LCC shall be covered under the standard warranty for the accompanying lighting equipment.

2. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The manufacturer shall notify the owner of outages within 24 hours, or the next business day. The controller shall determine switch position (manual or auto) and contactor status (open or closed). The Monitoring System shall be factory wired to control terminal blocks.

3. Remote Lighting Control System: The Lighting Control System shall allow owners and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs. The Light Control System shall be factory wired to control terminal blocks.

PART 3 – EXECUTION

3.01 WARRANTY

A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering materials and labor for the entire system for 25 years from the date of shipment. Warranty shall specify light levels, system energy consumption, monitoring, maintenance and control services, spill light control, and structural integrity. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers.

3.02 FIELD TECHNICIAN

A. Manufacturer shall have available a local factory trained technician to provide project support including but not limited to: Lamp replacement, confirm luminaire, aiming points, troubleshoot, and educate customer maintenance personnel.

END OF SECTION – 26 56 68

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 for Data and VoIP Telephone.

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. 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 271000.

B. Contractor Qualifications

Contractors will submit the necessary documentation to demonstrate their compliance with Section 271000.

C. Quality Assurance

Contractor shall comply with all requirements as specified in Section 271000.

D. Warranty

1. Contractor shall comply with all requirements as specified in Section 271000. 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 in conformance with the Districts standards and acceptance 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 and 6A Keystone Jack

- Jacks must exceed the Category 6 and 6A 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 6A 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 theT568B wiring scheme.
- Verify Color:

C. Wall Mount 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 Verify
- Quantity: Contractor will provide and install one single gang faceplate for each outlet shown on the drawings.

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.

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 and 6A 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 6A
- Color: Verify

2.3 TELECOMMUNICATION IDF

The Telecommunication Room (TR) includes those products that terminate horizontal and backbone cabling subsystems and connect then 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 and 6A 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)

B. Horizontal Cable Termination Equipment

1. Copper Termination Equipment

a) Data Category 6 and 6A 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.

2.4 FIBER OPTIC CABLE

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).

- Fiber Optic Backbone Cabling

A. Fiber Optic Backbone Cabling

1. Data System Backbone Cabling
   - Cable shall be UL/cUL OFNR/OFN FTA rated and be Flame Resistant in accordance with the UL 1666.
   - Cable shall an OSP.
   - Cable shall be constructed utilizing a loose tube design.
   - Cable will be fully water blocked combining overall water blocking tape and a moisture blocking gel for each individual tube.

- Cable will maintain the following:
  - Crush Resistance (EIA-455-41) = 2000 N/cm
  - Impact Resistance (EIA-455-25) = 2000 Impacts w/1.6 N-m
  - Min Bend Radius:
    Long Term - No Load = 15x Cable
    diameter Short Term – Load = 20x Cable
    diameter
  - Operating Temp. = -40°C to +70°C
  - Storage Temp. = -40°C to +80°C
- Cable shall be constructed of 50/125µ Laser Optimized rated glass capable of:
  1 Gigabit Ethernet Link at 1000m/600m
  (@850nm/1300nm) 10 Gigabit Ethernet Link at
  300m/300m (@850nm/1300nm)
- The Fiber Optic Cable in this specification is manufactured by Berk-Tek

B. 12 Strand Single Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# OPR012AB0403

2.5 IDF CABINET

A. 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

C. **Contractor will provide an additional set of mounting rails for each wall mount cabinet, equal to Chatsworth Products PN# 12787-5xx.*

D. Wall/Floor Mount Cabinet

E. 33U Cabinet equal to Chatsworth Products, PN# 13495-760 40U Cabinet equal to Chatsworth Products, PN# 13495-772

F. **Contractor will provide an additional set of mounting rails for each wall mount cabinet, equal to Chatsworth Products PN# 13276-7xx.*

G. Fan Kit/Filter Kit

H. Equal to Chatsworth Products Fan Kit, PN# 12804-701 Equal to Chatsworth Products Filter Kit, PN# 12805-701 Grounding Kit

I. Equal to Chatsworth Products, PN# 10610-019
Power Strip with Surge Suppression

J. Leviton 5500-192

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.

3.2 IDENTIFICATION AND LABELING

A. The labeling scheme for CAT6A 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.

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 6A 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.

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 27 10 00

SECTION 27 51 13 PAGING SYSTEMS

PART 1 – GENERAL

1.1 RELATED SECTIONS

A. Section 26 05 00 – Common Work Results for Electrical

B. Section 27 10 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. 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. Ceiling Mount: Atlas Sound #IP-SM speaker and #IP-STBE (flush mount) enclosure or IP-SEA-SD (surface mount) enclosure

B. Wall Mount: Atlas Sound #IP-SM speaker and #IP-FEST-SD (flush mount) or #IP-SEA-SD (surface mount) enclosure

C. Exterior Vandal Resistant Speaker: Atlas Sound #IP-HVP speaker and #IP-FEST-IH (flush mount) or #IP-SEST-IH (surface mount) enclosure

2.4 IP SPEAKER / CLOCKS

A. Wall Mount: Atlas Sound #IP-SDM speaker/clock and #IP-FEST-SD (flush mount) or #IP-SEST-IH (surface mount) enclosure

2.5 IP CLOCKS

A. Wall Mount: Atlas Sound #IP-DM clock and #IP-FEC-DM (flush mount) or #IP-SEC-DM (surface mount) enclosure

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. All new speaker, clock, and speaker/clock installations shall be flush mounted in walls and ceilings. Where an existing paging and clock system is being replaced, surface mounted speakers shall be acceptable at walls and gypsum board ceilings, but flush mounting is still required at T-bar ceilings.

C. 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.

D. Install SA-Announce software on a server designated by the district and configure per specifications and owner direction for bell schedule.

E. 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 27 51 13

SECTION 28 31 00 FIRE DETECTION AND ALARM

PART 1 – GENERAL

1.1 RELATED SECTIONS

A. Section 26 05 00 – Common Work Results for Electrical

B. Section 27 10 00 – Data Communications

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 72 – National Fire Alarm Code.
   7. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems.
   8. NFPA 101 – Life Safety Code.
   9. NFPA 750 – Standard on Water Mist Fire Protection Systems.
   10. 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 Node Communications:
      a. Communicated between panels on 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. Reside in remote panels with associated audio zones.
      b. SLC modules shall operate in peer-to-peer fashion with all other panels in system.
      c. 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.
      d. Limit the number of devices to 80% of the maximum allowed of each type on SLC circuits.
   8. Notification Appliance Circuits (NAC), and Control Equipment:
      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. 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.
12. 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. Refer to drawings for equipment manufacturer.

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: 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.
6. Wiring: Terminated on removable terminal blocks to allow field servicing of modules without disrupting system wiring.

C. Power Supply Module (PM-9): Use latest technologies to provide power to the Control Panel and incorporate the following features:
   1. Power-saving switching technology using no step-down transformers.
   2. 9-amp continuous-rated output to supply up to all power necessary under normal and emergency conditions.
   3. Integral battery charger with capacity to charge up to 55 amp-hour batteries while under full load.

D. Batteries:

   1. Sufficient capacity to provide power for entire system upon loss of normal AC power for a period of 24 hours with 15 minutes of alarm signaling at end of this 24-hour period, as required by NFPA 72, Local Systems.

E. LCD Display Module (LCD-E3):
   1. LCD Display: 80-character RS-485 based textual annunciator with capability of being mounted locally or remotely. Provides audible and visual annunciation of all alarms and trouble signals. Provide dedicated LEDs for:
      a. AC Power On: Green.
      b. Alarm: Red.
      c. Supervisory: Yellow.
      d. System Trouble: Yellow.
      e. Power Fault: Yellow.
      f. Ground Fault: Yellow.
      g. System Silenced: Yellow.
   2. 80-Character Alphanumeric Display: Provide status of all analog/addressable sensors, monitor and control modules. Display shall be liquid crystal type (LCD), clearly visible in dark and under all light conditions.
   3. Panel shall contain 4 functional keys:
      a. Alarm Acknowledge.
      b. Trouble Acknowledge.
      c. Signal Silence.
      d. System Reset/Lamp Test.
   4. Panel shall contain 3 configuration buttons:
      a. Menu/Back.
      b. Back Space/Edit.
      c. OK/Enter.
   5. Panel shall have 12-key telephone-style keypad to permit selection of functions.

F. Intelligent Loop Interface (ILI-MB-E3): System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. Intelligent Loop Interface shall be capable of mounting in stand-alone enclosure as specified.
   1. Field Programmable: System shall be capable of being programmed by Field Configuration Program (FCP), allowing programming to be downloaded via portable computer from any node on network.
   2. RS-232C Serial Output: Supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept downloaded program from portable computer, or provide 80-column readout of all alarms, troubles, location descriptions, time, and date. Communication shall be standard ASCII code operating from 1,200 to 115,200 baud rate.
   3. RS-485 Serial Output: Each ILI-MB-E3 shall incorporate RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet. Each ILI-MB-E3's RS-485 bus shall support up to 16 ASM-16 auxiliary switch modules, 6 LCD-E3 main annunciators, and 5 LCD-7100 annunciators.

4. Peer-to-Peer Panel Configuration: All Loop Interface Modules shall incorporate own programming, log functions, Central Processor Unit, and control-by-event (CBE) programming. If any loop driver becomes disabled, each remaining loop driver shall continue to communicate with remainder of network and maintain normal operation.
5. Control-by-Event (CBE) Program: ILI-MB-E3 shall be capable of programming using Boolean logic including AND, OR, NOT, and TIMING functions to provide complete programming flexibility.
6. Alarm Verification: Smoke detector alarm verification shall be standard option while allowing other devices such as manual stations and sprinkler flow to create immediate alarm. This feature shall be selectable for smoke sensors that are installed in environments prone to nuisance or unwanted alarms.
7. Alarm Signals: All alarm signals shall be automatically latched or “locked in” at control panel until operated device is returned to normal and control panel is manually reset. When used for sprinkler flow, “SIGNAL SILENCE” switch may be bypassed, if required by AHJ.
8. Electrically Supervised:
    a. Each SLC and NAC circuit shall be electrically supervised for opens, shorts, and ground faults. Occurrence of fault shall activate system trouble circuitry, but shall not interfere with proper operation of other circuits.
    b. Yellow “SYSTEM TROUBLE” LEDs shall light and system audible sounder shall steadily sound when trouble is detected in system. Failure of power, open or short circuits on SLC or NAC circuits, disarrangement in system wiring, failure of microprocessor or any identification module, or system ground faults shall activate this trouble circuit. Trouble signal shall be acknowledged by operating “TROUBLE ACKNOWLEDGE” switch. This shall silence sounder. If subsequent trouble conditions occur, trouble circuitry shall resound. During alarm, all trouble signals shall be suppressed with exception of lighting yellow “SYSTEM TROUBLE” LEDs.
9. Drift Compensation – Analog Smoke Sensors: System software shall automatically adjust each analog smoke sensor approximately once each week for changes in sensitivity due to effects of component aging or environment, including dust. Each sensor shall maintain its actual sensitivity under adverse conditions to respond to alarm conditions while ignoring factors which generally contribute to nuisance alarms. System trouble circuitry shall activate, display units that requires maintenance.
10. Analog Smoke Sensor Test: System software shall automatically test each analog smoke sensor a minimum of 3 times daily. Test shall be recognized functional test of each photocell (analog photoelectric sensors) and ionization chamber (analog ionization sensors) as required annually by NFPA 72. Failure of sensor shall activate system trouble circuitry, display “Test Failed” indication, and identify individual device that failed.
11. Off-Premises Connection:
    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 PRINTERS

A. Printers: Automatic type, printing code, time, date, location, category, and condition.
1. Provide hard-copy printout of all changes in status of system and time-stamp such printouts with current time-of-day and date.
2. Standard carriage with 80 characters per line.
3. Use standard pin-feed paper.
4. Enclose in separate enclosure suitable for placement on desktop or table.
5. Communicate with control using interface complying with EIA-232-D.

6. Power: 120 VAC at 60 Hz.

2.5 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

2.6 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. Speakers:
1. Operate on 24 VDC or with field-selectable outputs.
2. Refer to Drawings.

W. Strobes:
1. Compliance: ADA and UL 1971.
2. Maximum Pulse Duration: 0.2 second.
3. Strobe Intensity: UL 1971.
4. Flash Rate: UL 1971.
5. Strobe Candela Rating: Determine by positioning selector switch on back of device.

X. Speaker/Strobes:
1. Operate on 24 VDC
2. Refer to drawings

2.7 WIRING

A. Conduit:
1. EMT: Allied Tube & Conduit "Fire Alarm Red" steel EMT conduit, or equivalent.
2. Others: Where fire alarm raceway is not buried underground, it shall be painted red.

B. Cables & Conductors:
   1. Optical Fiber 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)
   3. Voice Evacuation Speaker Cable: Refer to drawings

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, California Electrical Code, 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 may be 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 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 28 31 00

SECTION 28 55 00 EMERGENCY RESPONDER RADIO COVERAGE SURVEY

PART 1 – GENERAL

1.1 SUMMARY

A. The purpose of this specification is to establish the requirements and standards for initial survey for public safety radio signal strength per NFPA and IFC

B. Survey should be performed after the building is substantially completed, and prior to start of installation of electrical wiring.

C. Conduct a survey using an RF Spectrum Analyzer, a calibrated, system-compatible radio or another suitable instrument with traceable certificate of calibration to analyze the RF signal strength of the Emergency Responder Radio Signal into the building and determine if amplification of the signal is required. Both inbound and outbound signal strength shall be determined, measured, calculated, and documented as required by code.

1.2 SURVEY CRITERIA IF REQUIRED

A. The required Public Safety Radio Signal Level inside the Owner's facility must be determined per code, ordinance or AHJ.

B. Survey shall be performed by an FCC licensed technician holding a current GROL license. Honeywell Fire have distributors that meet these requirements.

1.3 REGULATIONS

A. Codes, regulations, and standards referenced in the Section are:

1. NFPA 1 – The National Fire Code (including Annex O from 2009)
2. NFPA 70 – The National Electrical Code
3. IFC 510- Emergency Responder Radio Coverage
4. NFPA 101, Life Safety Code, the Ohio Building Code, and Local Code and Building Authority requirements.
5. NFPA 72 National Fire Alarm Code
6. FCC 47 CFR Private Land Mobile Radio
7. 90.219 Services-Use of Signal Boosters
8. ICC International Fire Code, Code and Commentary
9. Local or State Promulgated Fire Code
10. ADA "Americans with Disabilities Act"
11. FCC's OET 65 Standards "Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields"

12. FCC Rules Part 22, Part 90 and Part 101

13. NFPA 1221 2025 Edition

14. International Building Code 2025

15. UL 2524

1.4 DEFINITIONS

A. Definitions:

1. Bi-Directional Amplifier BDA: Device used to amplify band-selective or multi-band RF signals in the uplink, to the base station and in the downlink from the base station to subscriber devices for enhanced signals and improved coverage.

2. Emergency Responder Radio Coverage System: A two-way radio communication system installed to assure the effective operation of radio communications systems for fire, emergency medical services, or law enforcement agencies within a building or structure. A system used by firefighters, police, and other emergency services personnel.

3. FCC: Federal Communications Commission

4. OET 65 Standards: FCC's Bulletin 65 provides Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.

5. Public Safety/First Responder: Public Safety or First Responder agencies that are charged with the responsibility of responding to emergency situations. These include, but are not limited to law enforcement departments, fire departments, and emergency medical companies.

6. RSSI: Received signal strength indicator RSSI is a measurement of the power present in a received radio signal.

7. BER: Bit Error Rate is the number of bit errors per unit time

8. GROL- FCC General Radio Operators License

9. ERRCES- Emergency Responder Radio Coverage Enhancement System

10. DAS-Distributed Antenna System

1.5 EXECUTION

A. Testing Procedures

1. Minimum Signal Strength: For testing system signal strength and quality, the testing shall be based on the. -95dBm nominal signal at 100%.

2. Spectrum Analyzer or Calibrated Handheld Radio shall be used as basis for signal measurements or other method as approved by AHJ.

3. Testing should be based on a minimum of 20 grid locations per floor OR maximum of 1600 SQ ft. areas if the floor exceeds 32,000 Sq. Ft. Also, testing should include all critical areas per NFPA. See 1.02 of this specification and NFPA 72 2013 or NFPA 1221 2016. OR per any method determined by the AHJ, local code or ordinance.

4. A minimum signal strength of -95 dBm shall be provided throughout the coverage area for both uplink and downlink by the Local Fire Department.

    a. RSSI measurement only

1.6 SURVEY SUBMITTALS

A. Submit testing data for each level of the building.

1. An RF measurement drawing of each floor of the building which indicates relative RF field strength for each frequency band of interest must be submitted to the AHJ.

2. The drawing should clearly indicate the areas that have passed or failed based on the above parameters.

END OF SECTION 28 55 00

SECTION 31 11 00 SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY:

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

B. RELATED SECTIONS:
   1. Contract General Conditions and Division 1, General Requirements
   2. Section 312000 – Earthwork: Excavation, Filling, and Grading
   3. Section 312222 – Soil Materials
   4. Section 312333 – Trench Excavation and Backfill

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section GENERAL REQUIREMENTS, and the following:
      a. Materials and equipment used for this project shall comply with the current applicable regulations of the California Air Resources Board [CARB] and the Environmental Protection Agency [EPA].

B. Meetings:
   1. Minimum agenda shall be to discuss coordination of upcoming work, review the work progress, discuss field observations, identification of any potential problems which may impede planned progress; corrective measures to regain projected schedule; and maintenance of quality and work standards.
   2. Meetings shall include Pre-Clearing and Demolition Meetings.
   3. Participants (or designated representative of) invited to attend each of the above meetings shall be as follows:
      a. Contractor.
      b. Owner.
      c. Architect.
      d. Testing Laboratory.
      e. Local Governing Authorities as applicable.
      f. Utility Representatives as applicable.
      g. Owner’s Inspector.
      h. Clearing and Demolition Subcontractor.
      i. Other subcontractors, as appropriate (including any accessory subcontractors).

1.4 PROJECT CONDITIONS OR SITE CONDITIONS

A. Dust Control

1. Contractor shall comply with all requirements of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for construction activity related to this project.
2. A Dust Control Plan, as required by the SJVAPCD, may be required for this project. Contractor shall be responsible for preparing said Dust Control Plan, submitting to the SJVAPCD for review and approval, and paying all SJVAPCD review and permitting fees related to the Dust Control Plan.
3. No construction activity related to this project may begin until Contractor has secured an approved Dust Control Plan, if one is required.
4. Contractor shall be solely responsible to implement all requirements of the Dust Control Plan throughout the life of this contract.
5. Should fines or fees be levied against the Project for violations of the Dust Control Plan and/or related SJVAPCD regulations, Contractor shall be responsible to pay all said fines or fees and to implement all mitigation measures required by SJVAPCD in order to bring the construction activity into compliance with SJVAPCD regulations. The costs for any such fines or fees shall be included in the lump sum price bid for work under this contract and no additional payment will be made therefor.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives, walks or occupied facilities.
   a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and Authorities having jurisdiction.
   b. Provide alternate routes around closed or obstructed traffic ways if required by Authorities having jurisdiction.
3. Locate and identify utilities.
   a. Call a Local Utility Locator Service (USA – “Underground Service Alert” – [800] 227-2600) for the task of locating any applicable utilities in the area where the Project is located.
4. Carefully remove items indicated to be salvaged and store on Owner’s premises at the Owner’s direction.

PART 2 - PRODUCTS

(NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect and maintain all benchmarks and survey control points from disturbance during clearing and demolition operations.
2. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties.
3. Furnish and install temporary protection/barrier fencing surrounding the limits of demolition.

4. Protect trees, plant growth, and features not specifically designated for removal. Locate and clearly flag trees and vegetation to remain or to be relocated.
5. Protect existing improvements designated to remain from damage during construction.
    a. Restore damaged improvements to their original condition, as acceptable to the Owner.

3.2 CONSTRUCTION

A. Vegetation, Shrub, Topsoil, Weed Removal:
1. Remove weeds and rooted topsoil to a minimum four (4) inch depth and temporarily stockpile as needed for re-use in finished grading of landscape areas. Remove excess material from the site.
2. Where existing vegetation is to be replaced by new materials, remove contaminated or excess soil from the site and legally dispose of off-site.

B. Existing Site Improvements Removal:
1. Remove existing above and below grade improvements as necessary to facilitate new construction.
    a. Remove concrete slabs, sidewalk, curbs, mow strips, gutters, and fence post footings.
        1) Neatly saw-cut length of existing pavement to remain before removing existing pavement unless existing full-depth joints coincide with line of demolition. Saw-cut faces vertically.
    b. Remove indicated utility improvements within the limits of construction.
        1) Excavate for and disconnect utilities designated to be removed. Seal or cap off underground.
        2) Coordinate removal and/or relocation of utilities with the appropriate utility agencies.
    c. Where existing underground utilities, irrigation pipes, wells, leach fields, or underground tanks are encountered, they must be removed or moved to a point at least 5 feet horizontally outside the proposed building and 3 feet horizontally outside the concrete flatwork or pavement construction areas. All resultant cavities must be backfilled with engineered fill.
    d. Remove concrete slabs, foundations, and utilities within building footprint.

C. Existing Utilities to Remain or be Relocated:
1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
    a. Notify Architect and the Owner not less than seven (7) days in advance of proposed utility interruptions.
    b. Arrange to shut off indicated utilities with utility companies and Owner.

D. Disposal:
1. Legally dispose of all debris (surplus soil materials, unsuitable topsoil, obstructions, demolished materials, waste materials, trash, etc.) resulting from clearing, grubbing, demolition and from construction. Disposal of all materials shall be at a location secured by the Contractor off of the Owner’s property.

END OF SECTION 31 11 00

SECTION 31 20 00 EARTHWORK: EXCAVATION, FILLING AND GRADING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY:

A. This Section includes the following:
1. Excavating soil and other material for surface improvements.
2. Placing fill.
3. Compaction of existing ground and fill.
4. Preparation of subgrade for other improvements.
5. Grading of soil.

B. RELATED SECTIONS
1. Contract General Conditions and Division 1, General Requirements
2. Section 311100 – Site Clearing
3. Section 312222 – Soil Materials
4. Section 312333 – Trench Excavation and Backfill

1.3 REFERENCES

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18-inch (457 mm) Drop.

B. A Geotechnical Engineering Investigation Report has been prepared for the project by Certerra RMA GeoScience; Project No. 11-252521-0, dated January, 23, 2026, and revised January 26, 2026. A copy of the reports is available (for reference only) at the cost of reproduction. Contact Certerra RMA GeoScience if a copy of the report is desired.

1.4 DEFINITIONS

A. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.5 SUBMITTALS

A. Product Data:
1. Information indicating the source of all import material, the fill material type and where it is to be used, and approval of the District's Inspector of Record for incorporation of import material into the Work.

B. Material Test Reports:
1. Classification of Soils.
2. Compaction Characteristics of Soils.
3. Density and Unit Weight of Soils in Place.
4. Imported fill shall be tested and approved by the Owner’s Geotechnical Engineer prior to import to the site, including testing for compliance with Department of Toxic Substances Control (DTSC) guidelines. Said testing and certification documents shall be paid for by the Owner.

C. Project Closeout: In accordance with Specification Section PROJECT CLOSEOUT.
   1. Drawings indicating the extent and depth of all engineered fill, and overexcavation and recompaction. This information shall be a part of the Project "As-Built" and Project "Record" Documents in accordance with the Specification Section PROJECT DOCUMENTS.

1.6 QUALITY ASSURANCE

A. Installer:
   1. Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project within the past 5 years.

B. Regulatory Requirements:
   1. In accordance with Specification Section REGULATORY REQUIREMENTS and the following:
      a. CARB — Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board [CARB].
      b. CP — City of Parlier, Codes and Ordinances
      c. EPA — Environmental Protection Agency.
      d. CAL/OSHA — Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.
      e. DTSC — Comply with all recommendations of the California Department of Toxic Substance Control (DTSC) regarding soil testing for potential contaminants.

C. Certificates:
   1. Installer's certification that all Earthwork installation meets or exceeds the requirements of this specification.
   2. Contractor's certification (on Contractor's letterhead paper) that the Earthwork materials and installation meets or exceeds the requirements of this specification.

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

1.7 COORDINATION

A. Coordinate work with Owner's personnel.

B. Provide required notification to the Owner and Geotechnical Engineer or the Engineer of Record so that a representative from the Owner's Geotechnical Engineering consultant can be present for all excavation, filling and grading operations to test and observe earthwork construction.

C. Verify that the location of existing utilities has been indicated at work site by utility authorities, by Owner, and as specified on the Plans.

1.8 EXISTING CONDITIONS

A. Existing Conditions:
   1. Examine the site and verify conditions with the Drawings and Specifications. Contractor shall familiarize himself with existing site conditions and any changes that have occurred at the site since the preparation of the contract documents and shall be responsible to account for any such changes in the price bid for this work.
   2. Thoroughly investigate and verify conditions under which the Work is to be performed.
   3. Locate and identify utilities:
      a. Call a Local Utility Locator Service (USA - "Underground Service Alert" – [800] 227-2600) for the task of locating any applicable off-site and on-site utilities in the area where the Project is located.
   4. No allowance for Extra Work will be granted resulting from negligence or failure to meet requirements of this Section.

B. Where subsurface work involves more than the normal depth of excavation required for the removal and/or construction of surface improvements (surface improvements such as concrete flatwork, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to indicate on the plans the location of all main and trunk line utility facilities which may affect the Work. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. Under similar circumstance, service laterals and appurtenances will have also been shown where information was available as to their location. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

D. Determine exact location of existing buried utilities by:
   1. Marking on ground or pavement surface the alignment and extent of the facilities and the probable location of existing utilities using construction plans and existing surface features.
   2. Requesting Underground Service Alert (USA) to indicate location of existing buried facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days notice of request for locations and notify Owner of said request concurrently.
   3. Confirm exact location of existing utilities by hand methods of excavation, or by use of vacuum equipment.

E. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities along the route of the proposed work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or Owner's personnel.

F. Provide Field Engineering to record the location of all utilities encountered. Where locational conflicts exist between existing utilities and the planned location of facilities to be constructed under this Contract, submit detailed information to the Engineer for review and direction.

G. Maintain all existing utility mains and service lines in constant service during construction of the Work.

H. Where service disruptions are allowed, minimize the length of such disruptions by proper scheduling and diligent pursuit of the work, and coordinate the timing of any such disruptions in advance with the District.

I. Existing soils are considered to have no corrosive potential to buried metal objects.

J. Existing soils are considered to have a low expansion potential.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
   1. All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover.
   2. All land clearing, demolition, grubbing, scraping, excavation, land leveling, grading, and cut and fill activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by pre-soaking.
   3. When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions or at least six inches of freeboard space from the top of the container shall be maintained.
   4. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. The use of blower devices is expressly forbidden.
   5. Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/ suppressant.
      a. Contractor shall comply with all requirements of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for construction activity related to this project.
      b. A Dust Control Plan, as required by the SJVAPCD, may be required for this project. If required, Contractor shall be responsible for preparing said Dust Control Plan, submitting to the SJVAPCD for review and approval, and paying all SJVAPCD review and permitting fees related to the Dust Control Plan.
      c. If a dust control plan is required, no construction activity related to this project may begin until Contractor has secured an approved Dust Control Plan.
      d. Contractor shall be solely responsible to implement all requirements of the Dust Control Plan throughout the life of this contract.
      e. Should fines or fees be levied against the Project for violations of the Dust Control Plan and/or related SJVAPCD regulations, Contractor shall be responsible to pay all said fines or fees and to implement all mitigation measures required by SJVAPCD in order to bring the construction activity into compliance with SJVAPCD regulations. The costs for any such fines or fees shall be included in the lump sum price bid for work under this contract and no additional payment will be made therefore

B. Burning: No burning will be allowed on-site.

C. Rain: Work under this section shall not be started or maintained under threat of rain, unless the work is not affected by the rain.

D. Do not place fill during weather conditions which will alter moisture content of fill materials sufficiently to make compaction to the specified densities difficult or impossible.

E. When reference is made to SWPPP (Storm Water Pollution Prevention Plan), if any within this Project Manual, then comply with all environmental protection requirements included therein.

F. In accordance with EPA, CARB and CP.

G. Protection:
1. Protect cut and fill areas to prevent water running into excavation. Maintain areas free of water. Remove seeping water immediately by pumps. Provide dewatering as necessary.
2. Protect cut slopes from erosion due to precipitation and other sources of runoff.
3. Protect utilities to remain within the construction area and special construction. If utility lines are uncovered (water, electric, sewer, etc.) not shown on the drawings during excavation of site, notify the Architect promptly for its review and action.
4. Do not permit access to undeveloped portions of the site, nor to areas that are outside of the limits of grading.

H. Before being brought onto the site, all import soil must be sampled, tested and approved by Owner's Geotechnical Engineer. All import material must comply with DTSC recommendations and guidelines for environmentally clean soil suitable for school construction. Import testing will be provided and paid for by the Owner.

1.10 PROJECT RECORD DOCUMENTS

A. Submit under provisions of GENERAL CONDITIONS and DIVISION 1, GENERAL REQUIREMENTS.

B. Accurately record actual locations of utilities encountered including depth and horizontal location, as measured from permanent site features.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill in Turf or Other Planting Areas: Type S2 or S3 per Division 31 Specification Section SOIL MATERIALS.

B. Fill in Non-planting Areas: Type S1, S2 or S4 per Division 31 Specification Section SOIL MATERIALS.

C. Imported material: Type S3, S4 or S5 per Division 31 Specification Section SOIL MATERIALS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

3.2 PREPARATION

A. Layout of Work:
1. Contractor shall be responsible for all lines and grades. Layout shall be provided by a California registered Land Surveyor or Civil Engineer, at Contractor's expense.

2. Check all benchmarks, monuments and property lines and verify locations.
3. Locate and maintain all grade stakes.
4. Monuments moved or displaced during grading operation are to be replaced by a California Registered Civil Engineer or Surveyor, at Contractor's expense.

B. Locate, identify, and protect existing above and below grade utilities from damage.

C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

D. Protect existing structures, fences, curbs, sidewalks, paving and other improvements to remain from damage from excavation equipment and vehicular traffic.

E. Employ equipment and methods appropriate to the work site.

F. Protect excavated areas from drainage inflow and provide for drainage of all excavated areas.

G. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

3.3 SITE STRIPPING:

A. Reference is made to Division 31 Specification Section SITE CLEARING.

B. Within the areas of planned surface improvements and structures, the near surface soils containing vegetation, roots, organics, or other objectionable material must be stripped and removed from the site. Upon approval of the Geotechnical Engineer, suitable materials stripped from the site may stockpiled and incorporated into the finish fill for planting areas.

C. All areas to receive surface improvements shall be stripped to remove turf, shrubs, trees and other vegetation, along with associated root systems, concrete, wood, metal, rubbish and other unsuitable debris, and any loose, saturated or unconsolidated soil material. Minimum stripping depth is expected to be 4-inches below existing site grades. Stripping shall continue to the depth required to expose acceptable basement soils that are free from deleterious which are not suitable for Engineered Fill, as required by the Geotechnical Engineer.

3.4 EXCAVATION

A. Following clearing and stripping operations, excavate planned construction areas as specified in this Section.

B. Within the area of the planned building improvements plus at least 5 feet horizontally beyond the perimeter of these improvements, must be over-excavated and replaced as compacted fill at least 24 inches below the stripped subgrade or 12 inches below the of footings, whichever is deeper.

C. Areas of exterior concrete slabs on grade located outside the building pad over-excavation limits, should be prepared by scarification of the upper 12-inches below existing grade or 12-inches below the bottom of the recommended aggregate base section, whichever is greater. The zone of subgrade preparation should extend a minimum of 3 feet beyond these improvements.

D. Areas of asphalt concrete improvements should be prepared by scarification of the upper 12-inches below existing grade or 12-inches below the recommended base section, whichever is greater.

E. Provide additional excavation as required to conform to the lines, grades and cross-sections shown on the plans.

F. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw. Remove all roots ¼" in diameter and greater.

G. Remove excess soil not to be used as fill in the Work from the site. Unless requested by Owner to be deposited at a site designated by Owner on the property, obtain a disposal site and legally dispose of said excess material, all at no additional cost to the Owner.

H. Areas disturbed by demolition must be excavated to expose undisturbed soils.

I. Excavated soils free of deleterious substances (organic matter, demolition debris, tree roots, etc.) and with less than 2% organic content by weight, may be returned to the excavations as Engineered Fill.

3.5 FILLING AND COMPACTING

A. Once clearing, stripping and over-excavation operations are complete, scarify the surface to receive fill material or improvements to a depth of 12-inches, moisture condition to at least 2% above optimum moisture content, and compact to a minimum of 90% of maximum dry density (relative compaction) based on ASTM Test Method 1557. Beneath asphalt pavement and concrete pavement subject to vehicular traffic material shall be compacted to a minimum of 95%.

B. Place and compact soil to finish subgrade of improvements to be placed thereon, or to finished surface grade where no improvements are to be placed thereon.

C. All fill required shall be placed as Engineered Fill.

D. The Contractor shall be solely responsible for securing an acceptable source of import material as required to grade the site. Reference is made to 31 20 00 1.9.H

E. On-site soils are suitable for re-use as Engineered Fill, providing they are cleansed of excessive organics (less than 2 percent by weight, ASTM D2974), debris, and fragments larger than three (3) inches in maximum dimension and meet the requirements of soil Type S4, Division 31 Specification Section SOIL MATERIALS.

F. Engineered Fill shall be moisture conditioned to at least 2% above optimum moisture, placed in uncompacted layers not exceeding six (6) inches in thickness, and compacted as specified, based on ASTM Test Method D1557.
   1. Non-vegetative surface improvement areas (structures and site concrete improvements)- To a minimum of 90% of maximum dry density (relative compaction).
   2. Vegetative surface improvement areas (turf and planters)- Below top twelve (12) inches - to a minimum of 90% of maximum dry density (relative compaction). Top twelve (12) inches - 85% of maximum dry density (relative compaction).
   3. Asphalt Pavement and Concrete Pavement areas: to a minimum 95% of maximum dry density (relative compaction) in top twelve (12) inches.

G. Maintain optimum moisture content of fill materials to attain required compaction density.

H. Additional lifts shall not be placed if the previous lift did not meet the required dry density (relative compaction), or if soil conditions are not stable.

I. Conform fill to the lines, grades and cross-sections shown on the plans.

J. Fill materials to conform to Division 31 Specification Section SOIL MATERIALS.

K. Provide, at no additional cost to Owner, imported soil material conforming to the requirements of Division 31 Specification Section SOIL MATERIALS, as needed to attain finished grades of Work.

L. Utilize equipment which will not disturb or damage existing utilities and other improvements.

3.6 PREPARATION OF SUBGRADE FOR SURFACE IMPROVEMENTS

A. Where concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvements, or a layer of said surface improvements, are to be constructed on the soil surface, prepare the subgrade for said improvements in accordance with this section.

B. Scarify the soil as specified and remove and dispose of (off the project site) all rocks, hardpan chunks or otherwise unsuitable material over 3-inches in size.

C. Thoroughly moisture condition and compact as described above.

D. Prior to commencing construction of surface improvements, pass a test roller of size and weight as approved by the Owner over the subgrade to establish the extent of soft or spongy areas requiring repairs.

E. Conform finished subgrade surface to the lines, grades and cross-sections shown on the plans.

3.7 FINE GRADING

A. Fine grade all finished surfaces to the lines, grades and cross-sections shown on the plans, and to blend to hard surface improvements.

B. Rake and smooth all finished surfaces not to receive hard surface improvements.

C. Use suitable stockpiled or imported topsoil for the top 12-inches of areas to receive landscape improvements.

D. Import topsoil meeting the requirements of Division 31 Specification Section SOIL MATERIALS, as required to complete finish grading.

E. Topsoil may not be used in areas requiring Engineered Fill.

3.8 TOLERANCES

A. Top surface of Subgrade for Non-Vegetative Surface Improvements or Layers thereof: Plus or minus 0.02 foot from planned elevation.

B. Top surface of Subgrade for Vegetative Surface Improvements or for Bare Ground - Plus or minus 0.05 foot of planned elevation, or as required for finish surface to match adjacent improvements or ground.

3.9 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of GENERAL CONDITIONS and/or DIVISION 1, GENERAL REQUIREMENTS.

B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.

C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest.

D. All retesting required as a result of failure of initial test will be performed by Owner's testing agency, at the expense of the Contractor.

3.10 PROTECTION

A. Protect graded areas from traffic, freezing, erosion, and all other sources of damage. Keep free of debris and trash.

B. Repair and re-establish grades to specified tolerances where completed or partially completed work becomes eroded, rutted, settled, or where it is damaged by subsequent construction operations or weather.

C. Where settlement occurs prior to acceptance of the work, remove and replace surface improvements, excavate, replace, and re-compact in accordance with these specifications, and restore the surface improvements.

3.11 CLEANING

A. Remove all surplus or unsatisfactory soil material, trash, and debris, and legally dispose of off of the Owner's property.

END OF SECTION 31 20 00

SECTION 31 22 00.1 PLAYING FIELD GRADING

PART 1 – GENERAL

1.1 WORK SPECIFIED HEREIN

A. The Playing Field Contractor (hereby described as the Prime Contractor) shall provide all the necessary skilled labor, materials, fuel, specialized equipment, and services necessary to complete the playing field preparation, grading, and related items as indicated or specified.

B. The Prime Contractor shall obtain a copy of the final geotechnical report and topographic surveys. The Prime Contractor is responsible for reviewing and preparing any RFI's relating to the grading operations.

C. Refer to Section 32 25 42 - Synthetic Turf Playing Field System for additional Quality Assurance and Quality Control requirements.

1.2 FINISHED GRADE

A. "Finished Grade" as used herein, refers to the required final grade elevations indicated on the final contract playing field surface grading plan.

B. Unless otherwise indicated, provide uniform slopes between points for which finished grades are indicated or between such points and existing established grades.

1.3 PROJECT CONDITIONS

A. Existing Conditions: The Prime Contractor shall verify all existing conditions before starting work. All grading operations must be performed based on the proposed contours and slopes that have been shown on the playing field surface grading plans. Additional earthwork and grading will be required as part of this contract. The Prime Contractor shall request and review the final geotechnical report relating to grading fill material requirements. If applicable.

B. PROTECTION

1. Do not interfere with the use of adjacent buildings. Maintain free and safe passage to and from adjacent buildings and maintenance areas.

2. Prevent movement or settlement of structures. Provide bracing or shoring. Be responsible for the site safety and support of structures. Assume liability for building movement, settlement, damage, or injury.

3. Cease operations and notify the Field Designer, Architect and the Parlier Unified School District Project Manager immediately if the safety of structures or sports lighting appears to be endangered. Take precautions to properly support structures. Resume operations only after safety is restored.

4. Provide, and maintain all protective barricades, lighting, and guardrails required by an applicable regulatory advisory to protect passersby, workers, and building occupants.

1.4 QUALITY CONTROL

A. After completion of each of the grading operations for the playing field subgrade, drainage collection system, drainage gravel aggregate layer, finished topping stone aggregate layer, and final playing field surface grading with infill product the Prime Contractor shall provide a topographic survey to verify the proposed grades have been met. These surveys must be

signed and sealed by a licensed surveyor in the State of California and shall consist of a 25' grid (Refer to Part 2, 2.5 for grading tolerances) over the entirety playing field area and be submitted to the Field Designer, Architect, and the Parlier Unified School District Project Manager and the for review and approval prior to the commencement with the next layer of playing field construction. The Prime Contractor is fully responsible for all the necessary costs associated with the signed and sealed land surveying as-builts.

PART 2 – PRODUCTS

2.1 EXCESS OR UNSUITABLE MATERIAL

A. Excess or unsuitable material, broken asphaltic concrete, broken Portland cement concrete, pipes, etc., shall be removed and disposed of by the Prime Contractor in a legal manner. All materials shall be disposed of at an approved disposal site. The Prime Contractor shall, before the commencement of work, submit a letter to the Field Designer, Architect, and the Parlier Unified School District Project Manager stating the locations of the disposal sites for excess materials, and certifying that they have obtained the property owner's permission for disposal of surplus materials.

2.2 FILL MATERIAL

Imported soil material shall be sampled, tested, and approved by a Geotechnical Engineer licensed in the State of California at the Prime Contractor's expense.

A. Imported fill soils placed under the synthetic turf playing field shall be tested before acceptance of the subgrade by the Field Designer, Architect, and the Parlier Unified School District Project Manager. The Prime Contractor shall be responsible for all sample collections, shipping costs, and laboratory testing. The Prime Contractor must submit the name of the 3rd party certified independent testing laboratory for prior approval by the Field Designer, Architect, and the Parlier Unified School District Project Manager. The Prime Contractor is fully responsible for all the necessary costs associated with soil testing.

2.3 GRADE STAKES AND LINES

A. Grading, including sub grading and finished grading of un-surfaced, as well as natural turf areas, shall be controlled by such intermediate grade stakes and lines as may be necessary to obtain slopes and levels required by finished grade elevations shown on plans. Compacted subgrades and finished grade surfaces shall parallel and conform to control planes established by grade stakes and lines.

2.4 VERIFICATION OF QUANTITIES AND QUALITY

A. Quantities shown on grading plans and sections are for the Prime Contractor's convenience only, and grading shall be done in conformance with elevations shown on grading plans and in accordance with project written specifications. Discrepancies between such mentioned quantities and/or sections, and requirements of grading plans and/or specifications, would not entitle the Prime Contractor to additional compensation. The Prime Contractor shall obtain a copy of the final geotechnical report and coordinate with the Geotechnical Engineer relating to the quality of the suitable material to be placed under the synthetic turf playing field.

2.5 TOLERANCES

Required Grading tolerances are as follows:

A. Sub-Base Grading: The area below the 5" drainage gravel aggregate layer may vary within a tolerance of ½" in 10 feet (.04'), measured in all directions.

B. Drainage Gravel Layer Grading: The area below the 1" finished topping stone aggregate layer may vary within a tolerance of ½" in 10 feet (.04'), measured in all directions.

C. Finished Topping Stone Grading: The area below the synthetic turf may vary within a tolerance of ½" in 10 feet (.04'), measured in all directions. The synthetic turf manufacturer must submit a letter of acceptance of the surface planarity before the installation of the synthetic turf product.

D. Synthetic Turf and Infill Finished Grading: May vary within a tolerance of ¼" in 10 feet (.04'), measured in all directions.

E. It is critical to demonstrate that the uniform thickness of all gravel aggregates materials is fully maintained for each layer thickness based on the typical synthetic turf profile. Unless otherwise denoted.

PART 3 - EXECUTION

The Geotechnical Engineer shall test and inspect all earthwork operations including mass subgrade and backfill before proceeding with work.

3.1 EXCAVATION

A. Excavate areas shown on plans or as specified herein may include cutting for construction sub-grades, pipeline trenches, and turf areas.

B. Excavation shall be kept free from water until compacted fills and structures are complete to above water, safe from the uplift and horizontal water pressure and the backfill has been placed. De-watering equipment must be adequate to protect against flooding.

C. Excavated material not necessary, or suitable for fill construction, and shall be removed and disposed of by the Prime Contractor at no additional cost to the Parlier Unified School District.

3.2 SITE GRADING, COMPACTION, & BACKFILL

A. The existing soil shall be prepared in accordance with the final geotechnical engineering soils report.

B. The exposed subgrade surface shall be proof rolled to create a firm unyielding condition with relative compaction to 95% per ASTM D-1557, with a moisture content of optimum up to 3% above optimum.

C. Backfill and compact with suitable on-site or import non-expansive soil (PI of 20 or less) as required to secure the design subgrade elevations. All backfill materials shall be spread, moisture conditioned to optimum up to 3% above optimum, and compacted to relative compaction of 95% per ASTM D-1557.

D. All subsurface utility trench backfills, unless otherwise noted on the plans, shall be non-expansive (PI of 20 or less) and compacted to relative compaction of 95% per ASTM D-1557.

E. Subgrade surfaces shall be finished to uniform grades and slopes per the drawings, and in such a manner as to drain properly and be free of depressions, which may cause areas of standing water.

END OF SECTION - 31 22 00.1

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SECTION 31 22 22 SOIL MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY:

A. SECTION INCLUDES
   1. Excavated (and re-used) materials and imported materials.

1.3 RELATED SECTIONS:

A. Section 312000 - Earthwork: Excavation, Filling and Grading.
B. Section 312333 - Trench Excavation and Backfill.

1.4 SUBMITTALS

A. Samples: Submit, in air-tight containers, 10 lb. sample of Type S3, S4 and S5 fill to inspector.

B. Soil Analysis: Submit for Type S3, S4 and S5 soils to be imported.

C. Materials Source: Submit location of imported materials source. Provide materials from same source throughout the work. Change of source requires approval.

D. For imported soil, obtain Geotechnical Engineer and District approval prior to importing.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Soil Type S1: Excavated and re-used material, graded; free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.

B. Soil Type S2: Excavated and reused material, graded; free of roots, lumps greater than one inch, rocks larger than 1/2 inch, debris, weeds and foreign matter.

C. Soil Type S3: Imported topsoil, friable loam; reasonably free of roots, rocks larger than ½ inch, debris, weeds, and foreign matter.

D. Soil Type S4: Imported borrow, suitable for purposes intended, meeting the following characteristics:
   1. Maximum Particle Size: 3”
   2. Percent Passing 3/4” Sieve: 90-100
   3. Percent Passing #4 Sieve: 65-100
   4. Percent Passing #200 Sieve: 20-50
   5. Expansion Index: <20
   6. Plasticity Index: <10
   7. R-Value (in paved areas): >40
   8. Maximum Organic Content: 2% by weight

9. Low Corrosion Potential:
    a. Soluble Sulfates: <1,000 mg/Kg
    b. Soluble Chlorides: <500 mg/Kg
    c. Soil Resistivity: >2,000 ohm-cm
    d. pH: 6.0-8.5

E. Soil Type S5: Imported sand. Natural river or bank sand (sand equivalent greater than 30), washed; free of silt, clay, loam, friable or soluble materials, and organic matter.

2.2 SOURCE QUALITY CONTROL

A. Inspection of imported soil will be performed by the Geotechnical Engineer, at source of import and prior to being delivered to the site.

PART 3 - EXECUTION

3.1 STOCKPILING

A. Stockpile excavated or imported material onsite at location designated by project inspector.

B. Stockpile excavated or imported material in sufficient quantities to meet project schedule and requirements.

3.2 STOCKPILE CLEANUP

A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

B. Dispose of excess material off-site.

END OF SECTION 31 22 22

SECTION 31 23 33 TRENCH EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Geotechnical Report prepared by Certerra RMA GeoScience, Project No. 11-252521-0, dated January 26, 2026.

1.2 SUMMARY:

A. SECTION INCLUDES
1. Excavating trenches, holes and pits for constructing the Work.
2. Backfill and compaction.
3. Providing suitable bedding and backfill material, as specified herein.

B. RELATED SECTIONS
1. Contract General Conditions and Division 1, General Requirements.
2. Section 311100 - Site Clearing
3. Section 312000 - Earthwork: Excavation, Filling and Grading
4. Section 312222 - Soil Materials
5. Section 331200 - Water Utilities
6. Section 333000 - Site Sewer Systems
7. Section 334000 - Storm Drainage

1.3 REFERENCES

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.4 DEFINITIONS

A. Utility: Any buried or above ground pipe, conduit, cable, associate devices or appurtenances, or substructure pertaining hereto.

1.5 QUALITY ASSURANCE

A. Qualifications
1. Installer:
   a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project within the past 5 years.

B. Regulatory Requirements:
1. In accordance with Specification Section REGULATORY REQUIREMENTS and the following:
   a. CARB — Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board [CARB].
   b. CP — City of Parlier, Codes and Ordinances
   c. EPA — Environmental Protection Agency.

d. CAL/OSHA Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.

C. Certificates:
1. Installer's certification that all trench backfill installation meets or exceeds the requirements of this specification.
2. Contractor's certification (on Contractor's letterhead paper) that the trench backfill materials and installation meets or exceeds the requirements of this specification.

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

1.6 COORDINATION

A. Coordinate work with Owner's personnel.

B. Verify that the location of existing utilities have been indicated at work site by utility authorities.

1.7 EXISTING UTILITIES

A. Where subsurface work involves more than the normal depth of excavation required for the removal and/or construction of surface improvements (surface improvements such as concrete work, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to indicate on the plans the location of all main and trunkline utility facilities which may affect the Work. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

B. Under circumstance similar to 31 23 33/1.7A, service laterals and appurtenances will have also been shown where information was available as to their location. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. Determine exact location of existing buried utilities by:
1. Marking on ground or pavement surface the alignment and extent of the proposed facilities and the probable location of existing utilities using construction plans and existing surface features.
2. Requesting Underground Service Alert (USA) to indicate location of existing buried facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days notice of request for locations, and notify Owner of said request concurrently.

3. Locate exact location of existing utilities by hand methods of excavation, or by use of vacuum equipment.

D. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities along the route of the proposed work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or Owner's personnel.

E. Provide Field Engineering per Contract General Conditions and Division 1 to record the location of all utilities encountered. Where locational conflicts exist between existing utilities and the planned location of facilities to be constructed under the Contract, submit detailed information to the Owner's Inspector and Engineer for review and direction.

F. Maintain all existing utility mains and service lines in constant service during construction of the Work.

G. Where service disruptions are allowed, minimize the length of such disruptions by proper scheduling and diligent pursuit of the work.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Fill Type S1, S2, S4 and S5, as specified in Division 31 Specification Section SOIL MATERIALS.

2.2 WARNING TAPE

A. 6" wide warning tape shall be installed over all of the pipelines as shown on the details.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

B. Protect existing structures, fences, sidewalks, curbs, and other improvements from excavation equipment and vehicular traffic.

C. Maintain and protect above and below grade utilities which are to remain.

D. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

3.2 EXCAVATION

A. Excavate soil required to locate existing utilities and install the work.

B. Use hand methods of excavation to locate existing utilities, and to excavate trenches, pits and holes in congested areas.

C. Employ equipment and methods appropriate to the work site. Small mechanical excavators may be used only in areas where there is sufficient space so as not to damage adjacent improvements, and where the locations of all existing utilities have been determined by hand methods of excavating.

D. Cut trenches just wide enough to enable installation and proper bedding and backfill, and to allow inspection.

E. Trenches parallel with a footing shall not be below a plane having a downward slope of 2:1 (50 percent slope) from a line 9 inches above the bottom edge of the footing and not closer than 18 inches from edge of footing.

F. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose material.

G. Excavate trenches, pits or holes bottoming in hardpan to a minimum of 6 inches below the grade for the bottom of the pipe and any couplings, and then backfill to the pipe grade with Type S2 or S5 material, containing sufficient moisture to allow compaction to 90% maximum dry density (relative compaction). Soil Type S2 shall meet requirements of Type S5. No additional payment will be made for such over-excavation and refill.

H. In all trenches or excavation sites where a firm foundation is not encountered, such as soft, spongy, or otherwise unsuitable material, remove the material to a minimum of 12 inches, or to a depth determined by the Engineer, below the bottom of the proposed pipe or structure, and backfill the space with Type S2 or S5 material containing sufficient moisture to allow compaction to 90% maximum dry density (relative compaction). Soil Type S2 shall meet requirements of Type S5. No additional payment will be made for such additional excavation or backfill.

I. Excavate trenches to provide the design grade of the facility, or as directed by the Engineer.

J. Stockpile excavated material to be returned to trench adjacent thereto in location which will not be detrimental to existing improvements, or pedestrian or vehicular traffic. Remove from site all unsuitable or excess material not to be used.

K. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw.

L. Remove excess soil not used as backfill from the work site. Obtain a disposal site off of the Owner’s property and legally dispose of said excess material, all at no additional cost to the Owner.

M. If water is encountered during excavations, provide all dewatering measures necessary to construct improvements shown.

N. Contractor shall make all provisions necessary, including but not limited to, shoring or sloping back trench walls as required to address sandy soils. The cost of these provisions shall be included in the lump sum amount bid for this work and no separate payment will be made therefore.

3.3 PROTECTION OF EXCAVATIONS

A. Provide all shoring and bracing as required and those codified in local, state and federal safety regulations.

B. Prevent water, caving or sloughing ground from entering excavations.

C. Maintain excavations free of water.

3.4 BACKFILLING

A. Provide type S5 pipe bedding as required by Plans and compact to 90% maximum dry density (relative compaction).

B. After installation of pipes and appurtenances and placement of pipe bedding material, backfill trenches and excavations to finished grade, or subgrade in areas to receive surface improvements

C. Backfill trenches above pipe bedding material and to within 24 inches of finish subgrade with Type S1, S2, S4, or S5 soils, except that that top 12 inches shall be type S2, S3, S4, or S5 soils.

D. Employ a placement method that does not disturb or damage existing or proposed pipes or other Utilities or Improvements.

E. Place and compact all soil backfill in continuous layers not exceeding 8 inches in loose uncompacted thickness, moisture condition to at least 2% above optimum moisture content.

F. Maintain optimum moisture content of fill materials to attain required compaction.

G. Backfill final 12-inch thickness to finish subgrade in areas to receive concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvement, with Type S2, S4, or S5 soils.

H. Backfill final 12-inch thickness to finish subgrade in areas to receive sod, other vegetation, or bare soil, with Type S2 or S3 soils.

I. Compact backfill below the top 12-inches to 90% maximum dry density (relative compaction).

J. In areas to receive buildings, structures, or concrete flatwork, compact the top 12-inches to 90% maximum dry density (relative compaction).

K. In areas to receive asphalt concrete pavement or concrete pavement subject to vehicular traffic, compact the top 12-inches to 95% maximum dry density (relative compaction).

L. In planting areas, compact the top 12-inches to 85% maximum dry density (relative compaction).

3.5 TOLERANCES

A. Top Surface of Backfill under Paved or Concrete Areas: Plus or minus 0.02 feet from required elevations.

B. Top Surface of General Backfilling: As required for finish surface to match adjacent improvements or ground.

3.6 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of General Conditions and/or Division 1.

B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.

C. If tests indicate work does not meet specified requirements, recompact, and retest. Retests required due to failure of initial tests shall be paid for by the Contractor.

3.7 PROGRESS AND PROSECUTION

A. Backfill any excavation opened in any day on that same day.

END OF SECTION 31 23 33

SECTION 32 01 90 EXISTING LANDSCAPE PROTECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. This Section includes but is not limited to the following:
   1. Protection and maintenance of existing trees and other plants that are affected by the execution of the Work, whether temporary or new construction.

B. Related Work Specified Elsewhere
   1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections.
   2. Section 31 11 00: Site Clearing
   3. Section 31 20 00: Earthwork
   4. Section 31 23 33: Trench Excavation and Backfill
   5. Section 32 84 00: Irrigation System
   6. Section 32 90 00: Landscape Planting

1.2 SUBMITTALS

A. Product Data: For each type of product indicated or proposed for use.

B. Qualification Data: Submit arborist's certification and/or license information. Submit qualifications and experience of the certified tree worker if not the arborist.

C. Project Certification: Provide a certification letter from the consulting arborist that trees indicated to remain have had their Tree Protection Zone (TPZ) protected during construction according to these specifications and/or the arborist's recommendations. Provide a list of any trees damaged during construction and the subsequent treatment and repair.

D. Transplanting and Maintenance Recommendations: Submit transplanting, maintenance and protection specifications from a qualified arborist for care and protection of trees during and after completion of the Work that are likely to be affected by construction operations. The tree maintenance recommendations shall be included in the Maintenance Manuals required in 329000.

E. Tree Assessment and Valuation: Prior to the start of any construction operations of any kind, submit a tree assessment including tree valuation for existing trees scheduled to remain in the area of work or in auxiliary construction areas.
   1. Tree valuation for trees species that do not have comparable and available replacement sizes shall be determined by a certified consulting arborist experienced in tree valuation using the "Guide for Establishing Values of Trees and Other Plants", current edition, published by the International Society of Arboriculture, Urbana, Illinois.
   2. Tree assessment shall include a physical description, health, condition and recommended pruning and/or mitigation measures based on the expected construction operations to minimize the negative impacts to the affected trees.

1.3 QUALITY ASSURANCE

A. Tree Service Qualifications: An experienced tree service firm that has successfully completed tree protection and/or relocation work similar to that required for this Project, and who will provide experienced, certified tree workers.

B. Arborist Qualifications: The arborist shall be certified by the International Society of Arboriculture. If the arborist is performing tree work, he/she shall be employed by a licensed contractor, or shall hold an individual license if independent.

C. Tree Pruning Standards: Comply with ANSI A300, "Trees, Shrubs, and Other Woody Plant Maintenance--Standard Practices," unless more stringent requirements are indicated or recommended by the certified arborist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Drainage Fill: Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D 448, Size 24, with 90 to 100 percent passing a 2-1/2-inch sieve and not more than 10 percent passing a 3/4-inch sieve.

B. Topsoil: See Section 32 93 00.

C. Filter Fabric: Manufacturer’s standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers, minimum 4.8 oz/sq. yd.

D. Temporary Fencing at the TPZ: Heavy-duty exterior rated plastic or chain link fencing, minimum four feet high with stakes at a maximum 10 feet on-center or as needed for a taut installation.

E. Organic mulch: Walk-on type chipped wood and aged green waste material without leaves, green wood, sticks, dirt, dust, construction materials and other debris. Particle size 1/2” to 3" in general size.

F. Coarse sand: Clean sand with greater than 95% passing a #10 sieve, less than 5% passing a #30 sieve, and less than 1% passing a #50 sieve.

2.2 TEMPORARY TPZ FENCING TYPES

A. TPZ 1: Temporary fencing shall be installed at the drip line of the tree canopy. Where the canopy extends into remaining or proposed hardscaped areas, the posts may be supported by appropriate on-grade concrete or weighted bases.

B. TPZ 2: Where existing trees are in planting strips with active walkways and/or roadways in the TPZ, the temporary fencing shall extend to the edge of the hardscaped areas to keep the walkways and/or roadways open.

C. TPZ 3: Existing trees remaining in small planters or tree wells shall be wrapped with a minimum 2-inch thickness of orange plastic construction fencing from the ground to the first scaffold branch, or 4 feet high, whichever is greater. The wrapped section shall be covered with vertical 1.5-inch square slats and bound around the trunk firmly at least every 2 feet. Use caution when installing the slats so that the tree bark is not damaged.

PART 3 - EXECUTION

3.1 PREPARATION

A. Temporary Fencing: Install temporary fencing located around the canopy drip line of trees (the tree protection zone [TPZ]), and around the plants scheduled to remain that are inside the

construction area. The TPZ fence layout shall be reviewed for acceptance by the Owners Representative and the consulting arborist.

B. All work within the TPZ shall be reviewed and monitored by the consulting arborist.

C. Within the TPZ, install a 4-inch depth of wood mulch over a permeable filter fabric with minimum 4-inch overlaps at fabric seams. Remove the protection mulch and fabric prior to any cultivation and amendment tillage.

D. Provide a temporary dirt berm watering basin around trees and plants scheduled to remain. The berm around trees shall be a minimum diameter of six times (6x) the diameter of the tree at breast height (DBH), or not less than six feet in diameter, whichever is greater.

E. Provide temporary irrigation or a portable water source to irrigate trees and plants scheduled to remain. Irrigate at minimum once a week or more often as necessary to moisten soil to a minimum 18-inch depth for trees, and a minimum depth of 12 inches for shrubs. Reapply irrigation based on an evapotranspiration loss of 50%.

F. Protect plant/tree root systems within the protected fenced areas from damage due to noxious materials caused by runoff or spillage while mixing, placing, or storing construction materials. Protect root systems from flooding, eroding, or excessive wetting caused by dewatering operations.

G. Do not store construction materials, debris, or excavated material within the TPZ. Do not permit vehicles or reoccurring foot traffic within the TPZ to prevent soil compaction over root systems.

H. Do not allow fires under or adjacent to remaining trees or other plants.

3.2 EXCAVATION

A. Do not excavate within the canopy drip line of existing trees unless otherwise authorized. Any excavation within the TPZ shall be performed under the onsite monitoring by the consulting arborist.

B. Where excavation for new construction and/or utility lines are required within the canopy drip line of trees, hand clear and excavate to minimize damage to root systems. Use spading forks to comb soil or use an Air-Spade to expose roots.

C. Where utility lines are to be located within the dripline of trees, expose the existing root system to the depth of utility line installation plus the depth of any required bedding material. Place piping below and/or through the exposed roots without damage to the root system. Backfill with approved material and compact by flooding the area if allowed.

D. As an alternative to manual or Air-Spade trench excavation, utility or other below grade piping may be mechanically bored under the crown dripline with a minimum cover of 3 feet as authorized by the consulting arborist.

E. Root Pruning: Do not cut main lateral roots or taproots greater than one inch in diameter. Smaller roots less than one inch in diameter that interferes with the installation of new improvements and/or utility lines may be cut only if absolutely necessary. Only cut roots with sharp pruning instruments; do not break, tear or chop. Block out concrete footings around roots greater than one inch diameter leaving a minimum one-inch clearance around roots to remain. Provide alternative footing design if main lateral roots are in conflict.

3.3 REGRADING

A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by the certified arborist, unless otherwise indicated.
   1. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only roots less than one inch diameter. Cut roots with sharp pruning instruments; do not break or chop.

B. Minor Fill: Where existing grade is 12 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations. Do not place fill greater than 6 inches in depth within 24 inches of the trunk, and do not cover the trunk/root base flare. Do not allow standing water at the trunk.

C. Moderate Fill: Where existing grade is more than 12 inches, but less than 18 inches below elevation of finish grade, place drainage fill, filter fabric, and topsoil on existing grade as follows:
   1. Carefully place drainage fill against tree trunk approximately 2 inches above elevation of existing grade and extend not less than 20 inches from tree trunk on all sides up to the finish grade. Slope of the rock fill shall be a maximum 2h:1v. For balance of area within drip-line perimeter, place drainage fill a minimum 6 inches in depth.
   2. Place filter fabric over the drainage fill with edges overlapping 6 inches minimum.
   3. Place fill layer of topsoil to finish grade. Do not mechanically compact drainage fill or topsoil more than 85% relative density in planted areas. Hand grade to required finish elevations.

3.4 TREE PRUNING

A. Prune remaining trees affected by temporary and new construction only when authorized by the Landscape Architect and as recommended by the consulting arborist.

B. Prune remaining trees to compensate for root loss caused by damaging or cutting root system only when authorized by the Landscape Architect and as recommended by the consulting arborist. Provide subsequent maintenance during Contract period as recommended by the consulting arborist.

C. Pruning Standards: Prune trees according to ANSI A300 based on pruning for access clearance, to correct any defects in structure, or to remove potential conflicts with new improvements. Pruning shall only be performed by a Certified arborist or tree worker.

D. Cut branches with sharp pruning instruments; do not break or chop. Clean pruning tools with a diluted bleach solution prior to performing any pruning operations.

3.5 TREE REPAIR AND REPLACEMENT

A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to written instructions of the arborist.

B. Remove and replace dead and/or damaged trees impacted by the construction operations that the arborist determines to be incapable of restoring to a normal growth pattern.
   1. Provide new trees of the same size and species as those being replaced; plant and maintain as specified in 32 90 00.
   2. When new trees of the same size and species are not available, furnish and install the largest size boxed tree that is readily available and will successfully grow in the planting area with long term health and without damage to adjacent improvements. Credit the Owner the difference between the valuation of the removed existing tree and the installed replacement tree.

C. Aerate surface soil within any existing Oak tree dripline compacted before or during construction, 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch-diameter holes a minimum of 18 inches deep at 36 inches o.c. Backfill holes with coarse sand. Manually till the top 4 inches with a spading fork, and break up clods greater than 1 inch diameter. Smooth grade prior to installing wood mulch.

3.6 CLEAN-UP

A. Burning is not permitted.

B. Prior to Final Acceptance, remove the TPZ fence, stakes and other related materials.

C. Legally remove excess excavated material, debris, displaced trees, and green waste from Owner's property. Broom clean all hardscape surfaces in the area of work.

END OF SECTION

SECTION 32 11 26 AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, equipment and services necessary to install aggregate base surfacing as indicated by the Contract Documents.

1.3 RELATED SECTIONS

A. All Division 00 Specification Sections
B. All Division 01 Specification Sections
C. Section 312000 – Earthwork: Excavation, Filling, and Grading.
D. Section 312333 – Trench Excavation and Backfill.
E. Section 321216 – Soil Sterilization.
F. Section 321217 – Asphalt Paving.
G. Section 321313 – Site Concrete Improvements.

1.4 REFERENCES

A. SSCDOT - Standard Specifications, Department of Transportation, State of California (Caltrans), latest edition, except for references to method of payment, and references to any state furnished materials

1.5 QUALITY ASSURANCE

A. Provide and install in accordance with SSCDOT.

1.6 SUBMITTALS

A. Submit data sheets from supplier to document compliance with SSCDOT requirements.

B. Certificates of compliance for material.

C. Load tags for delivered material.

1.7 COORDINATION

A. Coordinate with other work, including subgrade preparation and soil sterilization.

B. Coordinate installation schedule with Owner’s use of the premises and with other contractors working at the site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate Base: Unless specified otherwise on Plans, Class 2, 3/4 Inch Maximum per Section 26 of SSCDOT.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify quantities required.

B. Verify that subgrade has been placed and compacted per Contract Documents

C. Verify gradients and elevations of subgrade are correct.

3.2 INSTALLATION OF AGGREGATE BASE COURSE

A. Install in conformance with SSCDOT Section 26, Aggregate Bases.

B. Thickness - As shown on construction drawings.

C. Spreading and Compacting - In accordance with Section 26, SSCDOT. Base course shall be moisture conditioned to within 2% of optimum moisture, placed in uncompacted layers not exceeding six (6) inches in thickness, and compacted as specified, based on ASTM Test Method D1557. The relative compaction of each layer of compacted base material shall be not less than 95 percent.

D. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities, true to grade and cross-section.

E. Lines and grades for the installation of aggregate base shall be set by a California licensed Land Surveyor or Civil Engineer, at Contractor’s expense.

3.3 TOLERANCES

A. Compacted thickness of aggregate base: Not less than the thickness specified on the Plans.

B. Finished Surface: Within 0.02 foot of planned grade per Section 26, SSCDOT. No more than 50% of the finish surface shall be above or below the specified grade for aggregate base.

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by the Owner’s inspector, under provisions of Division 01.

3.5 PROTECTION

A. Immediately after placement and compaction, protect surface from mechanical injury.

B. Protect completed surface until surfacing layers are in place.

END OF SECTION 32 11 26

SECTION 32 12 16 SOIL STERILIZATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work specified in this section.

1.2 SECTION INCLUDES

A. Furnish and install soil sterilant under all asphalt paving.

1.3 RELATED SECTIONS

A. Section 312000 – Earthwork: Excavation, Filling, and Grading
B. Section 312333 – Trench Excavation and Backfill
C. Section 321126 – Aggregate Base Course
D. Section 321217 – Asphalt Paving
E. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to the work of this section.

1.4 STANDARDS

A. In accordance with the following:

CCR-T21	California Code of Regulations, Title 21 Public Works.
CBC	California Building Code, California Code of Regulations, Title 24, Part 2, CCR-T24.
USDA	United States Department of Agriculture.
EPA	Environmental Protection Agency.
CP	City of Parlier

All applicable Environmental Regulations and Standards.

1.5 QUALITY ASSURANCE

A. Provide licensed operator to apply soil sterilant.

B. All products shall comply with the current EPA laws at time of application. Should the products listed become unavailable because of changes in the law, submit substitute products for review by the Owner.

1.6 SUBMITTALS

A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES.

B. Certificates of application.

C. Certificates of compliance for material.

1.7 COORDINATION

A. Coordinate with other work, including subgrade preparation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Soil Sterilant: Bayer Oust XP, weed and grass preventer, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that site is ready for application.

3.2 PREPARATION

A. Identify installation locations.

B. Employ equipment and methods appropriate to the work site.

3.3 APPLICATION

A. Thoroughly water soak surface to be treated. Avoid excessive water runoff.

B. Apply sterilant solution over surface to receive pavement or surfacing prior to the start of pavement or surfacing installation.

C. Apply in spray form, at rate as allowable by State of California and the manufacturer's recommended application rate.

D. Take all precautions to limit soil sterilant solution to areas immediately under proposed pavement or surfacing. Use shields as necessary, and do not apply under windy conditions.

3.4 FIELD QUALITY CONTROL

A. Field inspection will be performed under Specification Section QUALITY REQUIREMENTS.

END OF SECTION 32 12 16

SECTION 32 12 17 ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 RELATED SECTIONS:

A. All Division 00 Specification Sections
B. All Division 01 Specification Sections
C. Section 312200 - Earthwork: Excavation, Filling, and Grading
D. Section 312333 - Trench Excavation and Backfill
E. Section 321126 - Aggregate Base Course.
F. Section 321216 - Soil Sterilization.

1.4 REFERENCES

A. SSCDOT - Standard Specifications, Department of Transportation, State of California (Caltrans), latest edition, except for references to method of payment, and references to any state furnished materials.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with SSCDOT.

B. Mixing Plant: Conform to SSCDOT.

C. Installation Criteria: Asphalt concrete shall show no evidence of cracking, uneven settlement, improper drainage, or untoward junctions with adjoining or existing surfaces. Work displaying such conditions shall be corrected under the Contractor's guarantee of all work.

1.6 SUBMITTALS

A. Submit under provisions of Division 01.

B. Mix design

C. Certificates of compliance for material.

D. Load tags for delivered material.

1.7 COORDINATION

A. Coordinate with other work, including subgrade preparation, aggregate base placement and soil sterilization.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt-concrete when atmosphere temperature is less than 50 degrees F, or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Paint Binder: In accordance with SSCDOT Section 94, Asphaltic Emulsions.

B. Asphalt-Concrete: Type A in accordance with Section 39, SSCDOT, ½ inch or ¾ inch maximum aggregate (medium) as indicated on the Plans. The asphaltic concrete shall be compacted to an average relative compaction of 97 percent, with no single test value being below a relative compaction of 95 percent based on a 50 blow Marshall maximum density. Use asphalt binder performance grade PG 64-10.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify quantities required. New asphalt-concrete paving is required at all locations shown on the plans, and where existing asphalt-concrete paving to remain is removed or damaged by the Project excavation or related work.

B. Verify that subgrade or base material has been compacted to required relative compaction and is dry.

C. Verify gradients and elevations of base are correct.

D. Verify that subgrade or base material has been sterilized per Section 32 12 16 SOIL STERILIZATION.

3.2 AGGREGATE BASE

A. Where shown on the construction plans, place and compact aggregate base course per Section 321126 AGGREGATE BASE COURSE.

B. Where shown on the construction plans, place asphalt on compacted earth subgrade per Section 312000 EARTHWORK: EXCAVATION, FILLING AND GRADING and Section 312300 TRENCH EXCAVATION AND BACKFILL.

C. A soil sterilant shall be applied over the entire area which is to be paved in accordance with Section 311216 SOIL STERILIZATION

3.3 PREPARATION – PAINT BINDER

A. Apply paint binder to existing asphalt-concrete or concrete surfaces which will be in contact with asphalt-concrete surfacing.

B. Rate of application for all surfaces against which asphalt concrete is to be placed shall be no less than 0.02 and no more than 0.05 gallons per square yard. All vertical concrete surfaces which will be in contact with asphalt concrete surfacing and all areas now in place which will be covered with new surfacing materials and feathering operations shall be coated with a paint binder applied at the rate of 0.05 gallons per square yard.

3.4 INSTALLATION OF ASPHALTIC-CONCRETE

A. Install in conformance with SSCDOT Section 39, Asphalt-Concrete.

B. Thickness - As shown on construction plans. Where thickness exceeds 3 inches, place in no less than 2 layers with top layer no thicker than one inch. Asphaltic concrete shall be laid to the thickness designated on the Plans. The plan thickness is to be considered as a minimum thickness. The Contractor shall lay the asphaltic concrete to a depth required to insure that, after compaction, the in place compacted thickness is equal to or greater than the specified plan thickness.

C. The Contractor shall provide to the Engineer the truck delivery weight tags for the asphaltic concrete material. The quantity delivered shall be equal to or greater than the calculated in place quantity based on the specified thickness and area to be paved as designated on the construction plans and based on a unit density of the asphaltic concrete of 141 pounds per cubic feet.

D. Asphalt type: PG 64-10

E. Compaction Equipment - In accordance with Section 39, SSCDOT. At small difficult areas, equipment may be altered as approved by Engineer.

F. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities and to be true to grade and cross-section.

3.5 TOLERANCES –GENERAL

A. Finished Surface: within 0.02 foot of planned grade.

B. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.

C. Scheduled Compacted Thickness: Not less than specified.

3.6 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 01.

B. Pavement shall comply with the following:
1. Water shall not be able to accumulate at any point and the surface shall be free to drain to drainage inlets or gutters.
2. The paving contractor shall water flood the surface with the use of a water truck. If, after 30 minutes on a 70 degree F day, “bird baths” are evident in a depth more than 0.01 foot, the paving contractor and the Owner’s representative will determine the best method of correction.
3. A 10 foot straightedge shall be used to check for high spots and ridges. High spots and ridges out of compliance shall be reduced by a remedy determined by the paving contractor and the Owner’s representative.

C. Should a section of the work be not acceptable on the basis of inadequate compaction and/or the mixture becomes loose and broken, mixed with dirt, out of tolerance, or in any other way defective, it shall be repaired or removed and replaced with fresh mixture and immediately compacted to conform to the surrounding area to the satisfaction of the Owner.

3.7 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury.

B. Protect sealed surface until it is cured.

END OF SECTION 32 12 17

SECTION 32 13 13 SITE CONCRETE IMPROVEMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY:

A. This Section includes the following:
   1. All material, labor, equipment and services necessary to completely install exterior Portland cement flatwork, cast-in-place concrete, and architectural flatwork concrete, accessories and other related items, slabs, ramps and sidewalks and walkways, curb and gutter, mowstrips, and other miscellaneous concrete items of the form and dimensions shown on the plans and necessary to complete the project, and in accordance with the requirements of the Standard Specifications as modified and supplemented by these Special Provisions
   2. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to the work of this section.

B. RELATED SECTIONS:
   1. Section 312000 - Earthwork: Excavation, Filling, and Grading
   2. Section 321126 - Aggregate Base Course.
   3. Section 321315 - Concrete Reinforcement

1.3 REFERENCES

A. SSCDOT - Standard Specifications, Department of Transportation, State of California (Caltrans), latest edition, except for references to method of payment, and references to any state furnished materials.

B. ACI standards, including but not limited to #304, 305, 306, 308, 309 and 347.

C. ASTM standards, including but not limited to #C-33, C-39, C-94, C-136, C-143, C-150, and C-309.

1.4 SUBMITTALS

A. Submit under provisions of Specification Section SUBMITTALS.
   1. Certificates of compliance for materials and mix designs.
   2. Load tags for delivered material.
   3. Strength testing as required by the approving agency.
   4. Integral color sample, where applicable.
   5. Application instructions for the architectural finish materials.
   6. Accessories and manufacturer’s installation specifications.

1.5 QUALITY ASSURANCE

A. Furnish concrete materials conforming with SSCDOT.

B. Perform work in accordance with SSCDOT, unless noted otherwise herein.

PART 2 - PRODUCTS

2.1 MIXES

A. Mix Design and Proportions in accordance with SSCDOT:
   1. Mix designs with Fly Ash content no greater than 15 percent of the total weight of cementitious materials shall be proportioned by SSCDOT.
   2. Provide a maximum of 4 percent air entrainment, unless noted otherwise.
   3. Owners Testing laboratory shall review all mix designs before submittal.
   4. All concrete shall have the following minimum compressive strengths in accordance with ACI 318 and SSCDOT at 28 days and shall be proportioned within the following limits:
      a. Site Concrete: Use for exterior concrete slabs on grade including, but not limited to sidewalks, curbs, gutters, mow strips, utility appurtenances and miscellaneous site improvements.
         1) Strength: 3,000 psi at 28 days
         2) Maximum Aggregate Size: 1-inch
         3) Cement Type: Type I/II/IV/V
         4) Cement Content: 5.5 sacks/yd minimum
         5) Max Water/Cement Ratio: Per SSCDOT
         6) Admixture Per SSCDOT
      b. Structures & Vehicular Concrete Paving: Use for site structures and exterior slabs on grade subject to vehicle traffic.
         1) Strength: 4,000 psi at 28 days
         2) Maximum Aggregate Size: 1-inch
         3) Cement Type: Type I/II/IV/V
         4) Cement Content: 6.5 sacks/yd minimum
         5) Max Water/Cement Ratio: Per SSCDOT
         6) Admixture: Per SSCDOT
      c. Slurry Backfill: Use for backfill of over-excavated trenches, encasement of all penetration, and site utility piping.
         1) Maximum Aggregate Size: 3/8-inch
         2) Cement Type: Type I/II/IV/V
         3) Cement Content: 2.0 sacks/yd minimum

B. Reinforcement shall comply with relevant portions of Division 32 Specification Section CONCRETE REINFORCEMENT.

PART 3 - EXECUTION

3.1 PREPARATION

A. Subgrade shall conform to the requirements of Division 31 Specification Section EARTHWORK: EXCAVATION, FILLING AND GRADING. The District may elect to verify compacted subgrade elevations by measurement made from adjacent existing improvements or by a template supported by forms.

3.2 GENERAL CONCRETE

A. Concrete placement shall conform to the applicable requirements of Standard Specification Sections 51 and 90. Concrete shall not be placed when the air temperature in the shade at the project site exceeds 95º F or is below 45º F, or when the temperature of the concrete exceeds 85º F.

B. After the concrete has been placed, it shall be struck off to proper section and compacted with a grid of parallel metal bars until a layer of mortar not less than 3/8 inch thick has been brought to

the surface. All exposed concrete surfaces shall receive a medium broom finish applied transversely to the line of pedestrian traffic or to the longest dimension of the concrete, as applicable.

C. General concrete surfaces shall be cured by the curing compound method and shall be protected in accordance with the provisions of Subsections 90-1 and 90-2 of the Standard Specifications.

3.3 PROTECTION OF CONCRETE

A. The Contractor shall be responsible for the condition of all concrete work until such time as all work has been completed and is accepted by the District. The Contractor shall limit vehicular travel across concrete until such time as the concrete has achieved strength sufficient that it can support traffic without damage. In no case, however, will vehicles be allowed to travel across new concrete improvements until seven calendar days have passed since the concrete was placed.

3.4 CONCRETE JOINTS

A. Expansion joints and weakened plane joints shall be constructed at the locations shown on the plans or as directed by the Engineer. Where joint locations are not specified on the plans, expansion joints shall be constructed at maximum intervals of 30 feet, and weakened plane joints shall be constructed at maximum intervals of 10 feet.

B. Expansion joints shall be considered as weakened plane joints for the purpose of spacing weakened plane joints. Expansion joints shall be tooled with a 1/4 inch maximum radius edger, and shall be filled with 3/8 inch pre-formed expansion joint filler.

3.5 CONCRETE FINISHES

A. Where concrete is being installed adjacent to or near existing concrete improvements, match the finish of similar concrete surfaces (i.e. new sidewalks shall match existing sidewalks, new curbs shall match existing curbs, etc.).

B. Sidewalks and Mowstrips: Medium sweat finish or medium broom finish perpendicular to the direction of travel.

C. Curbs: Trowel smooth and finish with a light brush.

D. Gutters: Medium broom finish parallel with curb or direction of flow.

E. Drive approaches and wheelchair ramps: medium broom finish, perpendicular to the direction of travel.

3.6 INSTALLATION OF ACCESSORIES

A. Strictly comply with manufacturer's instructions and recommendations and approved details. Securely anchor work to substrate.

3.7 REPAIR AND CLEAN-UP

A. Contractor shall legally remove all trash, debris, containers and excess materials from the site on a periodic basis, and shall keep the work broom clean until Owner’s acceptance.

B. The Contractor shall be held responsible for the repair and/or replacement of new or existing improvements damaged as a result of this work to the satisfaction of the Owner.

C. The Contractor shall provide roll-off bins for wash-out of ready mix concrete trucks and pumpers. Do not allow concrete debris or cement water onto soils scheduled for landscape planting.

END OF SECTION 32 13 13

SECTION 32 13 15 CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY:

A. This Section includes the following:
   1. Deformed reinforcing bars for site concrete improvements.

B. RELATED SECTIONS
   1. Section 321313 - Site Concrete Improvements.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section SUBMITTALS 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. Drawings and placing diagrams for each grade slab including dowels and corner bars.
   3. On the placing diagrams, show all openings for pipelines and architectural features. Include additional reinforcing at openings and corner bar arrangements at intersecting beams, walls, and footings.
   4. Coordinate placing diagrams with the concrete placing schedule.

1.4 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

2.1 BARS

A. Bars shall be deformed billet steel conforming to ASTM A 615, Grade 60. Mixing of steel grades will not be allowed.

2.2 BAR SUPPORTS

A. Bar support shall be concrete or metal chairs, spacers or hangers. Reinforcing bars shall not be supported by forms.

2.3 TIE WIRE

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

PART 3 - EXECUTION

3.1 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.

3.2 SPLICES

A. Splice bars only at locations shown on the drawings. Where splices are not detailed, lap bars 72 bar diameters.

3.3 CLEANING

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

3.4 PROTECTION DURING CONCRETING

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

END OF SECTION 32 13 15

SECTION 32 15 40 CRUSHED STONE SURFACING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish and install decomposed granite surfacing which includes:
   1. Sub-grade Preparation
   2. Base Preparation
   3. Edge restraint
   4. Stabilizer
   5. Compaction
   6. Cleanup

B. Related work:
   1. Section 312200 - Earthwork
   2. Section 312222 - Soil Materials
   3. Section 321216 - Soil Sterilization
   4. Section 321126 - Aggregate Base

C. Definitions: The word Architect as used herein shall refer to the Landscape Architect or the Owner's authorized representative.

1.2 SUBMITTALS:

A. Procedure: Submittals shall be provided in accordance with Division 1 requirements.

B. Submit aggregate sieve analysis, product specifications and a one pint representative sample of the proposed decomposed granite, with named source.

PART 2 - PRODUCTS

2.1 DECOMPOSED GRANITE

A. Decomposed granite is referred to by the abbreviation (D.G.), or referred to as disintegrated granite. All decomposed granite for non-vehicular surfaces shall conform to the following grading requirements:

Sieve Designation	% Passing
3/8 inch	100
No. 4	90-100
No. 8	75-80
No. 16	55-65

Sieve Designation	% Passing
No. 30	40-50
No. 50	25-35
No. 100	15-20
No. 200	10-15

B. All decomposed granite for vehicular surfaces shall conform to the following grading requirements:

Sieve Designation	% Passing
1/2 inch	95-100
3/8 inch	90-95
No. 4	65-80
No. 8	43-63
No. 16	40-49

Sieve Designation	% Passing
No. 30	30-40
No. 50	20-27
No. 100	10-18
No. 200	10-12

C. The portion of D.G retained on the no. 4 sieve shall have a maximum percentage of wear of 50 at 500 revolutions as determined by AASHTO T96.

D. The portion passing a No. 40 sieve shall have a maximum liquid limit of 25 and maximum plasticity index of 7 as determined by AASHTO T89 and AASHTO T90, respectively.

E. The sand equivalent shall be in the range of 35-55. The R-value shall be a minimum of 71.

F. Crushed aggregate screenings shall be free from clay lumps, vegetative matter and deleterious material.

G. D.G. shall be grey in color.

2.2 SOIL BINDER

A. Binder shall be a non-toxic, colorless, odorless, organic powder that binds D.G. screenings consisting of 95% Psyllium with a minimum 70% Mucilliod content. The binder shall be “Stabilizer” as manufactured by Stabilizer Solutions Inc., (800) 336-2468, FAX: (602) 225-5902, or equal.

2.3 EDGING

A. Aluminum edging: 3/16” x 5 ½”, manufactured from 6063 extruded aluminum alloy of T-6 hardness with interlock system and 5 stake punch outs fabricated in each strip. Stakes 12” long, lock 1/2” below top of edging.
   1. Finish: Black anodized

PART 3 - EXECUTION

3.1 SUBGRADE AND DECOMPOSED GRANITE PREPARATION AND COMPACTION

A. Subgrade under all D.G. shall be scarified to a minimum depth of 12”, graded and compacted to 90% maximum dry density (relative compaction).

B. Aggregate base under D.G. surfacing shall be in conformance with Section.

C. After subgrade preparation or base installation, sterilize base or subgrade receiving D.G. surfacing per Specification Section SOIL STERLIZATION.

D. Minimum compaction for pedestrian use D.G. surfaces shall be 85% maximum dry density (relative compaction), and 90% maximum dry density (relative compaction) for vehicular use. The Contractor shall provide one compaction test for every 2,000 square feet or fraction thereof.

E. The finish grade shall be even between the headers with no humps or depressions greater than +/- 0.25" after the compaction.

3.2 SOIL STABILIZER AND DECOMPOSED GRANITE INSTALLATION

A. Soil stabilizer shall be thoroughly mechanically blended per the manufacturer's recommendations with the D.G. screenings prior to transport to the job site.
   1. For vehicular and/or pedestrian use, the stabilizer shall be mixed at a minimum rate of 15 lbs. of Stabilizer product per ton of D.G. aggregate.
   2. For tree well use, the stabilizer shall be mixed at a minimum rate of 8 lbs. of Stabilizer product per ton of DG aggregate.
   3. Premixed Stabilizer and D.G. material can be obtained locally by contacting the stabilizer manufacturer and obtaining the location of a local vendor.
   4. Drop spreading of the Stabilizer product over raked D.G. screenings and mixing stabilizer by rototilling is NOT ACCEPTABLE.

B. Place the premixed stabilizer product on the pre-soaked subgrade in maximum 2" lifts. Rake smooth to the desired grade and cross slope.

C. After placement and raking, water the Stabilized D.G. to achieve full depth moisture penetration of the placed product. Apply 25 – 45 gallons per ton to achieve the proper full depth moisture penetration.

D. After 6 – 72 hours for activation, roll the Stabilized D.G material with a 2 to 5 ton double drum roller to achieve finish grade and initial compaction without separation, plowing or any other physical compromise of the aggregate. Utilize a hand tamp at edges, around benches, and sign posts. Do not use a vibratory wacker plate or vibratory roller to compact the Stabilized D.G.

E. Finish surface elevation:
   1. Compacted finish surface of DG shall be flush with headers, paving, mowstrips and/or curbs, unless otherwise indicated.
   2. Compacted finish surface of DG shall be two inches above finish grade in adjacent shrub/ground cover planting areas, unless otherwise indicated.
   3. Compacted finish surface of DG shall be one-half inch above finish grade in adjacent sodded turfgrass planting areas, unless otherwise indicated.
   4. Compacted finish surface of DG shall be flush to finish grade in adjacent seeded or sprigged turfgrass planting areas, unless otherwise indicated.

F. Lightly spray the surface after compaction operations. Allow the finished surface sufficient time to dry prior to use.

G. Finished surface shall be smooth, uniform and solid with no evidence of chipping or cracking. Cured and compacted pathway shall be firm throughout profile with no spongy areas. Loose material shall not be present on surface after installation, but may appear after use and according to environmental conditions. Pathway shall remain stable underneath loose granite on top with a "natural" look. Any significant irregularities in path surface shall be repaired to the uniformity of entire installation.

3.3 CLEANUP

A. After all stabilization operations are completed, remove trash, excess materials, empty containers and rubbish from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a smooth condition throughout the site.

B. The D.G. surface shall be dragged and a final dressing performed within 48 hours prior to final acceptance.

END OF SECTION 32 15 40

SECTION 32 17 23 PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Furnishing and installing paint parking stall, traffic marking and wording on asphalt concrete surfaces.

B. Furnishing and installing disabled marking and hatching area on asphalt-concrete pavement.

1.2 RELATED SECTIONS:

A. Section 321217 – Asphalt Paving.
B. Section 321313 – Site Concrete Improvements.
C. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to the work of this section.

1.3 REFERENCES

A. SSCDOT Standard Specifications, California Department of Transportation (Caltrans), latest edition, except for references to methods of payment and to furnishing of materials by State.

1.4 SUBMITTALS

A. Submit under provisions of Division 1.

B. Certificates of compliance for materials.

1.5 COORDINATION

A. Coordinate work with other work, including associated traffic signing.

B. Commence striping or marking of asphalt concrete no sooner than 7 days following any sealing of the asphalt concrete.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Paint: Quick drying, high visibility water soluble acrylic striping paint; Stripe Master, Wikel Mfg. Company, or similar by Sherwin Williams, J.E. Bauer, or PPG, or approved equal.

B. Paint shall be of color indicated on the construction plans.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that site is ready for application.

3.2 PREPARATION

A. Identify installation locations. Place parking stall striping, traffic marking, wording, disabled symbol and access striping at locations, as shown on construction plans.

B. Thoroughly clean all surfaces to be painted.

C. Employ equipment and methods appropriate to the work site.

D. Provide vehicular and traffic controls per Division 1.

3.3 INSTALLATION

A. Apply paint striping and marking as indicated on the plans.

B. Apply paint uniformly, straight and true, with equipment designed for traffic striping and marking applications.

C. Apply paint striping and marking per Section 84 of SSCDOT, except supply paint conforming to 2.1 A. of this specification.

D. Apply a minimum of 2 separate coats of paint at all striping and marking locations, including asphalt concrete and concrete surfaces.

E. Paint international symbol of accessibility at the location as shown on the plans.

F. Paint accessible access area striping at the location as shown on the plans.

3.4 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Division 1.

END OF SECTION 32 17 23

SECTION 32 25 42 - SYNTHETIC TURF PLAYING FIELD SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

B. The Playing Field Contractor's attention is specifically directed, but not limited to the following documents and specifications for additional requirements:

1. Geotechnical Engineering Report.
2. Topographic Survey.
3. Playing Field Plans and Construction Details.
4. Civil Engineering Plans and Construction Details.
5. MEP Plans and Construction Details
6. All Written Specification Sections.

1.2 SUBMITTALS REQUIRED BY THE PLAYING FIELD CONTRACTOR

A. The Synthetic Turf Manufacturer and Prime Contractor Qualification Requirements: At the time of formal bid submission, the Synthetic Turf Manufacturer or Prime Contractor must provide a copy of proof that the corporation is currently a State of California General Contractor. Failure to provide this proof of license will result in the bidder submission package being non-responsive. The Parlier Unified School District retains the legal right to approve or reject any bidder's submission that fails to provide or meet the following minimum requirements.

B. All bidders must provide a minimum of ten (10) similar Professional, NCAA, and high schools synthetic turf projects located in the State of California. All similar projects must have also been completed within the last five (5) years that are similar in scope and size.

1. The ten (10) similar projects submitted must include the following minimum information:

    a) Name of the project.

    b) Location and description of the project.

    c) The overall original playing field budget, completion date, and if the project was constructed within the original playing field budget and schedule.

    d) Contact name, title, phone number, Team, University, High School, City, or County responsible for overseeing the work performed.

    All bidders are encouraged to update the contact names and phone numbers before bid submission.

2. All bidders must provide five (5) successful similar projects in the State of California (Only) that are utilizing the same proposed synthetic turf system profile utilizing a turf between 2.0" – 2.50" in pile height, total pile weight, and all infill mix products. All successful projects submitted must include the following minimum information:

    a) Name of the project.

    b) Location and description of the project.

    c) The overall original playing field budget, completion date, and if the project was constructed within the original playing field budget and schedule.

    d) Contact name, title, phone number, Team, University, High School, City, or County responsible for overseeing the work performed.

All bidders are encouraged to update the contact names and phone numbers before bid submission.

C. All bidders and sub-contractors shall submit a written statement signed by a corporate officer; "stating that the corporation has NO present, past legal action or pending arbitration or litigation against the corporation over the past ten (10) years as a direct result of product manufacturing failure, poor workmanship, unresolved warranty issues, failure to meet owners expectations, non-payment to any sub-contractors and has been terminated based on failure to meet the project schedule". If any of the above conditions have occurred, a written letter of explanation shall be required to be submitted for review by the Parlier Unified School District.

D. All bidders shall prepare an organization chart identifying all key staff member names, years of experience, direct roles and responsibilities, and contact cellphone numbers, and e-mail addresses. The organization chart must also list any subcontractors being utilized during any pre- or post-construction activities.

E. The Playing Field Contractor at the time of formal bid submission shall submit the playing field contractor qualifications that meet the following minimum standards: Currently holds a valid certified playing field builder's certification from the American Sports Builders Association in both classifications as a CFB and CFB-S.

F. The Parlier Unified School District Project Manager, Playing Field Designer, and Architect reserve the right to conduct field visits and contact the previous similar project references listed or not listed as part of this evaluation process.

G. All bidders shall submit a preliminary master bar chart for all tasks associated with the construction of the stadium playing field, running track, and field events that list the types of work to be performed and the length of time for each task and key milestone dates.

H. The Prime Contractor shall not enter into any formal sub-contractor agreements without prior written approval by the Parlier Unified School District Project Manager.

I. The Prime Contractor shall submit the name of the synthetic turf manufacturer product, pile height, type of material, type of rubber, infill mix ratio, total pile weight, the total system installed weight, and a list of projects that this proposed synthetic turf manufacturer product and infill mix has been successfully installed over the last 5 years in the State of California.

J. The following are the recommended synthetic turf manufacturer: The Prime Contractor must submit the synthetic turf manufacturer "Product Fact Sheet" at the time of submission of bid for evaluation by the owner and design team. Listed in alphabetical order.

a. AstroTurf
Mr. Steve Coleman
T: (813) 777-7677
E: Steve.coleman@astroturf.com

1.3 WORK INCLUDED

A. Provide all costs associated with the skilled labor; professional land surveying services, establish benchmarks, test results of proposed drainage gravel material, and finished topping stone aggregates. All required soil laboratory collection, and shipping cost and material laboratory material testing, specialized construction equipment, and all the necessary miscellaneous materials, means, and methods of construction for all the work necessary for the full construction of the entire synthetic turf playing field systems in a safe manner and in accordance with the final contract documents, details, permits, and project written specifications. Work shall include but is not limited to the following:

1. Earthwork Requirements:

a) Site Demolition.
b) Excavation, trenching, grading, backfilling, compaction.
c) Laser grading.
d) Off-site disposal of excess soil, unsuitable materials, construction debris, and site vegetation materials in a legal manner.
e) Acceptance of Compacted Subgrade – The Playing Field Contractor must certify subgrade elevation and compaction.
f) Acceptance of Drainage Gravel Layer – The Playing Field Contractor must certify the drainage gravel aggregate layer elevation.
g) Acceptance of Finished Topping Stone Layer – The Playing Field Contractor must certify the finished topping stone aggregate layer elevation. Provide a letter to the Parlier Unified School District project manager and architect relating to the final surface planarity.
h) Acceptance of installed Synthetic Turf and Infill Mix – The Playing Field Contractor must certify the final surface grading elevation.

2. Subsurface Drainage Collection System Requirements:

a) Approved Filter Fabric
b) Drainage Gravel Material Testing: Must submit 3rd party independent soil laboratory testing results and be approved by the Architect.
c) Finished Topping Stone Material: Must submit 3rd party independent soil laboratory testing results and be approved by the Architect.
d) Installation of the filter fabric and/or structural fabric product in accordance with plans, specifications, or manufacturers' requirements. (If required)
e) Survey Grade elevation certification of finished drainage gravel and finished topping stone installation.
f) Survey Final elevation certification of finished surface grading installation to include infill mix.

3. Playing Field Requirements:

a) Installation of perimeter turf anchor/nailer system.
b) Installation of Synthetic Turf including.

- Installation of full synthetic turf
- Inlaid field marking based on approved shop drawings.
- Infill material mix ratio/percentage to the optimum depth required.
- Refer to Section 11 68 00 – Athletic Field Equipment for additional athletic equipment.

4. Field Maintenance Equipment:

a) Synthetic Turf Maintenance Equipment (Purchased by the Playing Field Contractor)
b) Synthetic Turf Sweeper and Turf Brush per approved synthetic turf manufacturer awarded this contract. The Playing Field Contractor is fully responsible for all costs associated with field maintenance equipment.

1.4 REFERENCES

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.

1. American Association of State Highway and Transportation Officials (AASHTO):

a) T 89 - Determining the Liquid Limit of Soils
b) T 90 - Determining the Plastic Limit and Plasticity Index of Soils

2. Occupational Safety and Health Administration (OSHA)

3. Washington Department of Transportation (FDOT) Standard Specifications

4. American Society for Testing and Materials (ASTM):

a) D 395 - Rubber Property – Compression Test
b) D 418 - Pile Yarn Floor Covering Construction
c) D 2256 - Breaking Load (Strength) and Elongation of Yarn by the Single-Strand Method
d) D 3776 - Mass Per Unit Area (Weight) of Woven Fabric
e) D 3786 - Hydraulic Bursting Strength of Knitted Goods and Non-Woven Fabrics: Diaphragm Bursting Strength Tester Method,
f) D 4491 - Water Permeability of Geotextiles by Permittivity
g) D 4533 - Trapezoid Tearing Strength of Geotextiles
h) D 4632 - Breaking Load and Elongation of Geotextiles (Grab Method)
i) D 6241 - Index Puncture Resistance of Geotextiles, Geo-membranes, & Related Products
j) F 355 - Shock Absorbing Properties of Playing Surface Systems and Materials
k) F 405 - Corrugated Polyethylene (PE) Tubing and Fittings
l) F 449 - Subsurface Installation for Agricultural Drainage or Water Table Control
m) F 667 - 8, 10, 12, and 15-inch Corrugated Polyethylene Tubing and Fittings

5. American Wood Preservers' Association (AWPA):

a) C2 Lumber, Timbers, Bridge Ties, and Mine Ties
b) Preservation Treatment by Pressure Processes

6. Current NFHS Rules, Guidelines, and Interpretations

1.5 DEFINITIONS

A. Excavation: Removal of material encountered to subgrade elevations indicated and subsequent disposal or placement of materials removed.

B. Unauthorized Excavation: Inadvertent or purposely removing materials beyond indicated subgrade elevations or dimensions without specific direction of the Architect. Unauthorized excavation, as well as remedial work resulting from unauthorized excavation directed by the Architect, shall be at the Playing Field Contractor's expense.

1. Unauthorized excavation, including disposition of additional excavated materials and other work resulting from slides, cave-ins or remedial work shall be at the Playing Field Contractor's expense.

C. Additional Excavation: When excavation has reached required subgrade elevations, the Architect will be notified and will make an observation of conditions. If the geotechnical engineer/Testing Lab determines that the bearing materials at required subgrade elevations are unsuitable, the excavation shall be continued until suitable bearing materials are encountered and excavated materials shall be replaced as directed by the Geotechnical Engineer.

1. Removal of unsuitable material and its replacement as directed will be paid on the basis of the Conditions of the Contract relative to changes in work. A formal written submitted change in work must be submitted by the Playing Field Contractor for approval to the Architect, Civil engineer and the Parlier Unified School District County project manager before commencement of any work.

2. Subgrade: The undisturbed earth or the compacted soil layer immediately below the proposed playing field drainage or soil materials.

D. Finish Grade: This is the final surface grade with all the approved infill mix ratios at their optimum depth incorporated into the synthetic turf fibers.

E. Drainage Gravel Aggregate Material: Approved stone material with the sizing and performance characteristics described herein. This drainage gravel material is installed immediately on top of the filter fabric of the finished subgrade surface. The material must be tested and approved before placement on the field.

F. Finished Topping Stone Aggregate Material: Approved stone material with the sizing and performance characteristics described herein. This finished topping stone material is installed

immediately on top of the drainage gravel aggregate to create a smooth uniform surface (uniform planarity) for the placement of the synthetic turf product, as well as to aid in achieving finish grade tolerances of the playing field subsurface.

1.6 SUBMITTALS

A. Manufacturer's Product Data: Submit manufacturer's specifications and installation instructions for all products in the playing field system, including certifications and other data as may be required to show compliance with the Contract Documents. Included but not limited to the following: drainage pipe material, geotextile filter fabric, perimeter turf anchoring system, etc..

B. Material Certifications: Turf Manufacturer's or vendor's certified analysis for infill material and sand infill amendments.

C. Material Samples: Submit three (3) samples each of the following:

1. Geotextile fabric, approximately 7"x11".
2. All Drainage Pipe products, approximately 6 inches in length, full width
3. All Gravel Aggregate Materials – See Section 1.8, "Quality Control"

D. Synthetic Turf Material Samples and Test Reports:

1. Synthetic Turf – Three samples, approximately 12" x 12".
2. Main and Inlaid Seams: Two samples each, sewn (main) and glued (inlaid) per turf manufacturer's instructions, approximately 7" x 11".
3. Synthetic Turf Colors: Three samples of each color used for field markings (White, Yellow, Green, Lime Green, Gold, Black, and Blue).
4. Infill/Sand Mix: with proper mix ratio - three samples, approximately 8-ounces each product.
5. Infill Material: Submit sieve analysis for all infill mix materials.
6. Submit to Parlier Unified School District for approval: Quality assurance information as delineated in Section 1.7 Quality Assurance below.
7. Certified copies of independent (third-party) laboratory reports on ASTM tests are as follows:
    a) ASTM D72 - Specific Gravity
    b) ASTM D418 - Pile Height, Tuft Spacing, Face Weight & Total Fabric Weight
    c) ASTM D418 - Primary & Secondary Backing Weights
    d) ASTM D418 - Backing and Perforation Diameter and Spacing
    e) ASTM D1335 - Tuft Bind
    f) ASTM D5034 - Grab Breaking Strength and Elongation
    g) ASTM F-355 - Dynamic Cushion Test (G-max, HIC), Procedure A (system)
    h) ASTM D2859 - Flammability (Pill Burn Test)
    i) ASTM F3700 - PFAS Testing Report or current ASTM Method

E. Supplier List: Submit a list of procured and contracted suppliers of all materials required for the entire playing field system.

F. Progress Work Schedule: The Playing Field Contractor shall prepare a bi-monthly progress work schedule for all work described in these documents. This schedule shall be regularly updated and submitted as construction progress continues throughout the ultimate project completion.

G. Shop Drawings:

1. Synthetic Turf and Profile 10-Year Warranty
2. All structural foundation designs.
3. Quality Assurance and Quality Control 500 tons of aggregate material testing.

4. Seam Plan layout of the entire playing field.
5. Layout per the High School designated field lines, markings, and boundary lines.
6. Construction detail sketches, especially those that may deviate from the plans and specifications. Including but not limited to the following: perimeter turf anchor details, etc.

H. Subcontractor List: Submit a list of any key subcontractors for the project. Briefly describe the roles of responsibility for each as well as their experience with similar types of facilities as proposed as part of this constructed outline in plans and written specifications. This list should include but is not limited to:

1. Land Surveying Company.
2. 3rd Party certified soil laboratory specializing in playing field construction testing materials.
3. 3rd Party independent surface material testing company specializing in playing field G-max, Shock Absorption, Vertical Deformation, Energy Restitution, Rotational Resistance, CFH, and surface infiltration testing.
4. Geotechnical Testing Company.
5. Concrete Construction Company.
6. The Playing Field Contractor must have the ability to provide all the necessary current skilled employees to construct the entire playing field system including but not limited to a well-compacted subgrade, subsurface drainage collection system, drainage gravel blanket, Finished topping stone, uniform surface planarity, drainage/shock pad, concrete header board attachment, and installation of the synthetic turf material and infill product.
7. The Parlier Unified School District reserves the right to reject any proposed subcontractor that has or is currently involved in any pending legal action against them that resulted from failure to meet critical deadlines, inadequate drainage performance, overall poor quality of workmanship, etc. If the Parlier Unified School District rejects any subcontractor, the Playing Field Contractor shall replace that subcontractor or company at no additional cost to the Parlier Unified School District.

I. Synthetic Turf Manufacturer's Review: Shall submit a written statement, signed by Synthetic Turf Manufacturer that the plans and specification have been reviewed by a qualified representative of the turf manufacturer and that they agree that the proposed materials and entire system to be constructed for this synthetic turf field profile are proper and adequate for the applications shown in the design documents.

J. Warranty: Provide a copy of the Synthetic Turf Manufacturer's standard 10-Year Warranty noting any exceptions to the Warranty information included in this Specification Section. No 3rd Party Warranty shall be accepted.

K. Grade Verifications: A certified As-Built survey shall be prepared by a licensed State of Washington land surveyor shall be made of the in-place conditions at the compacted subgrade, subsurface drainage collection system, drainage gravel stone layer, finished topping stone layer, and finished synthetic turf surface grade with infill installed for demonstrating conformance to the specified grades shown on the final contract documents. The Playing Field Contractor shall not proceed until all grades, pipe inverts, pipe lengths, manholes, inline basins, have been submitted for approval by the Architect based on the signed and sealed As-Built surveys for all the above in-place conditions.

L. Turf Product System Hold Harmless: The turf manufacturer shall submit a written statement holding the Parlier Unified School District, Architect, and its representatives harmless as to any liability and or costs of any type, including but not limited to legal costs, royalties, replacement costs, etc. associated with any claim by the turf manufacturer or others associated and with any patents, IPO or infringements of any current or future patent issued for the synthetic turf product, infill materials, installation methods or drainage characteristics. It is not the intent of these documents to promote or induce the use of intellectual property belonging to others or promote infringement of any known or currently not known patents, licenses, or rights of others.

M. Statement of Supervision: Upon completion of the work, the Playing Field Contractor shall submit a written letter signed by the Synthetic Turf Manufacturer. Stating that the playing field inspection by the Synthetic Turf Manufacturer's representative was sufficient to ensure proper application of the completed system and all materials used and that all work was in accordance with the Contract Documents and that the installation is acceptable to the Synthetic Turf Manufacturer.

1.7 QUALITY ASSURANCE

A. Any site or playing field damage caused during construction shall be required to be repaired and corrected before final acceptance and issuance of substantial completion at no additional cost to the Parlier Unified School District.

B. The Playing Field Contractor shall be responsible for the protection of the synthetic field system and product after its installation through Substantial Completion.

C. Grade Verification: As-Built surveys shall be prepared by a licensed State of Washington land surveyor shall be made of the top of the in-place finished compacted subgrade, drainage gravel stone layer, and the finished topping stone layer using a Robotic Total Station or similar equipment. It is preferable that the Total Station equipment (or similar) also be utilized to install the finished grades at subgrade and topping stone layers. All As-Built surveys and lab testing certification shall be submitted to the Architect for approval before proceeding to the next phase of construction. Failure to comply with this requirement may result in an additional cost to demonstrate full project compliance with the approved contract documents and shall be conducted by the Playing Field Contractor at no additional cost to the Parlier Unified School District.

1.8 QUALITY CONTROL

A. Pre-Bid: Materials Inspection and Testing: Refer to Section 01 11 00.01 Playing Field Summary of Work for bid material submittal requirements.

B. Bid Award and before construction: The Playing Field Contractor shall submit samples of each of the following materials to establish the baseline specification and mix ratios for the remainder of the testing process.

1. Gravel Material: Provide a half-gallon sample of each gravel drainage source and for each type of gravel material to be used for testing. This could include:

   a) Drainage Gravel aggregate material.
   b) Finished topping stone aggregate material.

2. Infill Materials: Provide a half-gallon sample of each infill material to be used for testing. This shall include but is not limited to:

   a) Cryogenic SBR Rubber
   b) Silica Sand

   c) Cooling Technology Product

C. During Construction: Submit samples of each of the following during mass production of drainage gravel and finished topping stone aggregate materials for performance testing and before shipping to the site.

1. EARTHWORK MATERIAL QUALIFICATION AND TESTING:

   a) If found necessary, submit the following test data for each potential borrow source.

      - Particle Size Analysis:

         - Method: AASHTO D422.
         - Number of Tests: Three (3) per potential source.
         - Acceptance Criteria: Gradation within specified limits.

- Maximum Density Determination:
    - Method: Modified Proctor Test - ASTM D 1557.
    - Number of Tests: Three (3) per potential source.

b) Re-establish gradation and the maximum density of fill material if the source is changed during construction.

2. EARTHWORK/COMPACTION TESTING:

a) All compaction testing shall be performed by the Playing Field Contractors' geotechnical testing agency. The Playing Field Contractor shall coordinate all work with the Parlier Unified School District project manager, Architect, and Civil engineer. Notify the Architect at least two (2) working days in advance of all phases of filling and backfilling operations. The Playing Field Contractor shall not proceed until the Architect and Engineer receives approved certification from the geotechnical testing company that the compaction is within allowable testing limits.

b) Compaction testing shall be performed to ascertain the compacted density of the fill and backfill materials in accordance with the Earthwork specification included in the Documents or as per the following methods:

- IN-PLACE RELATIVE DENSITY:
    - Method: ASTM D-1556, Sand Cone Method
    - ASTM D-2922, Nuclear Method
- NUMBER OF TESTS:
    - One (1) per 2,500 SF in each vertical lift with a minimum of one (1) test per each vertical lift.

c) The Engineer may direct additional tests to establish gradation, maximum density, and in- place density as required by working conditions, at the Playing Field Contractor’s expense.

d) Acceptance Criteria: The sole criterion for acceptability of in-place fill shall be in situ dry density. The minimum dry density for all fill or backfill shall be 95 percent of the maximum dry density as determined by the Modified Proctor Test (ASTM D-1557). If a test fails to qualify, the fill shall be further compacted and re-tested. Subsequent test failures shall be followed by the removal, replacement of the material, and retesting.

3. Drainage Gravel Material / Finished Topping Stone Aggregate Materials:

a) A minimum of one gallon sample for every 500 tons of each material used shall be tested by the approved 3rd party certified soil testing laboratory for general compliance with the established Baseline specifications. All additional gravel materials shall be tested and certified against the approved baseline sample shop drawing before installation in the field. All costs associated with quality assurance and quality control testing are the Playing Field Contractor responsibility. All soil testing results must be submitted to the Architect for review and approval before any gravel aggregate material delivery.

4. Infill Materials:

a) Random samples shall be pulled from bulk packages or piles on-site. The number of samples is at the Parlier Unified School District discretion. The samples shall be tagged and marked from the packages for future reference after testing is complete. Sieve analysis testing results shall be compared to the Vendor’s previously submitted analysis for the in-fill materials for approval. Packages that do not meet approval shall be removed legally from the site. Initial testing shall be paid for by the Playing Field Contractor. Retesting shall be at the Playing Field Contractors' expense. Additional screening of rubber materials by the Playing Field Contractor to remove fines may be required at the Parlier Unified School District sole discretion at no additional cost to the Parlier Unified

School District (if applicable).

b) Heavy Metals Ingestion Test Method – One test per field from the final supplier of infill materials using the ASTM F963 Toxic Heavy Metals method. Test to be performed by Northwest Laboratories, 241 South Holden St., Seattle, WA 98108 (206) 763-6252 or equal.

5. Synthetic Turf Material Testing: Before shipment to the project site, one 12" x 12" sample from each fifth roll shall be randomly taken and tested by an independent laboratory with experience testing these materials. Test results shall be submitted simultaneously to the Parlier Unified School District Project Manager, Architect, and the Playing Field Contractor. Samples/Rolls not meeting approval shall not be shipped. Testing shall be paid for by the Playing Field Contractor. Samples used for testing shall be tagged and marked and submitted to the Architect after testing is complete. The following shall be tested/reported:

a) ASTM D418 - Pile Height, Face Weight & Total Fabric Weight
b) ASTM D418 - Primary & Secondary Backing Weights
c) ASTM D418 - Backing and Perforation Diameter and Spacing
d) ASTM D1335 - Tuft Bind
e) ASTM D1682 - Grab Tear Strength

6. SYNTHETIC TURF PRODUCT SAFETY STATEMENT:

a) The Playing Field Contractor shall submit a signed statement with documents from the synthetic turf manufacturer that provide information on the safety of their product regarding PFAS, lead, heavy metals, and other chemicals used in their product.

D. TESTING AGENTS:

1. Sitework and Materials Testing Agents:

a) The Playing Field Contractor shall hire a separate contract testing agent to certify and make recommendations regarding compaction, concrete, geotechnical and other items required by the Work. The Playing Field Contractor shall notify the Architect and the Parlier Unified School District Project Manager regarding the timing, scheduling, and use of this agent.

2. The Parlier Unified School District Recommended Soil Laboratory Testing Agent:

a) The Playing Field Contractor shall hire the recommended Soil Laboratory Testing Agent to perform testing of the field system aggregate materials, including but not limited to drainage gravel material, finished topping stone, as well as testing the capability of the aggregate materials to meet, product gravel sieve sizes, permeability, bridging requirements and Micro Deval or Alternate Testing Method before construction. Agent(s) shall be a 3rd party certified independent laboratory, accredited, and insured. The Playing Field Contractor shall be fully finically responsible for all soil laboratory testing, sampling, and shipping costs.

b) The Soil Laboratory is to report/submit test results as they are known and simultaneously to the Playing Field Contractor, Parlier Unified School District Project Manager, and Architect.

c) The Architect shall be solely responsible for approving or rejecting all laboratory testing results shop drawings. The approved 3rd party independent testing laboratory shall be responsible for all testing data. No multiple testing agent data shall be submitted.

- Recommended Soil Laboratory Testing Agent:

Turf & Soil Diagnostics
613 E. 1st Street
Linwood, KS 66052
(T) +1 855-769-4231

(E) lab@turfdiag.com
http://www.turfdiag.com

- Or approved Equal Testing Laboratory by the Parlier Unified School District.

E. Upon completion of the installation of Drainage Gravel Aggregate Material and Finished Topping Stone Aggregate, the specialized testing company shall perform 6 random infiltration tests for the field. The minimum infiltration rate shall be no less than 50 inches per hour. The Playing Field Contractor and Architect shall be present at these tests. Upon successful completion, the turf installation shall begin. Areas that do not meet the drainage performance requirements shall be repaired by the Playing Field Contractor and retested before synthetic turf installation.

F. Synthetic Turf Surface Testing: Upon completion of the installation of turf surface, field markings, and infill mix materials. The specialized testing company shall perform a minimum of six (6) random percolation tests for the field. The Playing Field Contractor and the Architect shall be present at these tests. A minimum percolation rate shall be no less than 12 inches per hour at the surface without any visual standing of any water. Areas that do not meet the drainage performance requirements shall be repaired by the playing field contractor and retested before acceptance of the synthetic turf installation.

1.9 DELIVERY, STORAGE, AND HANDLING:

A. All materials shall be delivered and stored within designated work limits or in an area approved by the Parlier Unified School District Project Manager and the Playing Field Contractor.

B. All material shall be stored in strict accordance with the Synthetic Turf Manufacturer's recommendations.

C. Special care shall be exercised during delivery and storage to avoid damage to any products.

D. Products that are damaged will be removed and replaced, unless the product can be repaired in an acceptable manner by the Playing Field Contractor, at his/her direct expense.

E. Packaged Materials:

1. Deliver packaged materials in containers showing weight, analysis, and name of the manufacturer. Protect materials from deterioration during delivery, and while stored at the site. Store all materials out of low-lying or standing water areas.

F. DRAINAGE GRAVEL AND FINISHED TOPPING STONE MATERIALS:

1. Deliver only pre-approved tested aggregate material lots in clean, washed, and covered trucks to eliminate contamination during transportation. Place it directly onto the playing field area. Do not stockpile any pre-approved tested materials on site. All materials must be laboratory tested and approved by the Architect before delivery.

1.10 COMPLETION AND ACCEPTANCE:

A. General: Field Completion shall be separated into two (2) phases, "Initial Punch List"- Preliminary Completion and "Substantial Completion."

B. Preliminary Completion: Scheduled date for the initial punch list preparation shall be at least ten (10) calendar days before Substantial Completion can be considered. Notify the Architect and the Parlier Unified School District Project Manager in writing three (3) days before the scheduled date and time for the punch list preparation field visit. Before scheduling this field visit to prepare the initial punch lists of items that need to be corrected or addressed, the following items shall be completed and provided to the Architect and the Parlier Unified School District Project Manager three (3) days before the initial field visit:

1. Completed Subsurface Drainage Collection System installed, and all required signed and sealed As-Built surveys.

2. All drainage gravel material and finished topping stone aggregates in place must have been tested and approved based on the 500 tons of materials testing requirements.
3. Field curbing was installed with a wooden nailer board and attachment anchors.
4. Synthetic turf installed including approved infill mix materials and all field markings.
5. In situ percolation tests were performed for both the entire gravel/finished topping stone profile and the synthetic turf infill surface.
6. All inground equipment identified on the construction plans and specified in Section 11 68 00 - Athletic Field Equipment

C. Substantial Completion: After “Preliminary Completion”, the Playing Field Contractor must have completed or addressed all outstanding punch list items and must be fully in compliance with the project design and written specifications. “Substantial Completion”. The Playing Field Contractor shall notify the Architect and the Parlier Unified School District Project Manager in writing, three (3) days before the scheduled date and time for the site visit to ensure that all outstanding punch list items have been completed to obtain “Substantial Completion.” The following must be provided:

1. All Punch List items have been deemed complete by the Parlier Unified School District Project Manager and the Architect.
2. Submit five (5) copies of written operating and maintenance instructions. Provide format and contents as directed by the Parlier Unified School District Project Manager.
3. Submit five (5) copies of all certified As-Built surveys performed during construction for Quality Control.
4. Submit all copies of certified soil laboratory testing results for all related sub-grade, drainage gravel aggregate materials, topping stone aggregate materials, compaction, and field-testing result for the in-place percolation rates for the complete subsurface profile and playing field surface.
5. Smooth, uniform playing surface, and level to meet the surface grading tolerances.
6. Written warranties/guarantees.
7. Upon completion of the synthetic field surface, the Playing Field Contractor shall provide the Parlier Unified School District staff with up to two (2) hours of maintenance training that shall be video recorded and supplied to the Parlier Unified School District Project Manager.
8. Upon completion, the Playing Field Contractor shall provide the Parlier Unified School District and the Architect with all project-related shop drawings, passing soils testing reports, 3rd Party independent surface material testing company specializing in playing field G-max, Shock Absorption, Vertical Deformation, Energy Restitution, Rotational Resistance, CFH, and surface infiltration testing. All as-Built survey drawings in a PDF and AutoCAD format in state plane coordinates. Failure to submit the required documents will result in the final payment being withheld. The final submission package is subject to review and approval by the Architect before making a final formal written recommendation for final payment by the Parlier Unified School District.

1.11 WARRANTY/GUARANTEE:

A. General: Warranties / Guarantees specified in this Article shall not deprive the Parlier Unified School District of other rights the Parlier Unified School District may have under other provisions of the Contract Documents and are in addition to and run concurrently with other warranties/guarantees made by the Playing Field Contractor under requirements of the Contract Documents.

B. The following are inclusive of the term “Playing Field System” for provisions of the guarantee:

1. Final grade tolerances to one-quarter inch in the length of 25' of finish grade in any direction (.04’).

2. Synthetic turf products as specified and represented by the Turf Manufacturer also including seams and adhesives type used in the installation.
3. Properly constructed and working subsurface drainage collection system.
4. All product materials and specified products have been installed in accordance with the manufacturer's product recommendations.
5. Proper infiltration testing results demonstrate that the entire synthetic turf profile system which includes synthetic turf product, infill mix, finished topping stone aggregate, and drainage gravel aggregate materials shall be guaranteed to have a minimum infiltration rate of no less than 12 inches per hour without any visual ponding of water.

2. The synthetic turf manufacturer shall retain a third-party certified testing laboratory and shall perform field safety testing (based on the highest level of intended athletic sports usage) testing before acceptance/Substantial Completion. Parlier Unified School District shall be responsible for maintaining this field and testing each year for the life of the Guarantee. The playing field is limited to the following athletic uses: Football, Soccer. Football usage in this field should also be considered in the final determination relating to the proper ASTM and EN guidelines testing.

C. ASTM and EN Testing Required

1. ASTM 3189-20 - Determination of Shock Absorption
2. ASTM 3189-20 - Determination of Vertical Deformation
3. ASTM 3189-20 - Determination of Energy Restitution
4. ASTM F1936-19 - Determination of Impact Attenuation
5. EN 15301:2007 - Determination of Rotational Resistance
6. EN 1177:2018 Method 2 - Determination of Critical Fall Height

1. Initial safety field testing shall be provided by the synthetic turf manufacturer in the third-party certified testing laboratory before acceptance/Substantial Completion.
2. The Parlier Unified School District Project Manager and the Architect shall receive a copy of the Initial G-Max and additional above testing results before acceptance/Substantial Completion.
   a) The initial test shall not exceed 150 G's at any one point on the field.
      - In cases where the results of the above testing exceed the specified values, the condition shall be corrected by the synthetic turf manufacturer.
      - The synthetic surface manufacturer shall provide adequate information to confirm that the mitigation measures were effective.
   b) At no time in the life of the Guarantee shall G-Max exceed 200G's be above that range, at any one point on the field. The Parlier Unified School District shall conduct yearly testing and retain the records for all corrective measures taken, if any.
3. The initial depth of the infill material shall be measured at the point of each test location.
4. The initial testing shall be performed by a certified independent lab and paid for by the Playing Field Contractor.
5. If the Playing Field Contractor does not perform the tests within 30 days of the dates noted, the Parlier Unified School District shall at its discretion order this work performed and the Playing Field Contractor shall bear this cost.

D. The Playing Field Contractor shall not be held liable for incidental or consequential damages. The Synthetic Turf Warranties described shall be conditioned upon:

2. The Parlier Unified School District shall make all minor repairs to the synthetic turf system as discovered, unless covered under the terms of the 10-year or 1-year workmanship warranties.

3. The Parlier Unified School District shall maintain the field as described in the Owner's Manual submitted by the Playing Field Contractor to Parlier Unified School District.

E. The warranty does not cover any failure related to any damage caused by or connected with abuse, neglect, deliberate acts, acts of God, casualty, or loads exceeding the Synthetic Turf Manufacturer's recommendations.

F. The total synthetic turf system and subsurface profile warranty length shall be ten (10-year) minimum.

1.12 SPARE PARTS/ATTIC STOCK

C. Stockpile Materials (Attic Stock): Provide the following additional materials stored as directed by the Parlier Unified School District. All infill products shall be provided in super sacks.

Material	Quantity
All Infill Profile Materials	1/2 ton (each)

D. SYNTHETIC TURF: The minimum size of turf shall be 10' x 10'. Provide the following minimum materials and store as directed by Parlier Unified School District.

1. Green and Lime Greem Turf: 2,000 square feet
2. Blue Turf: 250 square feet
3. White and Gold Turf for Lines: 100 linear per color feet 4-inch width.

PART 2 – PRODUCTS

2.12 EARTHWORK MATERIALS:

A. Suitable Material: Soils classified by ASTM as GW, GP, GM, GC, SW, or SP, free from organic, frozen, or other deleterious materials. When approved by the Field Designer / Architect Geotechnical Engineer on a case-by- case basis, Select Fill is an acceptable alternative.

B. Structural Fill: non-plastic, sound, durable, granular particles consisting of sand, gravel, stone, or blends with these materials, free from organic, frozen, or other deleterious materials, conforming to the following size and percentage passing requirements:

Sieve	Percentage Passing
4"	100
No. 40	0-70
No. 200	0-10

C. All gravel and stone shall be angular. Rounded or river stones are not allowed.

D. GEOTEXTILE FILTER FABRIC:

1. General:

a) The geotextile fabric shall be a nonwoven sheet of plastic yarn as defined by ASTM D123 and conform to the criteria presented in the following table. These requirements shall be based on the Minimum Average Roll Value (MARV) which is defined as the value that can be expected, with 95% confidence, to be the minimum test average obtained on a roll sampled and tested in accordance with ASTM D4759.

b) Geotextile shall meet the requirements of AASHTO M288 except as modified herein.

Physical Property	ASTM Procedure	Minimum Acceptance Criteria	
Class I			
Geotextile Class 1		English	Metric
Grab Tensile Strength	D 4632	120 lbs.	534 N
Grab Elongation at Break	D 4632	50%	50%
CBR Puncture Strength	D 6241	310 lbs.	1380 N
Mullen Burst Strength	D 3786	260 psi	1790 Kpa
Trapezoidal Tear	D 4533	50 lbs.	223 N
Apparent Opening Size (AOS)	D 4751	70 US Sieve (max.)	212 µm (max.)

2. Product

   a) Mirafi 140N or approved equivalent.

E. DRAINAGE GRAVEL MATERIAL AND FINISHED TOPPING STONE:

1. The drainage gravel material and finished topping stone shall conform to the turf vendor's standard specifications subject to the Field Designer and Architects approval based on the testing labs certification and meet the following requirements using ASTM Method C136:

Drainage Gravel Material 57 Stone		**Finished Topping Stone** 89 Stone	
Sieve Size	**% Passing by Weight**	**Sieve Size**	**% Passing**
1-1/2"	100		
1"	95-100		
3/4"			
1/2"	25-80	1/2"	100
3/8"		3/8"	90-100
No. 4	0-10	No. 4	20-55
No. 8	0-5	No. 8	5-30
No. 16	0	No. 16	0-10
No. 50	0	No. 50	0-5

2. All stones shall be angular. Rounded or river stone is not acceptable.

   a) Any aggregate sample with shell or shell fragments is not acceptable. The test report shall note if any sample received contains any shell or shell fragments.

   b) Topping stone and drainage gravel aggregate materials shall be evaluated every 500 tons by the approved the Parlier Unified School District testing agent and shall be submitted to the Architect, Field Designer, and the Parlier Unified School District Project Manager for approval before placement on any playing field. All testing will be at the Playing Field Contractors' expense. *Local quarry quality control testing is not and will not be an acceptable testing method for the approval of any aggregate materials.*

3. In no instance shall multiply quarry sources be used within a single playing field area.

4. Bridging Characteristics:

   a. $3 < \frac{D_{50} \text{ base stone}}{D_{50} \text{ top stone}} < 6$ b. $\frac{D_{85} \text{ top stone}}{D_{15} \text{ base stone}} < 2$

5. Drainage Characteristics

   a) Permeability for Drainage Gravel aggregate material shall be greater than 150"/hr.

   b) Permeability for Finished Topping Stone aggregate shall be greater than 50"/hr.

   c) Porosity for the Finished Topping Stone and Drainage Gravel aggregate materials shall be greater than 25% when compacted and saturated.

6. Finished Topping Stone aggregate is allowed for use to level the finished surface of the Drainage Gravel aggregate material. The total allowable depth for the proposed finished topping stone aggregate material to be in the range between 1/2" to 1" inch maximum.

7. All finished topping stone and drainage gravel aggregate materials should minimally meet the Micro Deval method (ASTM D6928). Testing Method
Criteria

Micro Deval (ASTM D6928) Not to exceed a loss of Material greater than 18%.

a) Any loss greater than 18% will not be permitted for use, unless otherwise approved by the Field Designer or Architect.

2.13 CONCRETE FIELD CURBING:

A. The synthetic turf concrete curbing and nailer board shall be located at the field perimeter or turf edges and shall be as per drawings or approved equal. Concrete curb detail as shown on drawings is the minimum base bid design requirement.

B. WOODEN NAILER BOARD:

2. Yella Wood

a) 2" x 4" Pressure Treated
b) Or approve equivalent.

C. ANCHORS NAILS FOR WOOD NAILERS ATTACHED TO FIELD CURB:

2. Stainless Steel Ramset/Redhead

a) Use 4 per 8-foot length nailer
b) Use 5 per 10-foot length nailer
c) 4 inches from the end of the board

2.13 SYNTHETIC TURF PRODUCT:

A. Refer to Section 01 11 00.01 PLAYING FIELD SUMMARY OF WORK for additional requirements.

B. GLUED SEAMS:

1. Adhesives for bonding tufted synthetic turf shall be one-part moisture cured polyurethane obtained from a single manufacturer. Modify the adhesive as recommended by the Manufacturer during adverse weather conditions.

2. Supplemental backing material shall be used if inlay seams are cut through the turf product.

3. PRODUCT

a) Nordot Adhesive #34G
b) Sopracolle "E", Manufacturer – Soprema USA, Wadsworth, Ohio
c) Or approved equivalent.

4. SUPPLIER

a) Synthetic Surfaces, Scotch Plains, NJ, (908) 233-6803
b) Or approved equivalent.

C. SEWN SEAMS:

1. The cord for sewing seam turf shall be high strength polyester fiber or nylon as recommended by the synthetic turf manufacturer, utilizing the flap method for joining seams.

D. TURF PERFORATIONS:

1. Turf products with a coated or non-drain backing must include perforations in the backing with no less than 98% perforations found in any roll. Any roll with less than 98% perforations will be rejected.
2. Perforations shall be a minimum of 3/16 inch diameter clear opening with a staggering maximum spacing of no greater than 4 inches.
3. Perforations shall be full diameter with no residue or hanging fibers remaining.
4. Turf products with permeable backing do not require perforations.
5. A minimum percolation rate for all turf products of 30 inches per hour shall be provided for the backing and verified by a third-party independent testing agent.

2.14 SYNTHETIC INFILL TURF PRODUCT

A. Infill Product Mix: Silica Sand and Cryogenic SBR Rubber

1. The Turf Manufacturer must provide five (5) successful similar projects in the State of Washington (Only) that are utilizing the same proposed synthetic turf pile height, total pile weight, and all infill mixed products.

B. APPEARANCE/FEEL:

1. The finished playing surface shall appear as mowed grass with no irregularities and shall afford excellent traction for conventional athletic shoes of all types.
2. The finished surface shall resist abrasion and cutting from normal use.

C. INFILL MATERIALS:

1. A mixture of silica sand, and cryogenic SBR rubber fill in specific infill mix ratios per manufacturer. The synthetic turf company and is fully responsible for 100% replacement of the entire infill product replacement and or full synthetic turf replacement as a result of surface infiltration decline or complete failure.
2. Infill material shall be provided at a depth leaving the top 1/2-inch height of visible synthetic turf fabric or as recommended by the manufacturer based on weight and/or as agreed by the Parlier Unified School District, Architect, and Field Designer.
3. The infill material shall be Silica Sand and Cryogenic SBR Rubber mix.
4. Infill materials shall be supplied by a single source.
   a) Sand Infill Material Characteristics
      - Clean round particles
      - The majority of particles between 0.50 and 1 mm
      - < 5% retained on a #100 sieve (.15 mm)
      - Not more than 0.5% of particles passing the #200 sieve
5. The initial laboratory testing and approval of the infill materials and the appropriate mix ratio (minimum, maximum, and optimum depth must be provided as a shop drawing) and once approved shall set the baseline for all additional testing of the material.
6. Synthetic Turf Manufacturer shall verify and approve the test results of the infill materials for the initial and all additional quantities for additional testing.
7. The proposed infill mix must be tested by utilizing a third-party certified independent testing laboratory in accordance with the proposed synthetic turf product, silica sand, organic infill, and cooling technology based on the optimum depth of the proposed mix ratio and provide the infiltration rate for the combined infill mix products utilizing the proposed synthetic turf product and submit the final testing results for review and approval by the Architect before installation on the playing field.

D. GLUED SEAMS:

1. Adhesives for bonding tufted synthetic turf shall be one-part moisture cured polyurethane obtained from a single manufacturer. Modify the adhesive as recommended by the Manufacturer during adverse weather conditions.
2. Supplemental backing material shall be used if inlay seams are cut through the turf product.
3. PRODUCT
    a) Nordot Adhesive #34G
    b) Sopracolle “E”, Manufacturer – Soprema USA, Wadsworth, Ohio
    c) Or approved equivalent.
4. SUPPLIER
    a) Synthetic Surfaces, Scotch Plains, NJ, (908) 233-6803
    b) Or approved equivalent.

E. SEWN SEAMS:

1. The cord for sewing seam turf shall be high strength polyester fiber or nylon as recommended by the synthetic turf manufacturer, utilizing the flap method for joining seams.

F. TURF PERFORATIONS:

1. Turf products with a coated or non-drain backing must include perforations in the backing with no less than 98% perforations found in any roll. Any roll with less than 98% perforations will be rejected.
2. Perforations shall be a minimum of 3/16 inch diameter clear opening with a staggering maximum spacing of no greater than 4 inches.
3. Perforations shall be full diameter with no residue or hanging fibers remaining.
4. Turf products with permeable backing do not require perforations.
5. A minimum percolation rate for all turf products of 30 inches per hour shall be provided for the backing and verified by a third-party independent testing agent

2.15 SYNTHETIC INFILL TURF MAINTENANCE EQUIPMENT

A. Equipment to be included in the project bid pricing. The Playing Field Contractor shall include the purchase and necessary training associated with the purchase of the Synthetic Turf Broom and Sweeper Model(s): Per approved turf manufacturer. (1 each for this contract)

PART 3 – EXECUTION

3.1 EXAMINATION AND PROTECTION

A. Previous Documents: The Playing Field Contractor to review Earthwork specifications from previous work to become familiar with and understand the extent of the previous work regarding earthwork and subgrade conditions.

B. Verification of Conditions: Examine areas and conditions under which all work of this Section is being performed. Do not proceed with any work until unsatisfactory conditions have been corrected. Commencement of work implies acceptance of all areas and conditions.

C. Protection of Work: Protect all ongoing work, so as not to delay work due to weather or project-related construction. This includes but is not limited to the use of tarps, geotextile fabric, plywood, and other protective measures.

D. Protection of Persons and Property: Provide all necessary measures to protect workmen and passersby. Barricade open excavations occurring as part of the work, as required by municipal or other authorities having jurisdiction.

1. Protect adjacent construction throughout the entire operation. Protect newly graded areas from destruction by weather or runoff. Protect structures, utilities, pavements, and other improvements from damage caused by settlement, lateral movement, undermining, and washout.

E. Unanticipated Conditions: Notify the Architect immediately upon finding evidence of previous structures, materials that penetrate below designated excavation levels, or other conditions which are not shown, or which cannot be reasonably assumed from existing surveys and geotechnical reports. Secure the engineer's instruction before proceeding with further work in such areas.

3.2 EARTHWORK EXECUTION / PLAYING FIELD SUBGRADE

A. PREPARATION:

1. Establish the required lines, levels, contours, and datum. The Playing Field Contractor is fully responsible for all work and shall coordinate and ensure that the final grade of various materials such as the subgrade, drainage gravel aggregate, finished topping stone aggregate, and synthetic turf surface grading with infill incorporated in the final surface grade, etc., that will result in the final field grades complying with the final Contract Drawings when the complete system is installed.

2. Maintain benchmarks and other elevation control points. Re-establish, if disturbed or destroyed, at no additional cost, to the Parlier Unified School District.

3. Establish the location and extent of utilities before the commencement of grading operations.

4. GROUNDWATER CONTROL:

a) Where groundwater levels are sufficiently high, always provide pumps in sumps as required, maintaining groundwater at a minimum depth of two feet below the excavation bottom. Maintain dry conditions until completion and acceptance of the base before synthetic turf placement.

b) Provide standpipes or other means of monitoring groundwater levels during groundwater control operations. Sumps shall be lined with geotextile filter fabric. Conduct dewatering operations in a manner that will limit the withdrawal of fines.

5. SURFACE WATER CONTROL:

a) All earthwork operations shall be conducted in a manner to prevent surface water from infiltrating into the subgrade and base. Drainage is always to be maintained in all parts of the site to drain surface water without ponding. The Playing Field Contractor, at his own expense, shall undercut soils saturated by ponding and backfill per this section at the direction of the Architect.

B. EXCAVATION:

1. Excavation shall consist, in general, of the excavation of whatever substance is encountered to the lines, grades, and sections shown on the Drawings, including excavation as necessary for grading and other similar features.

2. During construction, the grading operations shall be executed in such a manner that the excavation will always be well-drained. All grading shall be finished on neat, regular lines conforming to the sections and contours shown on the Plans.

3. Removal of materials beyond the indicated subgrade elevations, without authorization by the Architect, shall be classified as unauthorized excavation and shall be performed at no additional cost to the Parlier Unified School District.

4. Excavation shall be performed properly with all other associated operations.

5. Maintain the slopes of excavation in a safe condition until completion of the grading operation.

6. All excavation work shall be reviewed and approved by the Architect or Geotechnical

Engineer before proceeding with construction.

7. Any excess excavation shall be removed from the site to disposal areas at the Contractor's expense.

C. FILL:

1. All site fill material shall be "Structural Fill" unless otherwise shown on the Drawings or directed by the geotechnical engineer. "Structural Fill" shall be placed in a place of "Suitable Material" that was directed by the Geotechnical Engineer.

2. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from the ground surface before the placement of fill.

3. Before placing fill over undisturbed material, scarify to a minimum depth of six (6) inches.

4. The original ground or subgrade shall be proof rolled until the underlying soil is thoroughly compacted to the satisfaction of the Architect. A steel-wheel tandem roller weighing 8 to 10 tons of equipment capable of obtaining the same compaction effort shall be used to obtain a thoroughly compacted subgrade. The subgrade shall be inspected before any fill operations or construction of improvements. Remove or re-compact any soft or loose soils as determined by the geotechnical engineer before filling. Remove any material determined to be unsuitable by the geotechnical engineer and replace it with compacted suitable material.

5. A thoroughly and satisfactorily compacted subgrade is defined as having a minimum dry density of 95 percent of the maximum density of the material used as determined by the Standard Proctor Test (ASTM D 698). The subgrade material shall be compacted at moisture content suitable for obtaining the required density.

   a) When the existing subgrade ground surface has a density less than that specified under "Compaction" for particular area classification, break up the ground surface. Scarify the existing subgrade to a depth of 8 inches before compacting. Moisture condition between 3 percent below and 2 percent above optimum moisture content, and re-compact to at least 95 percent of standard proctor density (ASTM D698).

6. Placement of backfill and fill materials in layers not more than six (6") in loose depth. Lift height shall be governed by the ability of the compaction equipment to obtain the required compaction with six (6") as a maximum lift height. Before compaction, moisten, or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on muddy surfaces, ponding water, or extraneous debris.

7. When work is suspended during periods of freezing weather, measures shall be taken to prevent fill already in place from freezing. Upon resumption of work after any inclement weather, prepare the exposed surface by proof rolling to identify any zones of soft/loose soils. Soft/loose materials or frozen soils shall be removed and replaced by compacted select fill.

D. MOISTURE CONTROL:

1. Where subgrade soil material, fill, or backfill must be moisture conditioned before compaction, uniformly apply water to the surface and to each layer of fill or backfill as necessary to provide optimum moisture content. Prevent ponding or other free water on the surface after, or during, compaction operations.

2. Remove and replace, or scarify and air dry, soil that is too wet to permit compaction to specified density. Soil that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing, until the moisture content is reduced to a value that will permit compaction to the percentage of maximum density specified.

E. GRADING:

1. The finished grade lines are shown on the contract drawings. Upon completion of this work, all debris shall be cleaned out and removed from the premises.

2. All cutting, filling, backfilling, and grading necessary shall be done to bring the area to the following grade or subgrade levels:

    a) The final elevation of the Subgrade shall be within plus or minus one-tenth inch on a 25 foot by 25-foot grid of the finished grades indicated on the Contract Drawings. Laser-controlled or indicated equipment shall be used for this part of the work.

    b) The subgrade shall mirror the final finish elevation of the field surface regarding slope except as indicated otherwise denoted on the drawings.

    c) All surfaces shall be graded to drain to drainage structures with no ponding. The grading tolerances given above do not relieve the Playing Field Contractor from this requirement.

3. Sufficient grading must be done during the progress of the work so that the entire site shall be well-drained and free from water pockets.

4. Finish grading, including dressing swales, disposing of excess material and all other work necessary to prepare the site for final surfacing shall be done after construction of structures is complete.

F. COMPACTION EQUIPMENT

1. Compaction equipment used for the Work is subject to approval by the Geotechnical Engineer. Any equipment not originally manufactured for compaction purposes and equipment which is not in proper working order will not be approved. Furnish manufacturer's specifications covering data not obvious from a visual inspection of the equipment and necessary to determine its classification and performance characteristics.

3.3 EARTHWORK EXECUTION / FINISH PLAYING FIELD SUBGRADE

A. PLAYING FIELD SUB-GRADE REQUIREMENTS:

1. Trim to finish playing field subgrade meeting the finish elevation tolerances as described herein.

2. All cutting, filling, backfilling, and grading necessary shall be done to bring the playing field areas to the following tolerances:

    a) The final elevation of the finish playing field subgrade shall be plus or minus one-tenth inch at any point on the field and a 25 foot by 25-foot grid of the finished grades indicated on the Contract Drawings. Laser-controlled or indicated equipment shall be used for this part of the work.

    b) Finished playing field subgrade shall mirror the final finish elevation of the field surface regarding slope unless otherwise denoted on the drawings or details.

B. Playing Field Subgrade elevation verification: A certified survey by a State licensed land surveyor shall be performed at a 25-foot grid for each field to verify the grade and elevation of the sub-grade. The survey shall indicate spot elevations and a tenth of foot contours (.04'). Must be reviewed and approved by the Architect before placement of any additional materials.

C. LAYOUT AND CONTROL:

1. The Playing Field Contractor shall be responsible for furnishing, setting, and marking all line and grade, and location stakes, including offsets and general construction staking.

2. Playing Field Contractor to establish required lines, levels, contours, and the datum in preparation for achieving finish playing field surface grade. The Playing Field Contractor responsible for work shall coordinate and ensure that the final elevations of various materials such as the subgrade, concrete curbing, nailer board, drainage gravel aggregate, finished topping stone aggregate layers, synthetic turf, turf infill, etc., will result in the final playing surface turf elevations being in conformance with the final Contract Documents.

3. Maintain benchmarks and other elevation control points. Re-establish, if disturbed or destroyed, at no additional cost to the Parlier Unified School District.

4. Establish the location and extent of utilities before the commencement of grading operations.
5. SURFACE WATER CONTROL:
    a) All earthwork operations shall be conducted in a manner to prevent surface water from infiltrating into the sub-grade and base. Drainage is always to be maintained in all parts of the site to drain surface water without ponding. The Playing Field Contractor, at his own expense, shall undercut soils saturated by ponding and backfill per this Section at the direction of the Geotechnical Engineer.

D. PLAYING FIELD FINISH SUB-GRADING:
1. After approval of subgrade, trenching
2. All cutting, filling, backfilling, and grading necessary shall be done to bring the playing field areas to the following tolerances:
    a) The final elevation of the finish playing field subgrade shall be plus or minus one-quarter inch at any point on the field and a 25 foot by 25-foot grid of the finished grades indicated on the Contract Documents. Laser-controlled or indicated equipment shall be used for this part of the work.
    b) The finish playing field subgrade shall mirror the final finish elevation of the field surface regarding slope unless otherwise denoted on the drawings.

E. Playing Field Finish Subgrade elevation verification: A certified as-built survey by a State licensed land surveyor shall be performed at a 25-foot grid for each field to verify the elevations of the subgrade. The survey shall indicate spot elevations and a tenth of foot contours (.04').

F. Finish grading outside of the playing field areas:
1. Includes but is not limited to disposing of excess material and all other work necessary to prepare the site for final surfacing shall be done after construction of structures is complete.
2. All surfaces shall be graded to drain to drainage structures with no ponding.
3. The finished grading shall be graded to a tolerance of no greater than a one-tenth inch.

3.4 FIELD CURB/TURF NAILER:

A. Install approved anchoring/nailing system(s) at the entire perimeter/edges of turf installation.

B. Coordinate installation with the installation of concrete, storm structures, and other adjacent construction as shown on the drawings.

C. INSTALLATION OF GEOTEXTILE FILTER FABRIC:
1. The filter fabric shall be placed as recommended by the manufacturer and approved by the Architect, and Civil Engineer on surfaces that have been prepared to conform to these specifications and found acceptable for filter fabric installation.
2. All overlaps/seams in the field area shall be at least twelve inches in width without tension, stress, folds, or creases. Overlap in the direction of the runoff flow.
3. Install geotextile fabric onto the entire extent of the subgrade and side slopes.
    a) Extend fabric a minimum of 12 inches past each side of the top of the trench on top of the subgrade and attached between the concrete header curb and nailer board.
4. Sandbags or other devices may be used as required to hold the fabric in position during installation. Materials, equipment, or other items shall not be dragged across the fabric or be allowed to slide down slopes on the fabric.
5. Smoking shall not be permitted by personnel working on the fabric.
6. All areas of fabric damaged during installation as determined by the Architect shall be repaired by the Playing Field Contractor as specified at no additional cost to the Parlier Unified School

District.

7. At the time of installation, the fabric will be rejected if it has defects, ribs, holes, flaws, deterioration, or damage incurred during manufacture, transportation, handling, or storage. Damaged materials shall be removed and replaced at no additional cost to the Parlier Unified School District.

8. Fabric shall be covered as soon as possible after placement to minimize exposure to sunlight and other types of contamination such as surface run-off.

    a) Filter fabric shall not be exposed for more than 10 days.
    b) Any filter fabric that becomes overly contaminated shall be removed and replaced with new filter fabric.

9. The Playing Field Contractor shall temporarily fold the fabric over at the tops of the trenches during construction to eliminate migration of soil materials into the gravel trench. Just before installation of the drainage gravel aggregate, this fold shall be undone, and fabric shall be laid over the finished subgrade. Should contamination of the gravel trench occur, the Playing Field Contractor shall remove all contaminated material and replace it with clean approved materials at no additional cost to the project or the Parlier Unified School District.

3.5 INSTALLATION OF DRAINAGE GRAVEL / FINISHED TOPPING STONE

A. Install only tested and approved material at a uniform depth as indicated on drawings.

B. Placement of the drainage gravel aggregate shall proceed from a stable area next to the geotextile filter fabric and systematically worked outward onto the field area.

1. All aggregate material shall be pushed forward and not dumped onto the filter fabric in such a manner as to result in damaging the installed filter fabric.

2. Laser-operated equipment shall be utilized.

3. All equipment used in spreading or traveling on the aggregate material shall exert low ground pressures and shall be priorly approved by the Playing Field Contractor, Turf Manufacturer, and the Architect.

4. DURING PLACEMENT AND SPREADING:

    a) A minimum depth of seven (7) inches of granular material shall always be maintained between the fabric and wheels of trucks or spreading equipment.

    b) Dozer blades, etc. shall not make direct contact with the fabric. If tears occur in the fabric during the spreading operation, the granular material shall be cleared from the fabric, and the damaged area repaired as previously described.

    c) All equipment traveling on the drainage of the topping stone gravel aggregate layer shall avoid making sharp turns, quick stops, or quick starts.

    d) Care shall be taken to not disturb, displace, or damage the geotextile fabric or the drainage system.

    e) The Playing Field Contractor shall install the topping stone aggregate layer in such a way as to reduce the separation of the fines and larger particles in the drainage gravel aggregate material.

C. PLACEMENT OF THE FINISHED TOPPING STONE:

1. This finished topping stone aggregate layer shall be placed over the drainage gravel aggregate base at a finished depth as shown on the drawings to produce a uniform planarity /smooth surface before the placement of the synthetic turf. Due to possible drifting of this finished topping stone aggregate material into the drainage gravel aggregate layer below, more material may be required than the finished depth to eventually achieve finished grade elevations at the top of the finished topping stone aggregate layer and shall be considered as part of the overall quantities necessary. The Playing Field Contractor shall adjust the depth

of the drainage gravel aggregate if necessary if the finished topping stone aggregate will excess 1" in depth upon completion of the subsurface profile.

2. The Playing Field Contractor shall install the finished topping stone aggregate layer in such a way as to reduce the separation of the fines and larger particles in the drainage gravel aggregate blend.

D. FINISH GRADE TOLERANCE FOR DRAINAGE GRAVEL AND FINISHED TOPPING DRESSING STONE

1. Shall be verified using laser operated survey instrument with a tolerance of +/- one-quarter inch over 25 feet in any direction or (.04')

E. A survey of the finished spot grades is to be developed by a State licensed surveyor over the entire surface in a 25-foot grid. The survey shall be certified (signed) and submitted to the Owner and its representatives for approval before installing the synthetic turf. The survey shall indicate spot elevations and a tenth of foot contours (.04').

F. Upon acceptance of the final topping stone grade by the Architect the Synthetic Turf Installation can commence.

3.6 INSTALLATION OF SYNTHETIC TURF

A. Before beginning turf installation on the field, the Turf Installer shall submit a written statement accepting the playing field area conditions as described earlier in this Specification.

B. Synthetic Turf shall be installed by a crew approved by the Synthetic Turf Manufacturer and employed by the Synthetic Turf manufacturer, in strict accordance with manufacturer's recommendations and instructions including but not limited to fabric, adhesives, seaming and abutting, or attaching to adjacent materials.

C. FIELD MARKINGS AND LAYOUT:

1. The field shall be temporarily secured at the edges with ballast or other similar means as reasonably possible to prevent wind from misaligning or moving the turf installation before and throughout the installation of the infill materials.

2. The field lines shall be tufted or inlaid for field sports as shown on the drawings.

3. All lines and field markings shall be tufted in or installed as inlaid. Wherever possible, lines shall be tufted into turf panels in place of inlays. All markings shall have distinct edges and shall not vary more than 1/4 inch in width and location.

4. The synthetic turf shall be of sufficient length to permit full cross-field installation when possible. No head or cross seams shall be allowed except where required for the lining.

5. Final field markings and lines for the synthetic field surfacing shall be laid out as shown on the drawings, shop drawings, and as approved by the Architect and the Parlier Unified School District.

6. The Parlier Unified School District to make the final determination of colors, markings, etc.

D. SEAMS AND INLAYS:

1. All sewn seams glued with an adhesive as recommended by the Synthetic Turf Manufacturer and installed per manufacturer's instructions.

2. All seams shall be flat, tight, and permanent with no separation or fraying.

3. The width between fiber rows at seams shall be equal to that of the tufting gauge of the turf product.

4. All seams shall be brushed, and fibers trimmed as necessary to appear "seamless".

5. All seams shall be rolled before infill material installation for smooth surface appearance

and feel.

6. All glued seams (inlays) shall be brushed to eliminate adhesive materials from turf fibers.
7. Supplemental backing used at glued seams (inlays shall bridge the seam or edges a minimum of 4 inches).
8. All inlaid lines shall be backed using seaming tape with a width of 12 inches or shaved in and glued to the backing as per Synthetic Turf Manufacturer premium installation methods.

E. APPLICATION OF ADHESIVE MATERIALS OR INFILL MATERIALS

1. Air or material temperatures are below 10 degrees C. (Shall not be applied)
2. Rain is falling or conditions exist or are pending that will be unsuitable to the installation. Infill materials: (Shall not be applied)
3. Do not begin the installation of the infill materials until the playing field has been observed in the presence of the Architect and the Parlier Unified School District Project Manager. Debris from turf installation shall be removed, seams and inlays shall be observed. Inlays using glue shall be properly set up before infill is added.
4. Apply dry infill materials when the turf is dry.
5. The path from the stored on-site infill materials shall be kept clean and clear to eliminate contamination in the playing field area.
6. For installations, the final approved infill mix shall be applied in numerous uniform layers over the entire surface utilizing industry-standard broadcasting equipment.
7. The Playing Field Contractor shall utilize a combination of rolling and watering the surface after the infill mix materials have been installed to settle the materials into the turf. After this process, the Architect and the Parlier Unified School District project manager shall conduct an on-site field observation of the final surface for surface stability and possible settlement or unevenness of infill depth. Additional treatments may be required to achieve approval by the Parlier Unified School District and the Architect to achieve footing, stability, and uniformity of infill optimum depth.
8. Infill mix materials shall be applied at a uniform depth and an ultimate finish grade tolerance of 1/4 inch at any point over the entire playing field area.
9. Synthetic Turf fibers shall not be buried or trapped below infill mix material when complete.

F. Anchor turf edges at field curb at field perimeter using wood nailer as shown on drawings. Adjust header board elevation based on the final Infill mix product approved.

3.7 FIELD MARKINGS

A. The field lines and numbers shall be tufted or inlaid. Refer to sheet PF-1.01 for additional colors.

1. General
   a) The final field markings shall meet the Parlier Unified School District colors as shown on the drawings.
   b) Parlier Unified School District to make the final determination of all colors, etc.
2. Field Markings
   a) FOOTBALL: These line-markings to be White.
   b) SOCCER: These line-markings to be Yellow.
   c) All line widths per NFHS standards.

3.8 SPORTS EQUIPMENT INSTALLATION

A. Refer to Section 11 68 00 – Athletic Field Equipment for additional sports equipment.

3.9 CLEAN UP

A. At the end of each day, remove all scraps and other debris created by the synthetic turf installation from the playing field area.

B. At the end of turf installation and just before the punch list, the Playing Field Contractor must use a magnetic device/equipment to remove all metallic materials from the field caused by construction.

C. Remove all surplus excavated material not required for filling and backfilling, trash, and debris and dispose of it off the Parlier Unified School District property at the Playing Field Contractor's expense.

D. Leave the premises and work in a clean, satisfactory condition.

E. Drainage structures shall be free and cleaned, trash baskets emptied, and trenches flushed with water before turning over the project to the Parlier Unified School District.

3.10 PROTECTION

A. Protection of materials and work shall be the responsibility of the Playing Field Contractor during installation and through acceptance/substantial completion. All material damaged before acceptance shall be replaced at no additional cost to the Parlier Unified School District.

END OF SECTION - 32 25 42

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SECTION 32 28 52 PARKING LOT FURNITURE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish and install signs, posts and concrete wheelstops

1.2 RELATED SECTIONS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to the work of this section.
B. Section 321217 – Asphalt Paving
C. Section 321313 – Site Concrete Improvements.

1.3 REFERENCES

A. SSCDOT – Standard Specifications, California Department of Transportation (Caltrans), latest edition, except for references to methods of payment.

B. CBC – California Building Code, latest edition.

1.4 SUBMITTALS

A. Submit under provisions of Specification Section - SUBMITTAL PROCEDURES.

1.5 COORDINATION

A. Coordinate work with Owner’s personnel.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Signs: As per detail drawing.

B. ADA Accessible Signs: As per detail drawing.

C. Sign Posts: 2 inch diameter galvanized iron pipe, A 120, Schedule 40, unless otherwise shown on drawing.

D. Concrete for Sign Footings: Specification Section – SITE CONCRETE IMPROVEMENTS

E. Wheelstop: 3 or 4 feet long pre-cast concrete per detail drawing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing and proposed site conditions.

3.2 PREPARATION

A. Identify installation locations.

B. Locate, identify, and protect existing above and below grade utilities from damage.

C. Employ equipment and methods appropriate to the work site.

3.3 INSTALLATION

A. Install all sign posts straight and plumb in concrete footings as shown on plans.

B. Secure all signs to posts with vandal resistant galvanized hardware furnished by the Contractor.

C. Orient direction of all signs as indicated on the plans.

D. Install concrete wheelstops at locations shown on drawings. Anchor each wheelstop with two deformed reinforcing bars driven into the asphalt concrete pavement per detail drawing.

3.4 FIELD QUALITY CONTROL

A. Field inspection will be performed under Division 01.

END OF SECTION 32 28 52

SECTION 32 31 13 CHAIN LINK FENCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
1. Provisions of constructing chain link fence at locations shown on the Construction Documents, including but not limited to:
a. Site chain link fencing and gates.

B. RELATED SECTIONS
1. Contract General Conditions and Division 1 Specifications.
2. Section 312000 – Earthwork: Excavation, Filling, and Grading
3. Section 321313 – Site Concrete Improvements.

1.2 QUALITY ASSURANCE

A. Qualifications of Installer
1. Throughout the progress of installation of the work of this Section, provide at least one person who shall be thoroughly familiar with the specified 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 insure installation in strict accordance with the contract documents.
3. In acceptance or rejection of work performed under this Section, the Engineer will make no allowance for lack of skill on the part of the workmen.

1.3 PRODUCT HANDLING

A. Protection
1. Use all means necessary to protect the materials of this Section before, during and after installation, and to protect the work of other trades.

B. Replacements
1. In the event of damage, immediately make all repairs and replacements necessary to the satisfaction of the Engineer and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The materials and fabrication of chain link fabric shall conform to these specifications, and as shown on the plans and details.

B. All ferrous materials shall be new and galvanized. Imperfectly galvanized material or material upon which serious abrasions of the galvanizing occur shall not be used.

C. Height - all fencing shall stand at the heights shown on the plans.

D. Fabric
1. Standard: Chain link fabric shall conform to ASTM, designation: A392, Class 1. The wire used in the manufacture of the fabric shall be 9-gauge. All chain link fabric shall be

woven into approximately 2-inch mesh. Fabric shall be furnished with knuckling at all selvages. The knuckled selvage shall be used along all corners and edges. Fabric shall be GBW, galvanized before weaving.

2. Pre-woven slatted: Chain link slatted fabric shall be PrivacyLink, and shall conform to the specifications of ASTM, designation: A392, Type II, Class 4. The wire used in the manufacture of the fabric shall be 9-gauge. All chain link fabric shall be woven into approximately 3.5" x 5" inch mesh. Fabric shall be furnished with knuckling at all selvages. The knuckled selvage shall be used along all corners and edges. Fabric shall be GBW, galvanized before weaving. Slats shall be high density polyethylene, 2.85" wide. Color shall be selected by the Owner.

E. Posts, braces and gate frames
1. The base material for the manufacture of steel pipe used for posts and braces shall conform to the specifications of ASTM, designation: A53 Type A, standard weight, Schedule 40, and the base material for the manufacture of other steel sections used for posts and braces shall be good commercial quality weldable steel.
2. All posts, braces and gate frames shall conform to the size and weight designations shown on the plans.
3. All posts shall be fitted with rainproof caps designed so as to fit securely over the top of the posts.
4. All posts shall be of a total length of not less than the depth of the concrete footing as shown on the plans, plus the length required above ground.
5. Posts and braces shall be galvanized in accordance with specifications of ASTM, designation: A123.
6. All horizontal braces shall be attached to posts by approved steel fixtures.

F. Stretcher bars and other required fittings and hardware shall be steel and shall be galvanized in accordance with the specifications of ASTM, designation: A153.

G. All swinging gates and walk gates shall be installed with a gate holdback, Trimco 1209HOHA-626. Holdbacks shall be installed in the concrete mowstrip, unless otherwise noted.

H. Concrete mowstrip shall be in accordance with Section 321313 SITE CONCRETE IMPROVEMENTS.

I. Walk gates shall be constructed as per detail drawing and in accordance with CBC sections 11B-206.5 and 11B-404.

J. Drive gate, roll gate and walk gate shall be constructed as per detail drawing.

K. Non-accessible swinging gates shall comply with the following:
1. Have a lockable fork latch.
2. Have heavy-duty malleable iron hinges

PART 3 - EXECUTION

3.1 INSTALLATION

A. All posts shall be set in concrete footings as shown on the plans to within 3 inches of bottom.

B. All vertical line and end posts shall be braced to the nearest adjacent vertical post with galvanized horizontal braces as shown on the plans.

C. Welding

1. All welding shall conform to the requirements of the California Building Code, CBC, Chapter 22.
2. Where the galvanized surface has been burned by welding, all surfaces of the welded connections shall be thoroughly cleaned by wire brushing and all traces of the welding flux and loose or cracked galvanizing removed. The damaged area and weld shall then be painted in accordance with the following details.
   a. All galvanized, welded, or damaged surfaces that are to be painted shall first be cleaned by washing with mineral spirit solvent sufficient to remove any oil, grease or other materials foreign to the galvanized coating.
   b. After washing, all areas shall be roughened by abrasive blasting using an abrasive that is no larger than 30-mesh. Galvanizing shall not be removed by this operation.
   c. After preparation, all galvanized surfaces that are to be painted shall be covered with one application of zinc dust-zinc oxide primer, federal specification TT-P-641, Type II. The zinc dust-zinc oxide paint shall be applied by spraying to produce a complete covering of the galvanized surface.
   d. After the application of the zinc dust-zinc oxide paint, one application of pre-treatment, vinyl wash primer, Section 91-2.7 of the state Standard Specifications, shall be applied to such surfaces. The vinyl wash primer shall be applied by spraying to produce a uniform wet film on the surface.
   e. Such surfaces shall then be covered with two separate applications of white tint base vinyl finish coat, Section 91-2.22 of the state standard specifications, sufficient to completely cover the preceding color. Paint for the first application shall be tinted with a compatible coloring agent to slightly contrast with the color of the second application. After drying for 24 hours, one application of aluminum paint, finish coat, Section 91-2.8 of the state standard specifications, shall be painted on the welded areas.

D. Perimeter fencing chain link fabric shall be fastened to the outside of the fence.

E. All fabric shall be stretched and securely fastened to the posts, as follows:

F. The fabric shall be fastened to end, corner and gate posts with 3/16 inch by 5/8 inch stretcher bars and not less than 1/8 inch by 3/4 inch stretcher bar bands spaced at one foot intervals for whatever widths of fabric are supplied. The fabric shall be fastened to line posts with tie wires or post clips. Tie wires shall be at least 9-gauge (0.148 inch diameter) steel. Post clips shall be at least 6-gauge (0.192 inch diameter) steel. The wire or clip fasteners shall be spaced at approximately 14 inches on line posts, with a minimum of 5 fasteners per 6 foot high post. Top and bottom edges of the fabric shall be secured to each horizontal brace with tie wires or fastened to tension wire with hog rings spaced at 15 inch maximum intervals. Hog rings shall be at least 9-gauge (0.148 inch diameter) steel. Wire ties shall be given at least one complete turn. Hog rings shall be closed with ends overlapping. The distance from the selvage to the braces or top rails shall be 2 inch maximum and shall be fastened to the brace or rail by wire fasteners spaced at approximately 14 inches with a minimum of 8 fasteners per each 10 foot horizontal span.

G. Construct concrete mowstrip at the width as shown on the plans.

END OF SECTION 32 31 13

SECTION 32 31 19 DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY:

A. This Section includes the following:
   1. Decorative metal fences and gates (shop fabricated)

B. Related Requirements:
   1. Division 03 Section “Cast-in-Place Concrete” for concrete setting fence posts.
   2. Division 05 Section “Metal Fabrications” for metal fabrications not included in this section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including finishing materials.

B. Shop Drawings: Include plans, elevations, component details, and attachments to other work. Indicate materials and profiles of each metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

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

B. Installer Qualifications: Fabricator of products.

C. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.

D. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, “Structural Welding Code – Steel.”
   2. AWS D1.3/D1.3M, “Structural Welding Code – Sheet Steel.”

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store decorative metal fencing and gates in a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with decorative metal fencing and gates by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Requirements for Gates and Hardware: Pedestrian gates and hardware indicated to be accessible shall comply with accessibility requirements of the 2010 ADA Standards for Accessible Design and the 2025 California Building Code, Chapters 10 and 11B.
   1. Gates shall be capable of opening a minimum of 90 degrees.
   2. Gates in the open position shall provide a clear opening width of not less than 32 inches.
   3. The bottom 10 inches of the push side gates shall have a smooth uninterrupted surface that allows the door to be opened by a wheel chair footrest without creating a trap or hazardous condition.
   4. The effort to open gate shall not exceed a 5 pound force applied perpendicular to the face of the gate.
   5. Gates shall be openable from the secure side (inside) without the use of a key or special knowledge or effort. Operating hardware shall not require pinching or grasping to operate hardware.
      a. Gates may be designed for key operation from either or both sides when the gates are not required egress gates as determined by the Architect and the Division of the State Architect.

2.2 STEEL AND IRON MATERIALS

A. Metal Surfaces, General: Use materials with smooth, flat surfaces unless otherwise indicated. Use materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Tubing: ASTM A 500/A 500M (cold formed).

C. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

D. Plates, Shapes, and Bars: ASTM A 36/A 36M.

E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M unless otherwise indicated.

F. Steel Sheet, Cold Rolled: ASTM A 1008/A 1008M, either commercial steel or structural steel, exposed.

2.3 FASTENERS

A. Fastener Materials: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating or Type 304 stainless steel.

B. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.

C. Post-Installed Anchors: Mechanical fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
   1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 SETTING MATERIALS

A. Cementitious Material: Portland cement, ASTM C 150, Type II, gray.

B. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information. Proportion normal-weight concrete mixture as indicated below for strength, slump, water/cement ration, and maximum aggregate size.
   1. Strength: 3000psi at 28 days.
   2. Aggregate Size: 1-1/2 inch maximum.
   3. Slump: 4 inches.
   4. Water Cement Ration: 0.53 Maximum.

2.6 FABRICATION. GENERAL

A. Fabricate fence panels in sections to prevent the need for field welding or cutting. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
   1. Components of fabricated items shall not be finished until after fabrication.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.

D. Provide necessary brackets to assemble units and to attach other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.

E. Connect members with full-penetrations welds unless otherwise indicated. Use welding method that is appropriate for metal and finish indicated and that develops full strength of members joined. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces.

2.7 DECORATIVE METAL FENCING

A. General: Fabricate decorative metal fencing from steel bars and shaped of sizes and profiles indicated.
   1. Fabricate fence panels in sections to facilitate galvanizing, transportations to the Project Site, and installation.

B. Fence Height: As indicated on Drawings.

C. Posts, Rails, and Pickets: Square steel tube sections complying with ASTM A-500 with hot dipped galvanized exterior zinc coating and as follows:
   1. Posts: Posts having a minimum yield strength of 45,000 psi and a minimum size as follows:
      a. Posts for Fences: 4 inches square x 1/8 inch thickness.
         1) Spacing: Nominal 8 feet on center maximum; posts shall be equally spaced on a standard module.
      b. Posts for Swing Gates: Size as follows:
         1) Gates to 48 inches Wide: 4 inches square x 1/8 inch wall thickness.
         2) Gates over 48 inches Wide to 96 inches Wide: 6 inches square x 1/4 inch thickness.
         3) Gates over 96 inches wide to 144 inches Wide: 6 inches square x 3/8 inch thickness.
   2. Horizontal Rails: 2 inches square x 11 gage (0.120 inch).
   3. Pickets: 1 inch square x 14 gage (0.080 inch).
      a. Spacing: Nominal 6 inches on center nominal.

D. Finish: Galvanize and powder coat after fabrication.

2.8 SWING GATES

A. General: Fabricate decorative metal swings from steel bars and shapes of sizes and profiles indicated in Drawings, match characteristics of fence design.

B. Gate Height: Match adjacent fence panels.

C. Gate Width: As indicated on Drawings; 32 inches minimum clear width when gate is in a 90 degree open position.

D. Gate Framing: Hollow tubular steel sections of size, wall thickness, and spacing as indicated on Drawings, not less than 2 inches x 2 inches x 11 gauge (0.120) minimum size).

E. Rails: Match fence rails.

F. Pickets: Match fence pickets.

G. Hinges: Butt hinges or pivots as selected by fabricator; hinges to be sized for not less than twice the weights of the gate and allow the gate to open 180 degrees.

H. Operating Hardware: Gates shall be prepared to receive a cylinder lock, mortise lock, or exit device as indicated on the drawings.

I. Finish: Galvanize and powder coat after fabrication

2.9 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize products made from rolled, pressed, and forged steel shapes, castings, plate, bars, and strips indicated to be galvanized to comply with ASTM A 123/A 123M. Galvanize items after fabrication.
   1. Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A 153/A 153M.
   2. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
   3. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filling of smooth.

B. Powder-Coat Finish for Galvanized Metal: Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:
   1. Prepare galvanized metal be thoroughly removing grease, dirt, oil, flux, and other foreign matter.
   2. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.
   3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 2 mils.
   4. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative metal fences and gates

B. Proceed with installations only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Provide anchorage devices and fasteners where needed to secure decorative metal fencing to in-place construction.

B. Set posts accurately in location alignment, and elevation; measured from established lines and levels.
   1. Post Excavation: Drill or hand-excavate holed for posts to diameters and spacings indicated, in firm, undisturbed soil. Footings shall have a diameter not less than 4 times the width of posts and shall extend 6 inches below the bottoms of the post.
   2. Post Setting: Set posts in concrete into firm, undisturbed soil. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices. Crown top of exposed concrete to drain water away from posts. Protect aboveground portion of posts from concrete splatter.

C. Install gate level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Adjust hardware for smooth operation and lubricate where necessary.

D. Perform cutting, drilling, and fitting required to install decorative metal fencing. Set products accurately in location, alignment, and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concreter, masonry, or similar construction.

E. Fit exposed connections accurately together to form tight, hairline joints or, where indicted, uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of decorative metal, restore finishes to eliminate evidence of such corrective work.

F. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations by complete refinishing, or provide new units as required.

G. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections in “Fabrication. General” Article. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

H. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
   1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.3 ADJUSTING

A. Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortions, nonalignment, misplacement, disruptions, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

3.4 CLEANING AND PROTECTION

A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint exposed areas with same materials as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/ A 780M.

D. Protect finishes from damage during construction period with temporary protective coverings approved by decorative metal fabricator. Remove protective covering at time of Substantial Completion.

E. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 32 31 19

SECTION 32 33 10 TACTILE/DETECTABLE WARNING SURFACE TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Tactile/Detectable Warning Surface Tile where indicated.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's literature describing products, installation procedures and routine maintenance.

B. Samples for Verification Purposes: Submit two tile samples minimum, 6 inch by 8 inch of kind proposed for use.

C. Shop drawings are required for products specified showing fabrication details; composite structural system; plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.

D. Material Test Reports: Submit test reports from qualified independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated. All test reports shall be conducted on Surface Applied tactile tile system as certified by a qualified independent testing laboratory.

E. Maintenance Instructions: Submit copies of manufacturer's specified maintenance practices for each type of tactile tile and accessory as required.

1.4 QUALITY ASSURANCE

A. Provide Surface Applied tactile tiles and accessories as produced by a single manufacturer.

B. Installer's Qualifications: Engage an experienced Installer certified in writing by tactile manufacturer as qualified for installation, who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

C. Americans with Disabilities Act (ADA): Provide tactile warning surfaces that comply with detectable warnings on walking surfaces section of Americans with Disabilities Act (Title 49 CFR TRANSPORTATION, Part 37.9 STANDARDS FOR ACCESSIBLE TRANSPORTATION FACILITIES, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES.

D. California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR). Title 24, Part 1, Articles 2, 3 and 4 and Part 2, Section 205 definition of "Detectable Warning". Section 11B-406 for "Curb ramps, blended transitions and islands" and Section 11B-705 for "Detectable warnings and detectable directional texture".

E. Detectable Warning Texture: Division of the State Architect (DSA Access Compliance) approved products shall be used, compliance with CBC Section 11B-705.1, IRs 11B-2, 11B-3 and 11B-4 and the California Accessibility Reference Manual.
   1. Truncated Domes: provide raised Detectable Warnings with diameter of 0.9 inch at base tapering to 0.45 inch at top, height of 0.2 inch, with center-to-center spacing of 2.35 inches and corner domes spaced at 0.896 inch from the corner edges of tile. Provide raised truncated domes in a square grid (in-line) pattern.
      a. Truncated Dome: shall contrast visually with adjoining surfaces, light-on- dark or dark-on-light. Material used to provide contrast shall be integral part of walking surface. Warning surface shall differ from adjoining surface in resiliency or sound to cane contact.

1.5 DELIVERY, STORAGE AND HANDLING

A. Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings and tile type shall be identified by part number.

B. Tiles shall be delivered to location at building site for storage prior to installation.

1.6 SITE CONDITIONS

A. Environmental Conditions and Protection: Maintain minimum temperature of 40°F in spaces to receive tactile tiles for at least 48 hours prior to installations, during installation, and for not less than 48 hours after installation. Store tactile tile material in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 40°F in areas where work is completed.

B. The use of water for work, cleaning or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with the passengers or public. Provide barricades or screens to protect passengers or public.

C. Disposal of any liquids or other materials of possible contamination shall be made in accordance with federal state and local laws and ordinances.

D. Cleaning materials shall have code acceptable low VOC solvent content and low flammability if used on the site.

1.7 EXTRA STOCK

A. Deliver extra stock to storage area designated by engineer. Furnish new materials from same manufactured lot as materials installed and enclose in protective packaging with appropriate identification for Surface Applied tactile tiles. Furnish not less than two (2) percent of the supplied materials for each type, color and pattern installed.

1.8 WARRANTY (DETECTABLE WARNINGS AND DIRECTIONAL TEXTURE)

A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of detectable warnings and directional surface products that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Shape, color fastness, confirmation, sound-on-cane acoustic quality, resilience, and attachment will not degrade significantly.
      b. Degrade significantly means that product maintains at least 90 percent of its approved design characteristics, as determined by the authority having jurisdiction.
   2. Warranty Period: Five years from date of Final Completion.
   3. Authority: California Building Code Section 11B, Division of the State Architect Interpretation of Regulations (IR) 11 B-2, 11B-3 11B-4.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   1. Engineered Plastics Inc., Armor Tile.
   2. ADA Solutions, Inc., North Billerica, MA.

B. Detectable Warning Texture: Division of the State Architect (DSA/Access Compliance) approved products shall be used, compliance with CBC Section 11B-705.1, IRs 11B-2, 118-3 and 11B-4 and the California Accessibility Reference Manual.
   1. Truncated Domes: provide raised Detectable Warnings with diameter of 0.9 inch at base tapering to 0.45 inch at top, height of 0.2 inch, with center-to-center spacing of 2.35 inches and corner domes spaced at 0.896 inch from the corner edges of tile; Provide raised truncated domes in a square grid (in-line) pattern.
      a. Truncated Dome: shall contrast visually with adjoining surfaces, light-on- dark or dark-on-light. Material used to provide contrast shall be integral part of walking surface. Warning surface shall differ from adjoining surface in resiliency or sound to cane contact.
   2. Detectable Warning Texture (Truncated Domes): Plastics/Composites: Armor Tile, ADA Tactile Systems by Engineered Plastics Inc., North Billerica, or equal.

C. The Vitrified Polymer Composite (VPC) Surface Applied Tactile Tile specified is based on Armor-Tile manufactured by Engineered Plastics Inc. Existing engineered and field tested products which are subject to compliance with requirements, may be incorporated in the work and shall meet or exceed the specified test criteria and characteristics.

D. Color: Yellow conforming to Color No. 33538 of SAE AMS-STD-595A. Color shall be homogeneous throughout the tile.

2.2 MATERIALS

A. Fasteners: Color matched, corrosion resistant, flat head drive anchor: W diameter x 1 3/4” long, or manufacturer’s recommended fasteners.

B. Adhesive and Sealant: Manufacturer’s recommended adhesive and sealant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Surface Applied: The following installation instructions shall be used for tactile warning tiles installed at existing concrete surfaces.
   1. During all surface preparation and tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
   2. The application of all tile, adhesives, mechanical fasteners, and caulking shall be in strict accordance with the guidelines set by their respective manufacturers.
   3. Ensure that surfaces being prepared and fabricated to receive the tiles are constructed correctly and adequately for tile installation. Review design drawings with the Contractor prior to the construction and refer any and all discrepancies to Engineer.
   4. Set the tile true and square to the curb ramp area as detailed in the design drawings, so that its location can be marked on the concrete surface. Use thin permanent marker. Remove tile when done marking its location.

5. The surface to receive the detectable warning surface tile (not recommended for asphalt) is to be mechanically cleaned with diamond cup grinder or shot blaster to remove any dirt or foreign material. This cleaning and roughening of the concrete surface should include at least 4 inches around the perimeter of the area to receive the tile, and also along the cross pattern established by the corresponding areas on the backside of the tile. Those same areas should then be cleaned with a rag soaked in Acetone.
6. Immediately prior to installing the detectable warning surface tile, the concrete surfaces must be inspected to ensure that they are clean, dry, free of voids, curing compounds, projections, loose material, dust, oil, grease, sealers and determined to be structurally sound and cured for minimum of 30 days.
7. Using Acetone, wipe the backside of the tile around the perimeter and along the internal cross pattern, to remove any dirt or dust particles from the area to receive the adhesive.
8. Apply the adhesive on the backside of the tile, following the perimeter and internal cross pattern established by the tile manufacturer. Sufficient adhesive must be placed on the prescribed areas to have full coverage across the 2” width of the adhesive locator. A 3 x 4 foot tile will typically require an entire tube of adhesive.
9. Set the tile true and square to the curb ramp area as detailed in the design drawings.
10. Standing with both feet applying pressure around the molded recess provided in the tile, drill a hole true and straight to a depth of 3W using the recommended diameter bit. Drill through the tile without hammer option until the tile has been successfully penetrated, and then with hammer option to drill into the concrete.
11. Immediately after drilling each hole, and while still applying foot pressure, vacuum, brush or blow away dust and set the mechanical fastener as described below, before moving on to the next hole.
12. Mechanically fasten tiles to the concrete substrate using a hammer to set the fasteners. Ensure the fastener has been placed to full depth in the dome, straight, and flush to the top of dome. Drive the pin of the fastener with the hammer, taking care to avoid any inadvertent blows to the truncated dome or tile surface. A plastic deadblow or leather hammer is recommended.
13. Working in a sequence that will prevent buckles in the tile, proceed to drill and install all fasteners in the tile’s molded recesses.
14. Following the installation of the tiles, the perimeter caulking sealant should be applied. Follow the perimeter caulking sealant manufacturer’s recommendations when applying. Tape all perimeter edges of the tile and also tape the adjacent concrete back 1/2” from the tile’s perimeter edge. Tool the perimeter caulking with a plastic applicator or spatula to create a straight edge in a cove profile between the tile and adjacent concrete. Remove tape immediately after tooling perimeter caulking sealant.
15. Do not allow foot traffic on installed tiles until the perimeter caulking sealant has cured sufficiently to avoid tracking.
16. If installing adjacent tiles, note the orientation of each tile. Careful attention will reveal that one of the long edges of the tile is different than the other, in regard to the tiny dotted texture. You may also note a larger perimeter margin before the tiny dotted texture pattern begins. Consistent orientation of each Tile is required in order that the truncated domes on adjacent tiles line up with each other.
17. In order to maintain proper spacing between truncated domes on adjacent tiles, the tapered edge should be trimmed off using a continuous rim diamond blade in a circular saw or mini-grinder. The use of a straightedge to guide the cut is advisable. All cuts should be made prior to installation of the tiles.
18. If installing adjacent tiles, care should be taken to leave a 1/8 inch gap between each. If tiles are custom cut to size, and if pre-molded recesses (to receive fasteners) are removed by the cut, then any truncated dome can be center-drilled with a 5 inch through hole, and countersunk with a suitable bit, to receive mechanical fasteners. New holes should be created no closer to the edge of the tile than any of the other perimeter fastener pre-molded recesses. Care should be taken to not countersink too deeply. Fasteners should be flush with the top of the truncated dome when countersunk properly.
19. Adhesive or caulking on the surface of the Tile can be removed with Acetone.

B. Wet Set: The following installation instructions shall be used for tactile warning tiles installed at new concrete surfaces.
   1. During all surface preparation and tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
   2. The application of all tile, adhesives, mechanical fasteners, and caulking shall be in strict accordance with the guidelines set by their respective manufacturers.
   3. Ensure that surfaces being prepared and fabricated to receive the tiles are constructed correctly and adequately for tile installation. Review design drawings with the Contractor prior to the construction and refer any and all discrepancies to Engineer.
   4. Set the tile true and square to the curb ramp area as detailed in the design drawings.
   5. Immediately prior to installing the detectable warning surface tile, the wet concrete surfaces must be inspected to ensure that it is clean and free of debris.
   6. Do not remove protective plastic covering on detectable warning tile product until tile is installed and concrete is fully cured.
   7. Slowly press the detectable warning tile into the wet concrete until the base of the truncated domes is flush with the adjacent concrete. Do not stand on the tile during installation. Tap the detectable tile with a rubber mallet as required to ensure all edges are flush with concrete. Install anchors into wet concrete as specified per manufacturer's recommendation and ensure that the anchors are flushed with the detectable tile surface. Provide weight to the detectable tile surface if "floating" occurs after tile placement. All detectable tile edges shall be flush with adjacent concrete.
   8. While the concrete is workable, a 1/8" deep troweled edge shall be installed around the tile perimeter. Finish the concrete as required per specifications. Ensure concrete edge do not have any low areas that collect water.
   9. Set the tile true and square to the curb ramp area as detailed in the design drawings.
   10. If installing adjacent tiles, note the orientation of each tile. Careful attention will reveal that one of the long edges of the tile is different than the other, in regard to the tiny dotted texture. You may also note a larger perimeter margin before the tiny dotted texture pattern begins. Consistent orientation of each Tile is required in order that the truncated domes on adjacent tiles line up with each other.
   11. In order to maintain proper spacing between truncated domes on adjacent tiles, the tapered edge should be trimmed off using a continuous rim diamond blade in a circular saw or mini-grinder. The use of a straightedge to guide the cut is advisable. All cuts should be made prior to installation of the tiles.
   12. Remove protective plastic sheeting after all post-installation treatments are complete and the concrete has cured.

3.2 CLEANING AND PROTECTING

A. Protect tiles against damage during construction period to comply with tactile tile manufacturer's specification.

B. Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.

C. Clean tactile tiles not more than four days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean tactile tile by methods recommended by manufacturer.

END OF SECTION 32 33 10

SECTION 32 84 00 IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all materials, labor, equipment and services necessary to furnish, install and maintain the Irrigation System, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Work Specified Elsewhere
1. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 1 Specification Sections, apply to work of this section.
2. Section 312000 – Earthwork
3. Section 312300 – Trench Excavation and Backfilling
4. Section 329000 – Landscape Planting
5. Division 260000 – General Electrical

1.2 CODES AND REGULATIONS

A. All work and materials shall be in full accordance with the following codes adopted and amended by the authority having jurisdiction. Nothing in these drawings or specifications is to be construed to permit work not conforming to these codes. The work described in these specifications shall govern in the event that the drawings or specifications call for material or methods of construction of higher quality or standard than required by these codes.
1. California Plumbing Code
2. California Administrative Codes:
   a. Title 8, Industrial Relations
   b. Title 19, Public Safety
3. California Electrical Code
4. California Green Building Standards Code, Section 5.304.
5. California Department of Water Resources, Model Water Efficient Landscape Ordinance (MWELO)
6. Standards and Regulations of other agencies, water utility provider, or organizations as listed in this specification relating to products or procedures, e.g. American Society for Testing and Materials.

1.3 DEFINITIONS

A. Piping: All pipe fittings, valves, and accessories as required for a complete piping system.

B. PVC: Polyvinyl Chloride.

C. Agencies and Organizations:
1. ASTM- American Society for Testing and Materials
2. AWWA- American Water Works Association
3. IAPMO- International Association of Plumbing and Mechanical Officials
4. NEC - National Electrical Code.
5. UL - Underwriter's Laboratories
6. SSPWC – Standard Specifications for Public Works Construction, by the American Public Works Assoc./Associated General Contractors of California.
7. Caltrans – State of California Department of Transportation

D. Owner: An authorized representative of the Owner or the Owner's authorized consultant.

1.4 QUALITY ASSURANCE

A. The work of this section shall be performed by a single firm experienced in irrigation work and holding a current California Contractor's A or C27 License.

B. Qualifications of Workers
   1. The Contractor shall employ skilled workers who are thoroughly trained and experienced in irrigation system installation and who are completely familiar with the specified requirements and methods needed for proper performance of this work.
   2. The Contractor shall provide adequate supervision by a qualified foreman fluent in English that will be continuously onsite during the performance of this work.

1.5 SUBMITTALS

A. An operational assessment report of any existing irrigation system in the area of work shall be submitted prior to the start of the project's work, including demolition and clearing. See Subsection 1.7.

B. The Contractor shall submit complete lists of proposed materials and equipment per the Division 01 Submittal Section, including manufacturer's name and model numbers. Only provide additional product data and/or catalog cut sheets if a substitute material or equipment is proposed. No substitution will be allowed without prior written approval

C. Shop drawings shall be provided for the layout and description of all equipment assemblies, including dimensions, capacities, and other characteristics as listed in product specifications. Shop drawings for booster pump assemblies shall clearly and neatly indicate the layout of the assemblies and proposed piping in the pump yard, and shall show adjacent equipment, required clearances, walls, fences, piping and other existing permanent improvements affecting the layout. Materials and equipment shall not be ordered until given written acceptance. Equipment or materials installed or furnished without prior approval or acceptance may be rejected and the Contractor shall be required to remove such materials from the site at the Contractor's own expense.

D. When specific name brands of equipment and materials are used, they are intended as preferred standards only. This does not imply any right upon the part of the Contractor to furnish other materials unless specifically approved in writing as equal in quality and performance by the Owner. Decisions by the Architect/Engineer shall govern as to what name brands of equipment and materials are equal to those specified on the plans and the Architect/Engineer's decisions shall be final. It shall be the responsibility of the Contractor to furnish proof as to equality of any proposed equipment or material.

E. Approval of any item, alternate or substitute indicates only that the products apparently meet the requirements of the drawings and specifications on the basis of the information or samples submitted. Manufacturer's warranties shall not relieve the Contractor of the Contractor's liability under the guarantee. Such warranties shall only supplement the guarantee.

F. Acceptance of any submittals, deliverables, or other work product of the Contractor shall not be construed as assent that the Contractor has complied with, nor in any way relieved the Contractor of compliance with (i) the applicable standard of care, and/or (ii) applicable statutes, regulations, rules, guidelines, and contract requirements.

G. Irrigation Equipment: When the Contractor desires to transfer salvaged irrigation equipment and/or new spare equipment and/or parts to the Owner, the Contractor must submit along with

the equipment an itemized list. The Contractor is solely responsible for obtaining a written confirmation by the Owner that all materials received by the Owner matches the Contractor's material list. The transfer of materials will not be considered executed without written confirmation of same.

H. Submit any required or requested testing data and/or Certificates, including but not limited to the backflow prevention assembly testing Certificate after the assembly is installed prior to regular system operation.

1.6 EXPLANATION OF DRAWINGS

A. The intent of the drawings and specifications is to indicate and specify a complete and efficient sprinkler irrigation system ready for use in accordance with the manufacturer's recommendations, and all applicable local codes and ordinances. Interpretation of irrigation plans and specifications shall be the responsibility of the Landscape Architect or Owner.

B. All existing systems and improvements are shown in their approximate locations. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and shall report any variations to the Owner.

C. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc., which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all the Contractor's work, and plan the Contractor's work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed in the most direct and workmanlike manner, so that conflicts between sprinkler systems, planting, utilities, and architectural features will be avoided. Locate pipe, valves and other equipment in planting areas unless specifically noted otherwise.

D. All work called for on the drawings by notes shall be furnished and installed whether or not specifically mentioned in the specifications.

1.7 EXISTING CONDITIONS

A. The Contractor shall not install the irrigation system and equipment as shown on the Drawings when it is obvious in the field that obstructions or differences in existing conditions and/or systems are present. Such obstructions or differences should be immediately brought to the attention of the Owner. Failure to provide notification prior to the start of this work shall make the Contractor liable for any and all repairs and/or corrections necessary for proper functioning and coverage of the system without any additional cost to the Owner.

B. The Contractor shall examine carefully the site of work contemplated and the proposal, plans, specifications, and all other contract documents. By submitting a bid, the Contractor attests that the Contractor has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and quantity of work to be performed and materials to be furnished, and the requirements of the specifications. The Contractor shall take necessary precautions to protect existing site conditions that are to remain. Should damage be incurred, the Contractor shall make the necessary repair or replacement to bring it back to its original condition at the Contractor's own expense.

C. Prior to cutting into the soil, the Contractor shall coordinate with the Owner to locate all cables, conduits, sewers, septic tanks, and other such underground utilities as are commonly encountered, and the Contractor shall take proper precaution not to damage or disturb such improvements. If a conflict exists between such obstacles, notify the Owner who will consider realignment of the proposed work. The Contractor will proceed in the same manner if a rock layer or any other condition encountered underground makes change advisable. Should utilities

not shown on the plans be found during excavations, Contractor shall promptly notify the Owner for instructions as to further action. Failure to do so will make Contractor liable for any and all damage thereto arising from his operations subsequent to discovery of such utilities not shown in plans.

D. The Contractor shall verify the correctness of all finish grades within the work area in order to insure the proper soil coverage (as specified) of the sprinkler system pipes. The Contractor shall verify and be familiar with location and size of the proposed water supply (P.O.C.). The Contractor shall make approved type connection and install new work.

E. The Contractor shall be responsible for notifying the Owner prior to installation that equipment or methods indicated on the drawings or in the specifications conflict with local codes, are incompatible or an error is apparent. It the event the Contractor neglects to do this, the Contractor will accept full responsibility for any revisions necessary.

1.8 PERMITS

A. The Contractor shall obtain and pay required fees to any governmental or public agency. Any permits for the installation or construction of any of the work included under this contract, which are required by any of the legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. The Contractor shall also arrange for and pay all costs in connection with any inspections and examination required by these authorities.

1.9 TESTING

A. General: Unless otherwise directed, tests shall be witnessed by the Owner. Work to be concealed shall not be covered until prescribed tests are made. Should any work be covered before such tests, the Contractor shall, at the Contractor's expense, uncover, test and repair the Contractor's work and that of other contractors to original conditions. Leaks and defects shown by tests shall be repaired and entire work re-tested. Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the test.

B. Main Line Piping: Hydrostatically test main line pipe segments after a minimum of twenty-four (24) hours after any solvent connections. Purge any free air in the test pipe sections. Partially backfill pipe but keep all joints exposed. Maintain 125 psi water pressure in new main line piping for a minimum duration of two (2) hours. There can be a maximum +/- 5psi change in pressure during the test.

1.10 OBSERVATION

A. General:
   1. Installation and operations must be approved by the Owner.
   2. In no event shall the Contractor cover up or otherwise remove from view any work under this contract without prior approval of the Owner. Any work covered prior to inspection shall be opened to view by the Contractor at the Contractor's expense.
   3. In all cases, where inspection/observation of the irrigation system work is required and/or where portions of the work are specified to be performed under the direction and/or review of the Owner, including but not limited to the review items in the Irrigation plan Observation Log, the Contractor shall notify the Owner at least 72 hours in advance of the time when such review and/or direction is required. Any necessary re-excavation or alterations to the system needed because of failure of the Contractor to provide the required notification and/or to obtain the review/observation, shall be performed at the Contractor's own expense.

B. Periodic observations shall be required for basic operations and installations during progression of the project. The Owner's Representative, Owner or Landscape Architect shall perform the observations and shall record the observation on the Irrigation System Observation Log form on the As Built Record Drawings. Such observations will include but not necessarily be limited to the following items as included in the scope of work:
   1. Layout and flagging of sprinkler heads.
   2. Trenching.
   3. Main line installation.
   4. Main line sustained pressure check.
   5. Wire placement.
   6. Partial fill compaction of trenches.
   7. Control valve installation.
   8. Drip line installation prior to backfilling.
   9. Irrigation controller installation and operation.
   10. Sprinkler/emitter coverage prior to the start of planting operations.
   11. Overall system operation and primary/secondary communication.

C. Coverage & Operations Review:
   1. When the irrigation system is operational and prior to soil conditioning operations, the Contractor in the presence of the Owner shall perform a coverage test of the irrigation system. The Contractor shall furnish all materials and labor required to perform the coverage test and to correct any minor inadequacies of coverage disclosed. The Contractor shall inform the Owner and Owner of any deviation from the plan required due to wind, planting, soil, or site conditions that bear on proper coverage. If such notification of necessary corrections or additions to the irrigation system is not provided prior to or during the coverage test, the Contractor shall make all subsequent adjustments and corrections needed for proper coverage without any extra cost to the Owner.
   2. Prior to the start of the maintenance period, the irrigation system shall be reviewed by the Owner for proper operations, and a review of and training on equipment and associated controls performed. Any corrections and/or adjustment shall be made as a condition for the start of the maintenance period and subsequent Final Acceptance.

D. Final Acceptance: The work will be accepted in writing when the entire project improvements have been completed to the satisfaction of the Owner. In judging the work, no allowance for deviation from the original plans and specifications will be made unless already approved in writing at proper time. Should it become necessary for the Owner to occupy any portion of the work area before the contract is fully completed, such occupancy shall not constitute acceptance. The Contractor will not be responsible for any damage caused by the Owner's separate work forces.

1.11 REJECTION OF NON-CONFORMING MATERIAL OR WORK

A. The Owner reserves the right to reject any material or work which does not conform to the contract documents. The rejected material or work shall be removed or corrected by the Contractor at no additional cost to the Owner.

1.12 OPERATIONS AND MAINTENANCE INSTRUCTIONS & RECORD DOCUMENTS

A. The Contractor shall prepare and deliver to the Owner's Representative within ten (10) calendar days prior to completion of the maintenance period, all required and necessary descriptive material in complete detail and sufficient quantity, properly prepared in two individually bound sets of Operating and Maintenance Manuals. These manuals shall describe the material installed and shall be in sufficient depth to permit operating personnel to understand, operate and maintain all equipment. Spare part lists and related manufacturer identification shall be included for each installed equipment item. Each complete, bound manual shall contain the following information:

1. Cover sheet stating Contractor's address and telephone number, duration of guarantee period, and a list of equipment, with names and addresses of local manufacturer representatives and warranty periods.
2. The Contractor to issue a "CERTIFICATE OF CONSTRUCTION COMPLIANCE" which indicates that all work done, materials and equipment used and installed are in compliance with the approved plans, specifications and all authorized revisions and that the system functions properly.
3. Complete operating and maintenance instructions and warranties on all major equipment.
4. Complete set of manufacturer's literature and specifications of material installed, including parts list.
5. A list of the controller station number for each control valve if different than the control valve number shown on the drawings.
6. Initial electrical data on each control valve:
    a. Ohms reading for each valve taken at the controller (circuit is OFF).
    b. Voltage reading for each valve taken both at the controller and at the valve (circuit is ON).

B. The contractor shall furnish one set of As-Built full-scale drawings on bond, and two compact disks with complete sets of digital PDF files of all close-out documents after the As-Built Record Drawings have been reviewed and accepted by the Landscape Architect.
1. Label first page of each document, or set of documents, "AS-BUILT PROJECT RECORD" in neat large-printed letters on lower right-hand corner. Record information concurrently with construction progress. Prints for this purpose may be obtained from the Owner. This set of drawings shall be kept on the site and shall be used only as a record set. Do not conceal any work until required information is recorded. These drawings shall also serve as work in progress sheets, and the Contractor shall make **neat and legible** annotations thereon daily as the work progresses, showing the work as actually installed. These drawings shall be available at all times for inspection and shall be kept in a location designated by the Owner.
2. Drawings: Legibly mark to record actual construction:
    a. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Give sufficient horizontal and vertical dimensions to accurately trace route and depth of each concealed line or item. Accurately locate each capped, plugged or stubbed line.
    b. Field changes of dimension and detail.
    c. Changes made by Field Order, Addenda, or other change document.
    d. Show the final controller station number for each control valve if different than the control valve number shown on the drawings.
3. Deliver all Close-out Documents (As-Builts) to the Owner. Accompany submittal with transmittal letter in duplicate, containing:
    a. Date.
    b. Project title.
    c. Contractor's name and address.
    d. Title and number of each Record Document (As-Built).
    e. Signature of Contractor or his authorized representative.

C. The Contractor shall provide controller chart(s) as follows:
1. The Contractor shall provide two controller charts for each controller’s area of work.
2. The chart shall show the area of work controlled by the automatic controller and shall be the maximum size that the controller door will allow.
3. Show the controller station number for each control valve if different than the control valve number shown on the drawings.
4. The chart may be a reduced drawing of the actual as-built system. However, in the event the valve numbering is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable when reduced.
5. The chart shall be colored with a different permanent color for each station.

6. The chart shall be enclosed in a waterproof envelope or laminated.

D. Per MWELO Section 492.9, upon completion of the landscape planting and irrigation system, and as a condition of Final Acceptance and/or the issuance of a Certificate of Occupancy, the licensed landscape contractor shall submit to the approving agency and/or Owner, the following items in a form acceptable to the approving agency and/or Owner:
   1. Project information and contact information for the Owner and Applicant (Contractor).
   2. Certification that the installation complies with the approved Landscape Documentation Package.
   3. Irrigation scheduling parameters used in programming the controller during the establishment and maintenance periods.
   4. A Schedule of Irrigation System Maintenance.
   5. A Landscape Irrigation Audit Report per MWELO Section 492.12. Provide the Audit Report unless the report is not required by the approving agency or Owner.

1.13 SPARE PARTS AND EQUIPMENT

A. Prior to the conclusion of the maintenance period, furnish the Owner with the following spare parts and equipment:
   1. One quick coupler key with attached hose swivel for each set of four quick coupler valves installed.
   2. Ten spare nozzles for each different sprinkler head arc and/or radius nozzle installed.
   3. One valve key for the 2” operating nut and/or hand wheel isolation valve.
   4. One hundred feet of in-line emitter tubing with ten straight and ten ninety-degree compression fittings.

1.14 WORK AREA AND SAFETY

A. The Contractor shall furnish, erect, and maintain all temporary facilities; perform all temporary work during the period of construction, including those herein specified. All facilities shall be maintained in proper and safe operating and sanitary conditions at all times.

B. The Contractor shall comply with the provisions of the Construction Safety Orders, and General Safety Orders issued by the State Division of Industrial Safety, as well as all other applicable laws, ordinances and regulations.

C. The project site shall be maintained in a neat and safe condition at all times. Cleanup shall be accomplished as the work progresses and upon completion of the work. The Contractor shall provide adequate safety measures to protect workers and the public from injury.

1.15 GUARANTEE

A. Irrigation system consisting of materials, equipment and workmanship shall be guaranteed for proper operation a minimum of one year from date of Final Acceptance of the Work or the Notice of Substantial Completion of the Project, whichever is later. Manufacturer’s warranty periods may be longer, and shall be noted in the close-out documents.

B. The Contractor shall be held responsible for repair and/or replacement of damages to new or existing improvements resulting from the defects of materials, equipment or workmanship one year from the date of Final Acceptance of the Work or the Notice of Substantial Completion of the Project, whichever is later.

C. The Owner reserves the right to make temporary repairs as necessary to keep the irrigation system equipment in operating condition. The exercise of this right by the Owner shall not

relieve the Contractor of his responsibilities under the terms of the Guarantee as herein specified.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Schedule rated white rigid PVC Pipe shall be made from NSF approved Type 1, Grade I, PVC compound conforming to ASTM D-1785.

B. Class rated (Standard Dimension Ratio) white rigid PVC Pipe shall be made from NSF approved Type 1, Grade I, PVC compound conforming to ASTM D-1784.

C. PVC pipe shall be of the Class or Schedule as follows:
   1. PVC pipe shall meet ASTM D-2241 for solvent weld, plain end, ASTM D-2672 for solvent weld, bell end, and ASTM D-3139 for gasketed bell end. Pipe shall be of the Schedule and/or Class as indicated herein.
   2. Pipe sleeves under paving shall be PVC Schedule 40 for 3-inch and smaller or SDR 35 for 4-inch and larger pipes.
   3. Riser and/or manifold pipe connecting valves to main line fittings shall be Schedule 80 PVC.
   4. Pressurized main line pipe shall be Schedule 40, belled end with solvent welds for pipe sizes less than 2 inches. Pipe sized 2 inches and greater shall be Class 200, SDR 21, with gasketed bell ends.
   5. Non-pressurized lateral line pipe shall be Schedule 40, belled end with solvent welds.

D. All pipes shall be continuously and permanently marked and conform with the following information: manufacturer's name or trademark, nominal pipe size, Schedule or Class of pipe, pressure rating in PSI, ASTM designation and (NSF) seal of approval.

E. Rigid polyvinyl chloride (PVC) Fittings:
   1. White Schedule 40 type I and II grade 1, solvent weld socket fittings ASTM D-2466 for all lateral lines 2-1/2 inches and smaller.
   2. Gray Schedule 80 type I and II grade 1 solvent weld socket fittings ASTM D-2464 for all main line less than 2 inches diameter, and lateral lines 3 inches and larger.
   3. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable (IPS) schedule, and (NSF) seal of approval.
   4. All plastic fittings and connectors shall be injection molded of an improved polyvinyl chloride compound featuring high tensile strength, high chemical resistance and high impact strength in terms of current ASTM standards for such fittings. Where threads are required in plastic fittings, these shall be injection molded also.

F. PVC Solvent Weld Adhesive: All socket and bell type connections shall be joined with primer and PVC solvent cement which shall meet the requirements of ASTM F656 for primer and ASTM D2564, "Standard Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings." Solvent cement joints for plastic pipe and fittings will be made as prescribed by manufacturer. The high chemical resistance of the pipe and fitting compounds specified in the foregoing sections makes it mandatory that an aggressive colored primer, which is a true solvent for PVC, be used in conjunction with a solvent cement designed for the fit of pipe and fittings specified. A heavy bodied, medium set solvent cement, e.g. Weld-On 711 gray, shall be used for all classes and schedules of pipe and fittings.

G. PVC Pipe Thread Sealant: A non-hardening all-purpose sealant and lubricant similar to Permatex #51 or Lasco blue pipe thread sealant which is certified by the manufacturer to be harmless to PVC pipe and fittings. Apply sealant to clean male threads, brushing into grooves

and to the first three threads of the female threads. A good quality grade of Teflon tape recommended by the manufacturer for use with plastics may be used in lieu of sealant. Minimum width of tape to be used is 3/4". A minimum of two wraps and a maximum of three wraps shall be used.

H. PVC Swing Joints: Connections to sprinkler heads from lateral lines shall be made with swing joints as detailed. Pre-assembled swing joints from Hunter, King Brothers or Spears are acceptable.
   1. Use 6” length nipples for 1/2-inch inlet heads.
   2. Use 12” length nipples for 3/4- or 1-inch inlet heads.

I. Coated Ductile Iron pipe and fittings:
   1. Ductile Iron pipe shall be centrifugally cast pipe conforming to ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, thickness Class 50, with cement - mortar lining and seal coating per ANSI/AWWA C104/A21.4.
   2. Ductile Iron flanged pipe shall conform to ANSI/AWWA C115/21.15.
   3. Ductile Iron flanged fitting to PVC pipe shall use a ‘Megalug’ mechanical joint restraint Series 2000PV by EBAA Iron per either ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53, or equal.
   4. Joints shall comply with the following standards:
      a. Rubber gasketed/mechanical joints: ANSI/AWWA C111/A21.11.
      b. Flanged joints: ANSI/AWWA C110/A21.10, B16.1, B16.2.

J. Coated ductile iron push-on fittings meeting ANSI/AWWA C110 or C153/A21.10 shall be used for:
   1. Main line connections for pipe 2 inches and greater in diameter.
   2. New main line service tee at valve connections where a service saddle is not acceptable.
   3. Self-restrained fittings or joint restraints (Leemco LH or equal) shall be used for all elbows, tees, bends, etc. fittings.

K. Coated ductile iron service saddles with stainless steel double straps, Smith-Blair 317, Romac Industries 202NS, or equal, shall be used for remote control/quick coupler valve service connections on main lines 1.25 inch or greater, and where the available outlet size can match the largest lateral line size downstream of the remote-control valve.

L. Galvanized pipe and fittings:
   1. Galvanized Pipe shall be hot dip galvanized continuous welded, seamless steel SCH 40 pipe conforming to current ASTM A53 standards.
   2. Galvanized Fittings shall be galvanized, threaded malleable iron SCH 40 conforming to current ASTM A865 standards.

M. Electric Control Valves:
   1. Globe valves operated by low-power solenoid, normally closed, manual flow adjustment. Sizes and types as shown on drawings.
   2. Provide a pressure regulating module on all control valves, or other pressure regulating components as part of the operating spray head or low volume head zones when the dynamic system pressure is, or may be greater than 45 psi.

N. Control Valve Marking: Christy’s valve identification tag (or equal), yellow color (purple color for recycled water) with text designating controller and valve station number, e.g. “A12”, or equivalent.

O. Isolation Valves:
   1. Cast bronze, coated ductile iron or coated cast iron gate valve with resilient wedge, non-rising stem and two-inch operating nut for main line 2-inch size or greater. Match size of mainline.

2. Cast bronze threaded gate valve with bronze cross handle for main line less than 2-inch size.

P. Quick Coupling Valve: Two-piece quick coupling valve as shown on the Drawings.

2.2 VALVE BOXES

A. Control Valve/Master Valve/Flow Sensor boxes:
1. Shrub/Ground Cover areas: Carson 1419 body with lockable tan plastic cover, or equivalent. Drip Valve Kits shall use a Jumbo body with lockable tan plastic cover.
2. Turfgrass areas: Carson 1419 body with lockable green plastic cover, or equivalent.
3. Hardscape areas: Christy B16 concrete box (11.75” x 22.25”) with N16R composite solid flush lid, or equivalent.

B. Quick Coupler Valve boxes:
1. Shrub/Ground Cover areas: Carson 910 body with lockable tan plastic cover, or equivalent.
2. Turfgrass area: Carson 910 body with lockable green plastic cover, or equivalent.

C. Isolation Valve boxes:
1. Gate Valve box in hardscape: Christy G05 round concrete valve box (10.375” ID) with cast iron G05C lid, or equivalent.
2. Gate Valve box in planting areas: Christy F08 round concrete valve box (8” ID) with F08R concrete lid, or equivalent. Use F14 ADS adapter and extension for sizes 2.5 inches and larger.
3. Ball Valve box: Same as 2.2, A.

D. Control Valve box marking: Plastic lids shall have branded markings, and concrete lids shall have painted markings on the top of lid with minimum 2-inch-high stenciled letters showing controller letter and station number.

2.3 CONTROLLER

A. The irrigation Controller is existing and shall remain in place. Verify open stations and spare wire, if any, in the area of work.

B. Upgrade components, sensors, flow meters and other accessories shall be a model type compatible with the controller and as specified on the Drawings. Controller assembly shall include boards and/or connections for sensor inputs. Weather sensors shall be located over a planting area.

C. Grounding materials shall conform to ASIC Guideline 100-2002 and manufacturer’s specifications.

2.4 CONTROL AND TRACER WIRE, COMMUNICATION CABLE

A. Connections between the automatic controllers and the electric control valves, and tracer wire shall be made with direct burial AWG – UF 600-volt copper wire manufactured for irrigation system use.

B. Hot control wires for the first controller shall be red. If multiple controllers are installed, the hot wire color shall be orange, yellow, purple in order for each controller. Common ground wire shall be white, with a color stripe corresponding to the hot control wire color when multiple controllers are installed. Spare control wires shall be black and spare common wire blue. Tracer wire shall be green.

C. Install in accordance with valve manufacturer's specifications and wire chart. In no case shall wire size be less than #14. Common wire shall be a minimum #12 size.

D. All control wire splices/caps shall be made with direct bury rated, waterproof wire connectors with silicone sealant, Spears DS-500 Dri-Splice, 3M DBR/DBY or approved equal. Use one splice per connector sealing pack.

E. Apply waterproof numbered wire markers or sleeves at both sides of all splices and at the controller terminal board corresponding to the controller (A, B, etc.) and station number (02, 14, etc.). If multiple valves are connected to one station, add a single-digit identifier (1, 2, etc.) to the station number (XX), e.g. A02-1, A02-2, etc.

F. Communication/flow sensor cable shall be a shielded and jacketed, minimum 16 gauge twisted pair with drain wire, Paige P7162D or equal compliant with the controller manufacturer's specifications.

G. Below-grade conduit for control wires and/or cables shall be PVC for electrical use with long radius sweeps at direction changes and at valve/splice/pull box terminations.

2.5 IRRIGATION HEADS

A. Spray/Bubbler Pop-up Head: Molded plastic body with pop-up plastic riser and nozzle. Manufacturer's model numbers are listed with description on the Drawings.

B. Rotor Pop-up Head: Molded plastic body with plastic riser and nozzle. Gear driven rotation with memory arc, balanced nozzle sets. Manufacturer's model numbers are listed with description on the Drawings.

2.6 DRIP IRRIGATION EQUIPMENT

A. Flexible distribution tubing shall be 0.66" – 0.70" OD (17mm nominal) fabricated from virgin polyethylene resin specifically designed for subsurface drip irrigation use and conforming to ASTM D 1248 for Type I, Class C, Category 4 Grade P14, and to ASTM D-3350 for PE 122111C. Provide all fittings, connectors and accessories compliant with the tubing for a complete, properly functioning system.

B. Pressure rating of tubing shall be as defined in Standard ASAE S435. Burst strength shall be minimum 50 psi at 176 degrees F for 4,200 hours.

C. In-line wye filters shall be type as noted on the Drawings. Filter element shall be molded polyester screen cylinder with minimum 150 mesh screen (blue).

D. Preset pressure regulators shall be type as noted on the Drawings for above or below ground application.

E. In-line emitter tubing shall be a below grade product with self-cleaning emitters. Manufacturer as noted on the Drawings.

F. Flush valve assembly as noted on the Drawings.

G. Operation indicator shall be a 6-inch pop-up sprinkler body with built-in check valve. Install a bubbler or variable arc nozzle that can be adjusted to a no-flow condition, Hunter ECO-INDICATOR, or equal.

2.7 CONCRETE

A. Cast-in-place Portland cement concrete used for pipe encasement, cover, thrust blocks, pipe support or other below-grade use shall at minimum comply with 2,800 psi 28-day strength.

2.8 OTHER MATERIALS

A. Materials not specifically indicated but necessary for the proper execution of this work shall be of first quality as selected by the Contractor subject to the acceptance of the Owner.

B. All materials appearing in the legend and details of the irrigation drawings are to be furnished and installed by the Contractor unless specifically noted to the contrary. Contractor is responsible for installation according to plans and details. The system shall efficiently and uniformly irrigate all areas and perform as required by these plans and specifications.

C. Granular bedding material shall be clean natural occurring sand, free from clay, salt, sea shells or organic material, suitable for the purpose intended, and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve.

PART 3 - EXECUTION

3.1 SYSTEM DESIGN AND VERIFICATION

A. Contractor shall verify existing pressure and any existing irrigation equipment, and shall inform the Owner of any discrepancies between the exsiting systems' make and model of equipment, such as sprinkler heads, control valves, etc., and those indicated in the Drawings in writing prior to the start of irrigation system installation. Failure to inform the Owner of any discrepancy within seven working days prior to beginning of system installation will place the responsibility of any and all corrective action on the Contractor at no expense to the Owner.

3.2 PIPING INSTALLATION

A. General:
   1. Any equipment installed by the Contractor and deemed to be for the use of the Owner in various situations (i.e., control valves, control panels, etc.) shall be so installed to be readily accessible and quickly operable. Equipment deemed by the Owner to be inoperable for its intended purpose shall be reinstalled by the Contractor in an operable position before approval will be given. Any changes made by the Contractor shall be done without any additional cost to the Owner.
   2. The Contractor shall be responsible for layout of proposed facilities and any minor adjustments required due to differences between existing conditions and the Drawings. Any such deviations in layout shall be within the intent of the original drawings, and without additional costs to the Owner. The Owner will indicate the proposed precise location of the control panels. Head spacing on drawings is diagrammatic. Head spacing and patterns shall be adjusted to provide complete and adequate coverage with a minimum spray on non-planted areas. Where head spacing is not specifically noted, Contractor shall install sprinkler heads evenly along the irrigation area's perimeter. Flush all lines prior to installation of heads.
   3. Support piping without strain on joints or fittings and allow for piping expansion and contraction. "Snake" pipe into trench in accordance to manufacturer's recommendations to allow for expansion. Lay on solid bedding, at uniform depth.

B. The Contractor shall examine all other portions of working drawings and plan trenching and pipe layout so that no conflict will arise between irrigation and any other work. Any corrective action will be the Contractors responsibility at no further expense to the Owner.

C. Excavations:
   1. Excavations shall be open vertical construction, sufficiently wide to provide clear working space around the work installed and to provide ample space for backfilling and tamping.
   2. The use of a vibratory plow or methods other than open vertical trenching will not be allowed without the written approval of the Owner. To obtain such approval, a field test must be performed, at the proposed site, with the equipment to be used in the presence of the Owner and Owner. The field test is to indicate if the proposed site is favorable to the plowing method. Approval for plowing at one location does not allow the use of plowing at another location. Approval for plowing must be obtained for each location where the use of plowing is proposed. If, at previously approved plowing locations, conditions for plowing become unfavorable as determined by the Owner, plowing shall be terminated.
   3. Trenches for pipe and equipment shall be cut to required grade lines, and compacted to provide an accurate grade and uniform bearing for the full length of the line.
   4. Unless written approval for using native soils as bedding material is given by the Owner, main line pipe shall be placed on a minimum 6-inch depth of granular bedding material.
   5. Excess trench soil with rocks greater than ½ inch diameter shall be removed from the planted area and spread as directed by the Owner.
   6. When two pipes/conduit are to be placed in the same trench, it is required to maintain a minimum six inch (6”) horizontal separation between pipes/conduit.
   7. Depth of trenches shall be sufficient to provide a minimum cover above the top of the pipe as follows:
      a. 24-inch minimum over main lines and wire conduit.
      b. 18-inch minimum over non-pressure (rotary pop-up) lateral lines.
      c. 12-inch minimum over non-pressure (pop-up spray head) lateral lines.
      d. 24-inch minimum from subgrade over any lines located in a paved vehicle area.
      e. Maximum cover above the top of the pipe shall not exceed twelve inches (12”) greater than the required minimum cover.
      f. 12-inch minimum cover over drip line non-pressure lateral and manifold pipe, and main distribution tubing.

D. Maximum cover above the top of the pipe shall not exceed twelve inches (12") greater than the required minimum cover, unless specifically noted on the drawings.

E. Assemblies:
   1. Routing of pressure supply lines as indicated on drawings is diagrammatic. Install lines (and various assemblies) in such a manner as to conform with details on plans.
   2. Install all assemblies specified herein according to the respective detail drawings or specifications pertaining to specific items required to complete the work. Perform work according to best standard practice.
   3. Install no multiple assemblies on plastic lines. Provide each assembly with its own outlet.
   4. All threaded pipe and fittings shall be assembled using an approved Teflon tape, or equivalent, applied to the male threads only. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved Teflon tape will be required.
   5. No main line elbows, branch tees, or isolation valves are to be located closer than five (5) feet to each other without prior approval of the Owner.

F. Line Clearance: All lines shall have a minimum clearance of four inches (4") from each other, and six inches (6") from lines of other trades. Parallel lines shall not be installed directly over one another.

G. Plastic to Steel Connections:
   1. At all plastic (PVC) pipe connections, the Contractor shall work the steel connections first. Connections shall always be plastic into steel, never steel into plastic. An approved Teflon tape shall be used on all threaded (PVC) to steel, never steel into plastic. An approved Teflon tape shall be used on all thread (PVC) to steel pipe joints applied to the

male threads only, and light wrench pressure is to be applied. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved 3/4" wide Teflon tape will be required.

2. A non-hardening sealant and lubricant similar to Permatex #51 or LASCO blue pipe sealant may be used in lieu of Teflon tape. Apply sealant to clean male threads brushing into grooves and to the first three threads of the female threads.

H. Plastic Pipe:

1. The Contractor shall exercise care in handling, loading, unloading, and storing plastic pipe and fittings. All plastic pipe and fittings shall be stored under a weatherproof roofed structure before using and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lie flat so as not to be subject to undue bending or concentrated external load at any point.
   a. All lumber, rubbish, rubble, concrete and rocks shall be removed from the trenches by the Contractor. Pipe shall have a firm uniform bearing for the entire length of each pipe line to prevent uneven settlement. Wedging or blocking under riser tees shall be done only if specified on the plans. Pad trenches with soil as necessary to provide uniform bearing surfaces.
   b. Where extensive lengths of pipe are installed, snake pipe in trench from side to side to allow for expansion and contraction. One additional foot per one hundred (100) feet of pipe is the minimum allowance for snaking. Never lay pipe when there is water in the trench or when the temperature is 32 degrees F or below.
   c. All changes in direction of pipe shall be made with fittings, not by bending. No main line fittings for changes in direction shall be greater than 45 degrees. Provide a minimum five (5) feet between changes in direction fittings.
   d. Safely handle primers and cements per ASTM F-402. Make solvent weld joints per ASTM D-2855 with a non-synthetic bristle brush in the following sequence:
      1) Make sure pipe is cut square and all rough edges and burrs are removed. All connecting surfaces are properly cleaned and dry prior to application of pipe primer.
      2) Apply an even coat of colored primer to pipe and fitting prior to application of solvent.
      3) Apply an even coat of solvent to the outside of the pipe, making sure that the coated area is equal to the depth of the fitting socket.
      4) Apply an even light coat of solvent to the inside of the fitting.
      5) Apply a second coat of solvent to the pipe.
      6) Insert the pipe quickly into the fitting and turn pipe approximately one-eighth to one-quarter turn to distribute the solvent and remove air bubbles. Hold the joint for approximately fifteen seconds so the fittings do not push off the pipe.
      7) Using a clean rag, make sure to wipe off all excess solvent to prevent weakening at joint.
      8) Exercise care in going to the next joint so that pipe is not twisted, thereby disturbing the last completed joint.
      9) Allow at least fifteen minutes setup time for each welded joint before moving.
      10) Repairing plastic pipe when damaged shall be done by replacing the damaged portion of pipe.

I. Concrete Thrust Blocks: Concrete anchors or thrust blocks shall be provided on pressure main pipelines 2 inches or greater in diameter at abrupt changes in pipeline grade, changes in horizontal alignment (bends, tees and crosses), reduction in pipe size (reducers, reducing tees or crosses), end-line caps or plugs, and/or in-line isolation valve to absorb any axial thrust of the pipeline. The pipe manufacturer's recommendation for thrust control shall be followed. Thrust blocks must be formed against solid unexcavated earth (undisturbed). Do not enclose entire joint in concrete. Provide a minimum of three cubic feet of concrete for each thrust block.

J. Concrete thrust blocks may be eliminated if the main line piping system uses self-restrained fittings and bell joint restraints per manufacture's specifications throughout.

3.3 PIPE BACKFILL

A. Backfill shall not be placed until the installed system has been inspected, pressure tested and approved by the Owner.

B. Backfill for first 6 inches underneath, and 4 inches around and above main line pipe and control wires shall be granular bedding material, unless the Owner approves in writing that native soil may be used for initial backfill in lieu of granular bedding material. Backfill material for the upper portion of the trench shall be approved soil. Unsuitable martial, such as pipe remnants and wire including clods and rocks over two inches (2") in size, shall be removed from the premises and disposed of legally at no cost to the Owner.

C. Backfilling for all pipe shall be carried out in two basic stages.
   1. Stage One Backfilling: This shall be accomplished as soon as possible after the pipe is laid. A bedding of uniform depth with no voids must be provided along the entire length of the pipe. The bedding material should be placed in the trench and tamped into the areas under the pipe, using a suitable tool. Joints should be left exposed until hydrostatic tests are completed. Cover only those portions of the pipe necessary to prevent movement or damage.
   2. Stage Two Backfilling: This shall be completed after all hydrostatic tests are completed and the piping system has been thoroughly checked for leaks or other defects. Continue to add backfill material in four-inch (4") layers and hand tamp to achieve density similar to adjacent soil. After twelve inches (12") in main line trenches and eight inches (8") in lateral line trenches of hand tamped soil is in place over the pipe and fittings, backfilling can be continued, using light machinery to place dirt in the trenches in six-inch (6") layers and to compact the dirt to conform to adjacent soil. Extreme care should be taken to avoid damage to the pipe from machinery that is too heavy. All trenches shall then be water jetted to assure uniform settling and compaction. Backfilling operations will not be considered complete until the top surface has been graded to conform to the adjacent soil. All rocks uncovered and not used as backfill must be collected and removed from the site.

D. All backfilling shall be done carefully and shall be properly tamped. All soil shall be tamped and puddled to eliminate any voids.

E. Surplus earth remaining after backfilling shall be disposed of as directed by the Owner.

F. PVC piping and fittings shall not be backfilled during periods of extreme heat or when a sudden lowering of temperature of the pipe may cause separation of joints or fittings.

G. Contractor shall fill with properly amended topsoil any irrigation trench that subsides during the warranty period. Contractor shall assume all cost associated with the trench repair, including but not limited to plant replacement of a size of plant disturbed at the time of the repair.

3.4 CONTROL AND TRACER WIRE, AND COMMUNICATION CABLE

A. Install control wires alongside of main line piping. Do not tape wires together when encased in sleeve or conduit. Minimum cover shall be 24 inches. Crimp wires together at valve manifold with Scotchlok connector. Conventional valve wire splices shall use a 3M DBY splice kit. Tag all control wire at splices with approved control wire markers.

B. Wire size shall be determined by the number of valves operating on a given wire and the distance from the controller to the farthest valve, as specified by the charts furnished by the remote-control valve manufacturer. Splices are only allowed when rerouting or repairing existing wire. All splice connections must be provided in a valve box.

C. Communication/sensor cable shall be installed in electrical conduit with long radius sweeps at direction changes and at valve/splice/pull boxes. Maintain a minimum six-inch clearance to adjacent pipe. Minimum cover shall be 24 inches.

D. Install tracer wire along the top of pipe at the following locations:
   1. All pipe sleeves.
   2. Main line pipe without adjacent control wire.

3.5 VALVES

A. The Contractor shall make all necessary connections for operation, and shall be connected and aligned to provide the most efficient flow of water to the irrigation heads. Where pressure regulating electric control valves are specified, the Contractor shall adjust the valve, so a uniform distribution of water is applied by the heads, and that the most remote heads operate at the pressure recommended by the head manufacturer.

B. Each valve is to be enclosed in a separate valve box. The valve box shall be secured on firm soil clear of valves and wiring connections. Valve boxes and lids shall be set to finished grade or as indicated on the Drawings. Use valve box extensions of the same material as the box to the proper depth below the pipeline. Valve boxes shall be supported by common bricks at each corner and at the long side of the box. Use a minimum of six bricks to support rectangular boxes and four bricks to support round boxes. Backfill carefully and properly compact in order to prevent settlement and subsequent damage.

C. Install a concrete collar around valve boxes when located in asphaltic concrete pavement or in turfgrass areas.

D. Remote control valve boxes within the field of play at sports venues shall be buried with a minimum of 8 inches of cover over the box lid in turfgrass, and a minimum 3 inches in skinned infield or warning track surfacing.

E. When existing valve and/or splice boxes are within the area of work, replace in kind any damaged boxes and/or lids, unless noted otherwise. Adjust the elevation of all existing boxes within the area of work to final grade per the drawings.

F. Locate valve boxes in ground cover/shrub planting areas instead of turfgrass areas whenever possible. Locate valve boxes 18” from and perpendicular to adjacent paving. When grouped together, provide equal spacing of at least 36" between boxes.

G. Permanently attach the plastic valve identification tag to the remote-control valve body and locate so it’s clearly visible in an open valve box.

H. Permanently secure the control valve identification label to the top of concrete valve box lids with non-corrosive connectors.

3.6 AUTOMATIC CONTROLS

A. Install the controller and/or associated equipment, enclosure, sensors, and accessories per the manufacturer’s details and installation requirements, and the construction documents.

B. Where the controller is not connected to a building's electrical grounding system, install a grounding circuit for controller and associated equipment with either a ground rod or ground plate per ASIC Guideline 100-2002.

C. Connect operational control wires or accessory components to the controller, and program valve schedules appropriately for the new planting.

D. The Owner shall review the fully functional operation of the irrigation control system prior to acceptance of the system, and as a requirement for the start of maintenance.

E. Install automatic controller chart in laminated or watertight plastic envelope inside controller cover showing which valves are connected to which stations on controller in the work area.

3.7 ELECTRICAL SERVICE

A. Install grounding rods, plates, etc. per manufacturer's and CEC code requirements

3.8 SPRINKLER HEAD INSTALLATION

A. Head spacing on drawings is diagrammatic. Head spacing and patterns shall be adjusted to provide complete and adequate coverage with a minimum spray on non-planted areas. Flush all lines prior to installation of heads.

B. Overhead distribution sprinkler heads shall be installed as detailed, set adjacent to the edge of hardscape elements (2 - 4 inches for spray heads, 6 - 8 inches for rotary heads) and perpendicular to the finish grade. Sprinkler spray heads directed toward a building shall be a minimum 7 feet from building walls, and a minimum 2 feet when directed away from the building. Sprinkler heads in turfgrass areas shall have a minimum 10-foot radius except for corners.

C. The top of the nozzle shall be one-half inch (1/2") above the finish subgrade in areas to receive standard cut turfgrass sod.

D. Where individual shrub bubblers are installed, each plant shall have a bubbler within 10 - 14 inches of the shrub center.

E. Upon completion of the installation, the Contractor shall adjust or change sprinkler head nozzles to uniformly distribute water without overspray and shall place entire irrigation system in first-class operating condition without any additional cost to the Owner.

F. Sprinkler heads shall be adjusted in order by fully opening the sprinkler furthest from the control valve and working back toward the control valve. Adjust sprinkler heads which spray toward buildings or adjacent hardscape so that water spray does not contact the side of buildings or significantly over-spray onto hardscape.

3.9 DRIP IRRIGATION SYSTEM

A. Install control valves, wye strainer, pressure regulator and rigid PVC lateral distribution lines or manifolds prior to planting soil conditioning operations.

B. Install in-line emitter tubing as follows:
   1. After planting soil has been amended, tilled and rough graded, remove and stockpile the planting soil to the required depth of the in-line tubing, and install and stake drip tubing taking into account adjustments needed in the tubing location based on the planting layout. Stake in-line tubing at every-other emitter. Install flush and air relief valves, and

operation indicator. Install the operation indicator on the supply manifold with a swing joint in a location easily visible by maintenance personnel.

2. After system flushing, verification of proper operation and inspection, reinstall the stockpiled planting soil and finish grade to final elevation.

C. Operate the system to moisten the planting soils to a minimum 8-inch depth prior to planting operations.

D. Program the controller to operate the drip system using the controller's "cycle and soak" feature in order to apply the required daily watering amount in three equal cycles with a one-hour delay between cycles.

3.10 CONCRETE

A. Concrete shall be installed in accordance with the relevant portions of the Site Concrete specification section.

3.11 COMPLETION AND MAINTENANCE

A. After the system has been completed but prior to the start of maintenance, the Contractor shall operate the automated system with the Owner, shall instruct the Owner in the operations and maintenance of the system and controls, and shall program the controller for each station.

B. The irrigation system shall be maintained and adjusted as required to provide proper coverage throughout the maintenance period or until Final Acceptance of the project, whichever is greater. Irrigation system maintenance shall commence upon an acceptable review following the completion of irrigation installation, planting operations and general clean-up.

C. The maintenance period shall not terminate until the close-out documents and as-builts record drawings have been submitted and accepted.

3.12 REPAIR AND CLEAN-UP

A. All areas shall be maintained in a neat and orderly condition at all times. All reasonable precautions shall be taken to avoid damage to new planting and improvements. Disturbed and/or damaged areas shall be restored to their original condition to the satisfaction of the Owner.

B. Where trenching or other work disturbs existing and/or newly planted turfgrass and/or planting, the Contractor shall reinstall the existing sod if viable, or install a full width of new turfgrass sod or new planting to match the existing turfgrass/planting species, variety and size, after first conditioning the top 6 inches of soil per the Landscape Planting specification. Adjust finish grades to account for the new turfgrass sod's soil mat so that the new sod is flush to the adjacent turfgrass.

C. After the irrigation operations are completed, the Contractor shall remove all trash, excess materials, empty containers or any other debris accumulated by the work from the site. All damage caused by the work shall be repaired or material replaced at the Contractor's expense. The site shall be left in a neat and orderly condition to the satisfaction of the Owner.

END OF SECTION

SECTION 32 90 00 LANDSCAPE PLANTING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish all material, labor and equipment necessary to install all landscape work as indicated in the plans and specifications.

B. The landscape work includes but is not necessarily limited to the following:
1. Soil preparation including cross ripping of all planting soil.
2. Weed control including an application of a pre-emergent herbicide.
3. Providing import planting topsoil at raised grade planters and/or at planting areas needing fill.
4. Fine grading, conditioning and amending planting topsoil.
5. Installation of turfgrass sod
6. Planting new trees, plants and ground covers.
7. Tree drainage sump boring and testing.
8. Root Barriers.
9. Installation of mulch.
10. Turfgrass maintenance equipment and training.
11. Sixty (60) day maintenance.

C. Related Work Specified Elsewhere
1. Contract Drawings, Addenda, general provisions of the Contract, including General and Supplemental Conditions, and Division 1 Sections apply to work of this section.
2. Section 31 20 00 - Earthwork
3. Section 31 22 22 - Soil Materials
4. Section 32 01 90 – Existing Landscape Protection
5. Section 32 84 00 - Irrigation System

1.2 DEFINITIONS

A. Unless noted otherwise, the term "approved" shall mean by the Owner in writing.

B. Agencies and Organizations:
1. ASTM- American Society for Testing and Materials
2. ANSI – American National Standards Institute
3. ISA – International Society of Arborists
4. SSPWC – Standard Specifications for Public Works Construction, by the American Public Works Assoc./Associated General Contractors of California.
5. TPI – Turfgrass Producers International

C. Owner: The Owner’s authorized representative or authorized consultant.

1.3 QUALITY ASSURANCE

A. The work of this Section shall be performed by a single firm experienced in landscape planting and holding a current California Contractor’s A or C27 License.

B. Tree and plant quality and sizes shall conform to the current edition of “American Standard for Nursery Stock” for Number One nursery stock as adopted by the American Nursery & Landscape Association (ANSI Z60.1). Plants shall be of uniform, standard size for their listed container size, neither overgrown and root bound or encircling, nor so recently transplanted that

the root system is not thoroughly well established throughout the container. Roots should reach the sides of the container and maintain a firm root ball. Pruning shall not be done prior to delivery except by prior approval.

C. Trees shall also comply with quality characteristics described in “Guideline Specifications for Nursery Tree Quality” current edition, published by the Urban Tree Foundation. Trees not in compliance with any of the following characteristics may be subject to removal and replacement, whether planted or still in their containers.
   1. Acceptable caliper and height ranges for the Type, Form and Size of tree.
   2. An intact central leader, or after heading of an old leader, the new leader diameter is greater than one-half the diameter of the old leader. Co-dominant leaders are not acceptable.
   3. Scaffold branch diameters are less than two-thirds the diameter of the trunk, and without included bark at the attachment.
   4. Scaffold branches shall be balanced, well-spaced vertically, and with a radially blank section no greater than one-third of the canopy circumference.
   5. Temporary branches on the lower trunk shall be less than three-eighths inch diameter, and the clear trunk height shall be no more than forty (40) percent of the overall tree height.
   6. The root collar and rootball shall be free of defects, including circling, kinked and girdling roots. Roots at the edge and bottom of the container shall be less than one-quarter inch diameter, and uniformly distributed throughout the container.
   7. The tree canopy width shall be a minimum of twenty-five percent of the standard form tree height, except for naturally columnar forms.

D. Botanical names shall take precedence over common names. Provide plants that are true to name. Tag one representative plant of each species and size with the botanical name and size.

E. Inspection:
   1. All landscape work and materials shall comply with applicable Federal, State, County and City regulations.
   2. All plant material shall be reviewed onsite or by providing photo submittals by the Owner’s Representative and/or Landscape Architect prior to positioning and planting. The lack of a review shall not limit the right of rejection during any stage of the work until Final Acceptance for any reason including condition of the foliage or root ball, size, variety, form, appearance, latent defects or injuries or location errors. Rejected or wrongly located plants shall be removed/relocated from/on the site and replaced/replanted immediately by the Contractor as directed at no additional cost to the Owner.

F. Qualifications of Workers
   1. Employ skilled workers who are thoroughly trained experienced in landscape planting and who are completely familiar with specified requirements and methods needed for proper performance of the work in this section.
   2. Provide adequate supervision by a qualified foreman fluent in English that will be continuously onsite during the performance of this work.
   3. Weed control pesticides shall only be applied by an individual holding a valid Qualified Applicator Certificate (Category A) issued by the Department of Pesticides Regulation. Submit a copy of the Certificate.

G. Any pruning of existing trees specified as part of this Work shall be performed under the direct supervision of an ISA Certified Arborist and in compliance with ANSI A300-Part 1 Standard Practices (Pruning).

1.4 SUBMITTALS

A. In accordance with the Submittal section, submit:

1. A complete materials list of all items proposed to be furnished including estimated quantities.
2. Laboratory analyses of soil conditioning materials, e.g. organic compost, shall have been performed within three months of the submittal date.
3. Quality Certificates and/or Certificates of Inspection required by government agencies (providing duplicate copies for the Owner's Representative).
4. Qualified Applicator Certificate, and DPR Registration Certificates and Material Safety Data Sheets for all pesticides/herbicides proposed for use.
5. Submit photos with a scale marker of all boxed trees, and a representative photo of each species/variety of ground plane plants proposed for use from the nursery source. Photos shall clearly show the individual tree or plant form without background greenery.

B. Soil amendments: Submit one (1) pint sample and an analysis of organic compost and mulch.

C. Other Samples: When requested by the Landscape Architect and/or Owner's Representative.

D. Soil Fertility Analysis and Recommendations:
1. The Contractor shall provide and pay for a fertility analysis of the existing topsoil and any proposed import planting topsoil. After mass grading operations are completed, native soil samples shall be collected for the fertility analysis by collecting a minimum of 5 representative samples of the soil per acre throughout the area of work. Separate samples shall be produced for cut and fill areas, and for any other area composed of soils not similar to the existing soils. Each sample shall be a minimum of one pint each, and shall be thoroughly mixed together to prepare a homogenous sample. A one-quart representative sample for cut, fill and any other special conditions shall be submitted to the soil testing laboratory as a representative sample for fertility analysis. The fertility analysis shall at a minimum provide the following data:
    a. soil texture class and percent sands, silts and clays per ASTM D422
    b. estimated soil infiltration and percolation rates
    c. pH
    d. organic matter (%)
    e. total soluble salts (ECe)
    f. Cation Exchange Capacity (CEC) and Percent Cation Saturation for K, Mg, Ca and Na
    g. major and minor nutrients (ppm).
2. Recommendations for improvement of the soil conditions for optimum plant growth shall be made by the testing laboratory, and at a minimum shall include the following:
    a. A fertilizer and amendment application program (including macro and micronutrients) for both pre-planting and maintenance fertility applications for broad area tillage and for planting pit backfill (pre-plant only).
    b. Treatments to neutralize soil pH and to correct any adverse conditions as warranted.
    c. Recommendations shall address soil conditioning for both planting area tillage and tree/plant planting pit backfill.
3. The soil analysis and recommendations shall be performed by one of the following laboratories capable of providing the above analyses by a licensed soil scientist:
    a. D&D Agricultural Laboratory. Contact Darrin Peters at 559-348-1818.
    b. Wilber-Ellis Company. Contact Michael Cline at 209-442-1220.
4. The Contractor shall submit the results of the soil testing investigations and shall receive written direction from the Landscape Architect before proceeding with any soil conditioning activities such as fertilizing and/or tillage of amendments.

E. Within seven days from the start of the maintenance period, submit a calendar of maintenance activities, including scheduled dates for mowing, fertilizing, weed control and all other activities. Provide the quantities of maintenance fertilizer and any other materials scheduled to be used in each application during the maintenance period.

F. Submit invoices and/or delivery tags from material suppliers for all amendments, fertilizer, seed, plants, mulch and any other materials provided for the landscape planting installation and applied during the maintenance period. Submit tags from seed packaging indicating seed varieties, percent purity and percent germination minimums. The invoices and/or delivery tags shall be provided directly to the Owner's Representative/Inspector of Record within 24 hours of delivery to the site, as well as to the normal submittal recipients per the Contract Documents.

G. Close-out Documents: Submit prior to the end of the maintenance period. Acceptance of the Close-out documents in a condition for scheduling a Final Acceptance review. Provide two bound copies of the following:
   1. Cover sheet stating Contractor's address and telephone number, duration of guarantee period, and a list of plant nurseries, materials and equipment vendors with names and addresses of the vendor/manufacturer representatives and warranty periods.
   2. A "CERTIFICATE OF CONSTRUCTION COMPLIANCE" which indicates that all work done, materials and equipment used and installed are in compliance with the approved plans, specifications and all authorized revisions.
   3. Maintenance Manuals and Instructions: Submit a monthly schedule of procedures to be established by Owner for maintenance of landscapes (trees, mixed planting and turfgrass) for one full year and shall include recommendations for fertilizing, pest and disease control, weeding, mowing, aeration and top dressing.
   4. Soil Amendment confirmation form noting the installed quantities of materials, tags or invoices from Subsection F. above, and the person who confirmed the delivery and installation of the materials.
   5. Operations and Maintenance Manuals and Warranty certificates for any maintenance equipment turned over to the Owner.
   6. As-built Record Drawings with all modifications to the Drawings noted in red ink, and the Landscape Planting Observation Log completed.

1.5 AVAILABILITY

A. The Contractor shall confirm availability of plants, supplies, and materials prior to submitting the landscape bid. Plant variety substitutions are not desired.

B. If a plant is found not to be suitable or available, the Contractor is to notify Landscape Architect before bidding. The Landscape Architect is then required to select a reasonable alternate and to inform all those bidding of the availability of the original plant. If a substitute is selected, it must be of the same size, value, and quality as the original plant. Failure to inform the Landscape Architect of unavailable plants prior to bidding will require that all plants specified shall be provided by the Contractor at time of installation.

C. Plant container size listed on construction documents are minimum acceptable size. If plant material specified is not substituted prior to award of the contract the minimum container size specified shall be provided by the Contractor. If the Contractor cannot provide the minimum specified size plant material at the time of installation, the Contractor shall be required to install a larger size container of the plant specified at no additional cost to the Owner.

1.6 EXISTING CONDITIONS

A. The Contractor is to visit the job site to verify existing conditions including soils, vegetative growth, subsurface conditions, existing grade and drainage, irrigation system etc. making allowances in the Contractor's bid for any required work to provide the landscape installation as specified in the construction documents.

B. The Contractor shall notify the Owner to locate underground lines prior to hole boring or trenching. Do not permit heavy equipment such as trucks, rollers, or tractors to damage utilities. Hand excavate as required to minimize possibility of damage to underground utilities. Maintain

grade stakes set by others until removal is mutually agreed upon by all parties concerned. Prevent damage to temporary risers of underground irrigation system and similar obstructing work located in the landscape areas.

C. If there is a conflict with existing utilities, improvements and/or planting and the proposed planting, Contractor shall promptly notify the Owner's Representative for instructions as to further action. Failure to do so will make Contractor liable for any and all damage or corrective actions arising from Contractor's operations.

D. Prior to the start of this work, the Contractor and the Owner's Representative shall verify the operational condition of that portion of the existing irrigation system pertaining to the proposed planting area. The Contractor shall notify the Owner's Representative of any repairs and/or corrections necessary for proper functioning and coverage. The repairs and/or corrections shall be completed before any plant material is planted. Failure to perform system verification and provide notification prior to the start of this work will make the Contractor liable for any and all repairs and/or corrections necessary for proper functioning and coverage, as well as any required plant replacement, without any additional cost to the Owner.

E. No plants shall be planted in situations that show poor drainage infiltration or low areas that result in standing water. Such situations shall be corrected by the Contractor as directed by the Landscape Architect or Civil Engineer. Failure by the Contractor to notify the Owner of poor drainage conditions prior to proceeding with the conditioning or planting operations shall place the responsibility for any plant removals, additional soil conditioning and replanting on the Contractor without any additional cost to the Owner. Any corrections of finish grading not in compliance with the Contract Documents including plant removal, soil conditioning and replanting shall be performed by the Contractor at no additional cost to the Owner.

1.7 PROTECTION

A. The Contractor shall guarantee repair of damage to any part of the premises resulting from but not limited to leaks, defects in materials or workmanship, operation of equipment, storage of materials and/or equipment, installation of underground or overhead utilities. The Contractor shall be liable for any and all accidents resulting from the Contractor's work, including open holes and trenches during construction.

B. Protect new and existing landscape areas in the area of work from theft, loss, damage and deterioration during storage, installation and maintenance. Protect from unauthorized persons (trespassers) as well as from operations by other contractors and tradesmen, and landscape operations. Protect all planted turf and shrub areas from persons as well as operations of other contractors and the Owner. Cost of protection shall be borne by the Contractor with means of protection such as temporary fencing as approved by Owner. Cost for protection shall be included in the Contractor's bid for the work.

C. Contractor shall repair or replace damaged work and/or damage to existing improvements/landscape as identified by the Owner's Representative to a condition acceptable to the Owner's Representative. No additional payment will be made to the Contractor for repair or replacement of damaged work and/or damage to existing improvements/landscape.

1.8 OBSERVATIONS

A. General:
   1. Installation and operations must be approved by the Owner.
   2. In no event shall the Contractor cover up or otherwise remove from view any work under this contract without prior approval of the Owner. Any work covered prior to inspection shall be opened to view by the Contractor at the Contractor's expense.

3. In all cases, where inspection of the landscape planting work is required and/or where portions of the work are specified to be performed under the direction and/or review of the Owner, the Contractor shall notify the Owner at least 72 hours in advance of the time when such inspection and/or direction is required. Any necessary re-excavation or alterations to the planting needed because of failure of the Contractor to have the required inspection, shall be performed at the Contractor's own expense.

B. The Owner or the Project Inspector shall perform periodic observations and shall record the observation on the Landscape Planting Observation Log form on the As Built Record Drawings. Field Reports by the Owner's Representative noting the observations may be acceptable if included in the Close-out Documents. Such observations shall include but are not necessarily limited to:
1. Weed control operations prior to other portions of work.
2. Ripping and soil conditioning of the planting area.
3. Layout of the plant material and trees at the site prior to planting in order to avoid conflicts and to meet the design intent.
4. Condition and quality of plant material prior to planting.
5. Auguring, digging and preparation of plant pits and drainage sumps for trees and shrubs.
6. Planting and staking of trees.
7. Planting of shrubs, ground cover and turfgrass.

C. Any corrective action called for shall be immediately performed by the Contractor.

D. Failure by the Contractor to obtain the above observations shall place the responsibility on the Contractor for any relocation and/or replacement of planted trees or shrubs.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Plant label shall identify each species and variety. A label shall be attached to each individual plant or block of identical plants grouped together.

B. Adequately protect plants from sun and wind prior to planting. Do not allow stored plant material to dry out at any time.

C. Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at the site. Store materials and equipment in a location as directed by the Owner's Representative.

1.10 PESTICIDE NOTIFICATION

A. A written notification of any and all pesticide/herbicide products scheduled for use by the Contractor or their representative on the Owner's property must be submitted to the Owner's Representative at least seven days prior to the scheduled application. Notification shall include the product name, manufacturer's name, the pesticide active ingredient, the U.S. EPA and CalDPR registration numbers, the scheduled date and application areas, and the reason (target species) for the application.

1.11 REPAIR OF DAMAGED EXISTING PLANTING AREAS

A. The Contractor shall be responsible to repair all damage and/or distress to existing planting areas including turfgrass, shrubs, ground covers, perennials, etc., whether specifically shown on the Contract Documents or not, as a result of construction operations, material and/or equipment storage, site access, site offices, utility and/or irrigation line installations or other actions.

B. Replacement shrubs shall be 15-gallon size, replacement ground cover and perennial plants shall be 5-gallon size, and turfgrass shall be full width sod. Damaged areas shall be amended and finish graded per the Contract Documents prior to planting. Damaged areas outside of the limit of work shall be returned to the pre-construction condition with new replacement plants and/or turfgrass sod. Non-turfgrass planting areas shall also receive wood mulch as specified herein. The limits of repair shall be determined by the Owner.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil used in planting areas shall be a clean, friable soil without noxious weeds, clods or stones larger than 0.5 inch in diameter, subsoil, hardpan, wood, debris, fine organic material greater than 2% by weight, undesirable insects, plant disease or any other natural or extraneous objects detrimental to normal plant growth.

B. The Contractor shall provide a particle size analysis, fertility testing and amendment recommendations of proposed native and/or import topsoil, and the Landscape Architect reserves the right to reject topsoil not conforming to the minimum specifications. Stockpiled onsite topsoil may be used if analysis and testing determines compliance with these requirements prior to placement. Failure to meet minimum specifications shall result in the removal of any unauthorized placed topsoil at the Contractors' expense.

C. Particle size distribution for topsoil shall meet the following per ASTM D422:
1. 100% passing a 12.2 mm (1/2") screen.
2. Minimum 95% passing a 9.5 mm (3/8") screen.
3. Minimum 75% passing a 2.36 mm (No. 8) screen.
4. Maximum 45% passing a No. 200 screen.
5. Silt content shall be a maximum 35%.
6. Clay content shall be a maximum 25%.
7. Silt to Clay ratio shall be less than 2 and greater than 0.5.

D. Other characteristics shall conform to the following:
1. Permeability rate shall be not less than one (1.0) inch per hour or not more than 20 inches per hour.
2. The sodium absorption ratio (SAR) shall not exceed 3.0 and the electrical conductivity (ECe) shall not exceed 2.5 milliohms per centimeter at 25 degrees centigrade.
3. Soluble boron shall be no greater than 1.0 part per million (mg/l).
4. Soil pH range shall be 6.5 – 7.9.
5. Maximum concentration of soluble chloride shall be 150 parts per million.
6. Maximum concentration of heavy metals shall not exceed the following when the pH is between 6 and 7:
    a. Arsenic: 0.5 ppm
    b. Cadmium: 0.5 ppm
    c. Chromium: 5 ppm
    d. Cobalt: 1 ppm
    e. Lead: 15 ppm
    f. Mercury: 0.5 ppm
    g. Nickel: 2.5 ppm
    h. Selenium: 1.5 ppm
    i. Silver: 0.25 ppm
    j. Vanadium: 1.5 ppm
7. Petroleum hydrocarbons shall not exceed 100 mg/kg dry soil.
8. Aromatic volatile organic hydrocarbons shall not exceed 2 mg/kg dry soil.

2.2 SOIL AMENDMENTS

A. Organic Compost: “Harvest Premium” as supplied by Harvest Power (559) 435-1114; “WonderGrow Compost” by Grover, Inc. (866) 764-5765, or “Allgro Compost” by Synagro (559) 341-5158, or approved equal and conforming to the following minimums per the US Composting Council ‘Compost Technical Data Sheet’ report, or equal, and dated within three (3) weeks (21 days) of the submittal date:
   1. Certified as “Mature” or better
   2. Pass EPA Class A standards for pathogens and heavy metals.
   3. Particle size: 1/8" maximum
   4. pH: 6.0-7.5.
   5. Macro-nutrients: Minimum of 1.0% Nitrogen, 0.5% Phosphorus, 0.5% Potassium.
   6. AgIndex ratio (Nutrients/Salts) 10 or more.
   7. Ammonia N/Nitrate N ratio: rated Mature or Very Mature
   8. Organic matter content greater than 50% dry weight.
   9. Ash: equal or greater than 6%, not greater than 20%
   10. Carbon/Nitrogen ratio: less than or equal to 25.
   11. Salinity (ECe): less than 10.0 dS/m.
   12. Odor shall be soil-like (musty, earthy) without any sour, ammonia-like or putrid smell.
   13. No measured component shall be rated as “Extreme” or “Very High” that will be detrimental to plant growth.

B. Gypsum shall be mined agricultural grade gypsum composed of no less than 95% $CaS0_4$-$2H_20$ hydrated calcium sulfate in a pelletized form. Elemental Sulfur shall be a minimum 95% pure agricultural grade.

C. Dry Humate organic soil conditioner comprised of a minimum 70% humic acid from Leonardite.

D. Endo 120 Mycorrhizae containing a minimum 60,000 living propagules per pound.

E. Amendment material types and application rates may be subject to change based on the findings and recommendations of the horticultural soil testing lab, and as such may result in an increase or decrease in the Contract Amount.

2.3 FERTILIZER

A. Trees and Shrubs: Fertilizer for all trees and shrubs to be BEST PAKS (20-10-5) controlled release fertilizer in a biodegradable 10-gram packet. The BEST PAKS shall be applied at the following rates:
   1. 1 Gallon Can: 1 Best-Pak
   2. 2 Gallon Can: 2 Best-Paks
   3. 5 Gallon Can: 5 Best-Paks
   4. 15 Gallon Can: 10 Best-Paks
   5. 24” Box: 16 Best-Paks
   6. 36” Box: 24 Best-Paks

B. The pre-plant fertilizer shall be a commercial homogeneous, granular pellet:
   1. Pre-plant fertilizer for turfgrass shall be:
      a. BEST 6-24-24-5S XB+ with Avail.
   2. Pre-plant fertilizer for mixed plantings shall be:
      a. BEST Landscape Color 14-14-14 (14-6-11.6-3S and micronutrients) with 9.9% slow-release N, or equal.

C. The maintenance fertilizer shall be a commercial homogeneous, granular pellet:
   1. Maintenance fertilizer for turfgrass shall be one or more of the following:

a. Urea 46-0-0
b. BEST Ammonia Sulfate 21-0-0-24S, standard grade, or equal
c. BEST Nitra King 21-2-4-14S-2Fe, or equal.
d. BEST Nitex 20-2-3-12S-5Fe, or equal.

2. Maintenance fertilizer for mixed plantings shall be the pre-planting fertilizer.

D. Fertilizer material types and analysis may be subject to change based on the findings and recommendations from the horticultural soil testing lab, and as such may result in an increase or decrease in the Contract Amount.

2.4 MULCH

A. Mulch for on-grade or raised native soil planters shall be a walk-on type of chipped and aged green waste woody material without leaves, green wood, sticks, dirt, stones, dust and other non-organic debris as accepted by the Landscape Architect. Particle size 1/2” to 3" in general size.

2.5 STAKING & GUYING MATERIALS

A. Stakes: 2" Diameter Lodgepole Pine or Douglas Fir, pressure treated and pointed one end.

B. Ties: V.I.T. Cinch Tie, 32 inches long, V.I.T. Products, Inc. (619) 673-1760, or equivalent.

2.6 PLANTS

A. Plants shall be typical of their species and variety, shall have normal growth habits, well developed branches and be densely foliated, and shall have fibrous root systems. No substitutions will be allowed unless approved in writing by the Landscape Architect.

B. Plants shall be free from defects and injuries including disease, insects, insect eggs and larvae and girdled or matted roots.

C. Quality and size of plants shall be in accordance with ANSI Z60.1-2004, "American Standard for Nursery Stock", and as described in Quality Assurance.

D. Plants shall not be pruned before planting.

E. Plant material must be selected from nurseries that have been inspected by State or Federal Agencies.

F. Plants shall be nursery grown and shall have been transplanted or root pruned at least once in the past three (3) years. Plants shall have been grown under climatic conditions similar to those in the locality of the project.

G. Each bundle of plants shall be properly identified by weatherproof labels securely attached thereto before delivery to the project site. Label shall identify plants by name.

H. Nomenclature shall be in accordance with Sunset Western Garden Book, current edition.

I. No plants shall be removed from their container until a review has been made in the field or at the nursery, or except when specifically authorized in writing by the Owner.

J. Collected plant material may be used only when approved. Approval shall not limit the right of rejection during work progress for conditions of the root ball, latent defects or injuries.

K. Where shown a "MULTI" provide trees with a minimum of three trunks.

L. Plant sizes listed on the planting plan are minimum acceptable sizes. The quantities listed are the Landscape Architect's estimate only. The Contractor is responsible for the quantities of plant symbols shown on the plan, and/or the quantities in hatched planting areas at the specified triangular spacing.

2.7 TURFGRASS SOD

A. Sod shall be produced from certified or approved seed/stolons, fresh and labeled in accordance with U. S. Department of Agriculture Rules and Regulations. Sod quality shall be Premium or Standard Grade per TPI specifications.

B. Sod shall be neatly mowed and be mature enough that when grasped at one end it can be picked up and handled without damage, delivered to the project site, adequately protected and installation commenced within 24 hours of harvesting.

C. Turfgrass shall be a species and variety as specified in the Contract Drawings. If a warm-season grass is specified and the installation is to be performed between the months of October and April, a species with an established perennial ryegrass overseeding shall be installed. Submit the overseeded product information for approval prior to the installation.

2.8 ROOT BARRIER

A. A ribbed polyethylene panel of minimum 0.080” thickness equal to Deep Root Partners #UB 24-2 PANEL, (800) 458-7668..

2.9 TREE TRUNK PROTECTOR

A. ArborGard+ polyethylene tree guard by Dimex (800) 334-3776, or equal.

2.10 HERBICIDES

A. Herbicide products for removal of unwanted grass and broad-leafed weeds shall be registered and approved for use by the U.S. EPA and CalDPR, and shall comply with the Owner’s Standards and with the “Healthy Schools Act” with current amendments, and with the current list of prohibited herbicides at Schools and Child Care facilities per California Assembly Bill 405.

B. Provide pre-emergent and post-emergent, selective herbicide formulations for use on turfgrass areas and/or ornamental shrub/ground cover areas that are not injurious to the proposed plantings and turfgrasses.

C. Provide a non-selective contact herbicide formulation only for use to remove existing established weeds prior to new plantings. The herbicide shall be certified for organic use, broad-spectrum with systemic function, ‘Weed Slayer’ by Agro Research International, or equal.

2.11 OTHER MATERIALS

A. Materials not specifically indicated, but necessary for proper execution of the work, shall be of first quality as selected by the Contractor subject to approval of the Landscape Architect.

PART 3 - EXECUTION

3.1 EXAMINATION & PREPARATION

A. General: Verify that existing site conditions are as specified and indicated before beginning this work.

B. Damaged Earth: Verify that earth rendered unfit to receive planting due to concrete water, mortar, limewater, hydrocarbons or any other contaminant dumped on it has been removed and replaced with clean earth from a source approved by the Owner's Representative.

C. Examine the area and conditions under which the work in this section is to be performed. Verify that any existing irrigation system within the limit of work is in proper working order with full coverage. Correct conditions detrimental to the timely and proper completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Commencement of the work signifies acceptance of the existing conditions.

D. Protection:
1. Locate sewer, water, irrigation, gas, electric, phone and other pipelines or conduits and equipment within the area of work prior to commencing work.
2. Mark existing irrigation heads, valves, valve boxes and other below grade equipment or components that are scheduled to remain. Protect in place.

E. Runoff and Erosion Control: Furnish equipment, materials and labor necessary to control the flow, drainage, and accumulation of excess water running off the work area and prevent soil erosion, blowing soil and accumulation of wind-deposited material on the site per the approved SWPPP.

3.2 ROUGH GRADING, SOIL PREPARATION, PLANTER BACKFILL

A. Rough grading shall be performed by other subcontractors to the extent of establishing rough pads, slopes and drainage patterns. The Contractor is responsible for placement of topsoil and grading required to ensure positive drainage in all turfgrass and planting areas. All planting areas shall have a minimum top-soil depth of 18 inches from on-site native and/or approved import sources. Rough grading shall be completed prior to weed control, cross ripping or rock removal operations.

B. After the completion and acceptance of the weed control operations outlined below, and unless directed otherwise by the Landscape Architect or noted on the Drawings, and except for the area under the canopy of existing trees, the Contractor shall cross rip and till (break up large clumps and clods in excess of 2-inch diameter) the existing soil within all planting areas outside the canopy drip line of existing trees until the soil is loose and friable. Ripping shall be to a minimum depth of twelve inches (12") in turfgrass areas and eighteen inches (18") in shrub/ground cover areas, with ripping tines a maximum 18" apart performed in a minimum of two passes total in different perpendicular directions. The Contractor shall review the completed ripping operation with the Owner's Representative and Landscape Architect to determine compliance. The first 6 inches of any new topsoil fill shall be tilled into the existing soil to a minimum depth of 6 inches prior to placing any further topsoil fill. The Contractor shall provide any additional work as directed by the Owner's Representative after the review to obtain compliance. Do not proceed with the addition of topsoil and/or amendments, or commence rock picking or fine grading until the completed ripping operation is accepted in writing by the Owner's Representative.

C. Planting area soil under the canopy drip line of existing trees, or in planting beds not accessible by motorized equipment, shall be ripped to a minimum depth of 12 inches using manual spading

shovels, forks and/or broadforks and working around major tree roots and/or utilities. In areas receiving new mulch, rip to a minimum depth of 4 inches while protecting any existing plants and their root system. Break up and/or remove rocks and clods as indicated below.

D. Do not work soil when moisture content is so great that excessive compaction will occur, or when it is so dry that dust will form in air or clods will not break up readily, or when a full ripping depth cannot be achieved. Apply water, if necessary, to bring soil to an optimum moisture content for tilling and dust control. Maintain within 2 percent above or below optimum moisture content for the existing soil type at all times during the work.

E. After soil ripping and preliminary finish grading is completed, the topsoil shall be cleared of all concrete, wire, sticks, roots, debris and foreign materials. Remove native stones and clods as follows:
   1. In shrub/ground cover areas, remove stones and clods greater than one (1.0) inches in diameter from the top 3 inches of finish grade.
   2. In general, non-play or non-sport turfgrass areas, remove stones and clods greater than three-quarter (0.75) inch in diameter from the top 2 inches of finish grade.
   3. In designated play or sports field turfgrass areas, remove stones and clods greater than one-half (0.50) inch in diameter from the top 4 inches of finish grade using a mobile tractor pulled, PTO powered, hydraulic controlled rock picker, Cherrington Model 4500 or similar.

F. Add clean planting topsoil where needed to bring grade to elevation to promote positive drainage. Spread approved planting topsoil over ripped subgrade prior to incorporating amendments.

G. Backfill all raised grade planters with a minimum depth of 18 inches of imported clean sandy loam planting topsoil conforming to Subsection 2.02 and approved prior to import and/or placement. Failure to obtain import approval prior to backfilling raised grade planters shall result in the removal of any planting and non-approved backfill, and the reinstallation of the work with approved materials.

3.3 WEED CONTROL

A. Weed control pesticides shall only be applied by an individual holding a valid Qualified Applicator Certificate (Category A) issued by the Department of Pesticides Regulation.

B. The Contractor shall treat any weeds in proposed new turfgrass and planting areas with a non-selective contact weed killer at the manufacturer's approved rates and procedures prior to any commencement of work at the site including any irrigation work, ripping of soils or fine grading.

C. Weed eradication shall be ongoing throughout the course of the landscape installation. The Contractor shall apply a pre-emergent herbicide after shrub/ground cover planting and prior to mulch installation. Manually remove weed seed heads. At no time will weeds be allowed to become established. Contractor shall provide all weed control operations as directed by the Owner’s Representative.

D. All weed control operations using pesticides/herbicides shall comply with the CalDPR and Owner Standards, as well as AB2260 “Healthy Schools Act”. The Contractor shall comply with the notification and posting requirements of the “Healthy Schools Act”.
   1. The Contractor shall notify the Owner per Subsection 1.10, A.
   2. The Contractor shall post highly visible signs around the treatment area in conformance with the “Healthy Schools Act” warning of a scheduled pesticide/herbicide application a minimum of 24 hours before to 72 hours after a pesticide application.

E. A non-selective contact herbicide for grassy weeds, '20% Vinegar Weed Slayer' by Good Natured, CA DPR Reg# 85208-1-AA-42177, shall be applied directly to the weed foliage. Only apply to dry surfaces, and a minimum of 8 hours before a rain event. Allow a minimum of 14 days from herbicide application to commence any planting.

F. Perform pre-plant clearing and weed control for native open ground areas planned to receive planting as follows:
   1. Apply irrigation to encourage weed growth prior to ripping, and to maintain moisture in the soil.
   2. Apply a contact herbicide to weed foliage. Remove weeds and expose bare soil.
   3. Lightly disk/till to a depth of three inches.
   4. Perform a "grow and kill" operation after the first disking/tillage:
      a. Water and lightly fertilize to encourage weed germination.
      b. Follow with a second application of a contact herbicide.
      c. Remove weeds and perform a light harrowing or disking.
   5. Apply irrigation to encourage weed growth. If additional weeds germinate, perform a second "grow and kill" operation.
   6. Once existing weeds are completely removed, obtain authorization from the Owner's Representative to proceed with deep ripping, rock removal, soil conditioning and finish grading operations. Allow a minimum of 14 days from herbicide application to commence any planting.

G. After the shrub/ground cover planting is complete and prior to mulch installation, apply an approved pre-emergent herbicide per the manufacturer's recommended rates.

3.4 SOIL CONDITIONING

A. Before commencement of any soil conditioning, weed and rock removal shall be completed as outlined above.

B. Uniformly amend the entire area of topsoil in turfgrass and mixed planting areas per the following bid rates and per the approved modifications as a result of the soils analysis recommendations:
   1. Turf and Non-Sloped (less than 4h:1v) Planting Area Soil Conditioning (per 1,000 square feet).
      a. Compost at a rate of six (6.0) cubic yards (a 2.0-inch-thick layer).
      b. Gypsum at a rate of 100 pounds, or Sulfur at a rate of 25 pounds, or an equivalent combination.
      c. Humate soil conditioner at a rate of fifteen (15) pounds.
      d. A pre-planting fertilizer to turfgrass areas at a rate of 1.25 pounds of actual P and K.
      e. A pre-planting fertilizer to mixed planting areas at a rate of 1.5 pound of actual N.
      f. Mycorrhizae per Subsection 3.06, Mycorrhizae Application.

C. Till soil amendments into the entire planting area soil to a minimum depth of six (6) inches. Perform the cultivation in at least two passes, one in each perpendicular directions to the first, so that the amendments are homogeneously incorporated into the topsoil. All cultivation inside the dripline of existing trees shall be performed manually with minimal disturbance to the root system.

D. If the contractor chooses amendments, conditioners, fertilizers and/or other materials that do not meet the specified characteristics, the contractor shall be responsible for obtaining from the original sol testing lab recommendations to mitigate the out-of-spec material use. Any and all costs for testing and providing the recommended mitigation measures shall be the responsibility of the contractor without any increase in the project cost or time.

E. Planting backfill for trees and shrubs shall be a mix of three parts native soil and one part Compost by volume. Add Humate at 2.0 pounds, and Mycorrhizae at 0.5 pounds per cubic yard of backfill.

F. Amendment material types and application rates may be subject to change based on the findings and recommendations of the horticultural soil testing lab, and as such may result in an increase or decrease in the Contract Amount.

3.5 FINE GRADING

A. Upon completion of soil preparation, fine grade all planting and turfgrass areas to a smooth and even slope conforming to and establishing drainage patterns per the approved Grading Plan. Grading shall eliminate all humps and hollows and promote positive drainage in all planting and turfgrass areas.

B. Where hardscape is installed in existing mixed planting areas, a minimum transition grade width of 2 feet adjacent to the edge of hardscape shall be constructed unless noted otherwise. The maximum slope of any transition grade in mixed planting areas shall be 20 percent (1v:5h). The area of transition grading shall be planted or repaired as specified herein.

C. Tolerance of grade differential for planting and general turfgrass areas shall be plus or minus 0.04 foot. If requested, the Contractor shall water test all turf and planting areas after the grading operations are completed in the presence of the Owner's Representative and/or Landscape Architect. The water test shall consist of applying water to the turf and planting areas to the point where water begins to run over the soil to show the drainage pattern. Make all corrections to the finish grading as required by the Owner's Representative to re-establish positive drainage patterns. Acceptance of the finish grading shall be obtained in writing from the Owner's Representative and/or Landscape Architect prior to proceeding with soil conditioning and planting operations.

D. After the finish grading process, relative compaction of the soil in turf and planting areas shall range between 82% and 85% relative density. Compaction/moisture levels are generally acceptable if an Oakfield probe is able to penetrate a minimum of six inches into the cultivated planting topsoil with moderate pressure. The Owner reserves the right to require the Contractor to test for over compaction. If the compaction is within the acceptable range, the test will be paid for by the Owner. All testing due to non-compliance will be paid for by the Contractor.

E. Remove all rocks produced as a result of the soil conditioning and finish grading operations per the requirements of Subsection 3.02.

F. Finish grades shall be one-half inch (1/2") to three-quarter inch (3/4") for turfgrass sod areas and two inches (2") for shrub/ground cover planting areas below the finish surface of all adjacent walks, curbs, mow strips and utility/valve boxes or collars. Transition any non-compliant grade in existing turfgrass areas at a maximum 12h:1v slope to meet finish grades above, unless shown otherwise on the grading plan.

3.6 MYCORRHIZAE AND HUMATE APPLICATION

A. In turfgrass planting areas, after fine grading is completed broadcast Mycorrhizae at a rate of one and one half (1.5) pounds per 1,000 square feet (65 lbs. per acre). Lightly rake into the top one inch (1") of topsoil immediately prior to turfgrass installation.

B. In shrub and/or ground cover planting areas, the Mycorrhizae inoculant shall be incorporated into the soil with the other soil amendments at five (5.0) pounds per 1,000 square feet (218 lbs.

per acre) per Subsection 3.04, Soil Conditioning. Inoculant shall also be incorporated into the planting backfill per Subsection 3.04, E.

C. In areas receiving turfgrass renovation/aeration, broadcast Humate at a rate of ten (10.0) pounds per 1,000 sf in conjunction with the sand/compost top dress application prior to spreading operation.

D. In existing mixed planting areas where new mulch is to be installed, broadcast and rake Humate into the top 2" of planting soil at a rate of five (5.0 lbs.) per 1,000 sf prior to the new mulch installation.

3.7 PLANTING

A. General Requirements
1. Obtain written approval from the Landscape Architect or Owner's Representative to begin planting operations. The irrigation system shall be fully automated and operational, all weeding, soil conditioning and finish grading completed, and the tree and plant layout approved.
2. Planting shall be performed by workmen familiar with planting procedures and under the supervision of a qualified foreman. The planting foreman shall be on the job site al all times when planting is in progress.
3. Planting operations shall not occur under unfavorable weather conditions.
4. Boxed trees shall be planted first. Shrub planting shall be completed before groundcover is planted.
5. Proceed and complete the landscape work as rapidly as portions of the site become available, working within the seasonal limitations for each kind of planting required.
6. Cooperate with other contractors and trades working in and adjacent to the planting work areas. Examine drawings which show the development of the entire site and become familiar with the scope of other work required.

B. Planting Preparation and Operations
1. Planting material shall be provided with adequate protection of root system and balls from drying winds and sun. Do not bend or bind trees or shrubs in such a manner as to damage bark, break or destroy natural shape. Provide protective covering during delivery.
2. Deliver trees and shrubs after preparations for planting have been completed, and plant immediately. If planting is delayed more than six (6) hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage and keep roots moist. Do not remove container grown stock from containers until planting time.
3. All planting areas shall be smooth and even. Finish grades shall be done prior to any placement of plants.
4. Place all trees and shrubs in locations shown on the planting plan and obtain written field approval of the Landscape Architect before planting or digging planting pits. Inform the Landscape Architect seven (7) days prior to placing the plants. Maintain a minimum 15-foot clearance from trees to any light pole, unless specifically noted otherwise.
5. Carefully remove all canned stock from containers with tin snips or approved cutter. Cut away and remove any girdled or matted roots.
6. Excavate holes of circular outline with vertical sides for all plants 15 gallon or less. Boxed trees shall have square planting holes. The vertical sides and bottom of the holes shall be thoroughly scarified to promote union of backfill with existing soils. All trees shall have two drainage sump holes drilled with a twelve-inch (12") diameter auger penetrating hardpan layers to a minimum one (1) foot into a sand/gravel layer or to a minimum depth of ten (10) feet below the planting pit bottom. Precautions shall be exercised to avoid smooth sides on the holes. Offset augured holes a minimum of eighteen inches (18") from planned tree location to avoid settling of tree after planting.

7. After cleaning out the sump holes, the Contractor shall test the sumps for drainage by flooding with water. If the water does not drain out within twenty-four (24) hours, auger down as required to achieve such drainage by breaking through the hardpan layer, or by extending the drainage sumps to a minimum depth of 15 feet below the bottom of the planting pit. After obtaining approval of the sump holes, fill the augured drainage sump holes with coarse concrete sand.
8. Tree and shrub planting pits shall be at least two and one half (2.5) times the width of the plant container, but a minimum of 36” wide for trees and 18” wide for container shrubs. Planting pits shall be as deep as the soil depth in the container or box, less the additional height of the crown above the finish grade.
9. Set each plant in the center of the pit, plumb and straight. Set the crown of the plant at one inch (1") for shrubs, two inches (2”) for trees above finish grade. When 1/2 of the backfill mix has been placed, tamp-in, insert fertilizer (BEST PAKS as per Section 2.1B1) and allow no air pockets as remainder of backfill is added.
10. Compact soil around the rootball of all plants and thoroughly water in the entire backfill depth.
11. Excess soil from plant holes shall be cultivated and raked to a smooth outline.
12. Shrubs and groundcovers shall be installed in relation to walks and paving to allow for future growth without obstructing traffic with clearance as shown on the drawings.
13. All plants shall be set in watering basin which shall be as wide as the planting pit, but at least four feet (4') in diameter and four inches (4") deep for trees and two feet (2') in diameter and three inches (3") deep for shrubs and vines.
14. Ground cover plants shall be planted at the spacing noted on the drawings. Not more than fifteen minutes shall elapse from the time any groundcover plant is planted until it is watered.

C. Pruning: Prune plants in accordance with established horticultural practice. Shearing of any plants will not be acceptable. Tree pruning shall only be performed with the written approval of the Landscape Architect and under the direction of a certified arborist, and shall comply with ISA Pruning Standards (ANSI 300).

3.8 MULCH

A. Prior to any mulch application, perform weed control operations as specified herein.

B. Where mulch is to be installed in an existing planting area, breakup/till the existing soil in open areas around existing plantings to a minimum 4” depth per section 3.02, and adjust finish grade adjacent to hardscape elements per section 3.05 where not prohibited by existing plantings.

C. Install a minimum 3” compressed layer of mulch in all non-turf planting areas, except for slopes greater than 3h:1v. Install a minimum 2” compressed layer of mulch in all areas receiving flatted plants.

D. Install a minimum 3” compressed layer of wood mulch at a minimum 3’ radius from the tree trunk of all trees located in turfgrass areas. Provide a smooth finish grade transition to a 2” compressed depth where the mulch meets the turfgrass, so that the top elevation of the mulch is flush to the turfgrass soil. Keep mulch off the trunk. For new trees in turfgrass areas, remove the watering berm just prior to the turfgrass planting but maintain the mulched area within the planting pit.

3.9 STAKING & GUYING

A. Trees shall be supported by two (2) tree stakes as shown on the drawings. Cut off the top of stakes damaged by installation or where the stake conflicts with canopy branches.

B. Stakes shall be set firmly in the ground outside the rootball and where possible set stakes perpendicular to the prevailing northwest wind.

C. Trees shall be tied to upright stakes loosely with tree ties (see planting detail). Remove the nursery stake.

D. Multi-trunked trees shall be guyed, or individual branches may be staked and loosely tied as shown on the Drawings.

3.10 ROOT BARRIER

A. Install root barrier along hardscape edges whenever the distance from the center of the trunk to the hardscape edge is less than eight (8) feet. Install per the planting details and manufacturers' recommendations.

3.11 ARBOR GUARD

A. Install ArborGard+ on all newly planted tree trunks in turfgrass areas per manufacturer's recommendations.

3.12 TURFGRASS SOD

A. The area to be planted shall be finish graded to present a smooth and even surface free of humps and hollows and conforming to the finish grading plans. Where new sod is abutting existing turfgrass, fine grade to allow for the thickness of the new sod soil so that the new and existing sod grades are flush. Immediately prior to planting, the surface of the area to be planted shall be sufficiently loose and friable, with adequate moisture to receive the sod. Avoid laying sod on hot or dry soil.

B. Lay first strip of sod slabs along a straight line (use a string in irregular areas). Butt joints tightly. Do not overlap edges. On second strip, stagger head joints (similar to a running bond brick pattern). Use a sharp knife to cut sod in order to fit curves, edges, and sprinkler heads.

C. Install with turf-tired machinery full width sections sod as delivered and flush to adjacent surfaces. Terminating sod edges shall be straight and at right angles to hardscape elements whenever possible.

D. As the sod is being installed, water the sod lightly to prevent drying out. Continue to lay sod and lightly water until installation is complete.

E. After laying sod, roll to eliminate irregularities and to form good contact between sod and soil. Avoid a too heavy roller or excessive initial watering which may cause roller marks.

F. Water the completed lawn surface thoroughly. Topsoil should be constantly moist for a minimum two inches deep. Repeat irrigating at regular intervals to keep sod moist until rooted. The areas shall not be watered to the extent of saturating the soil and causing "flotation" or "flowing" of the top surface of the soil. After water has been applied, no portion of the planted areas shall be allowed to dry out during the entire maintenance period. After sod roots are established, decrease frequency and increase amount of water per application as necessary to maintain good soil moisture to a minimum 6" depth without standing water or excess runoff. The Contractor shall be responsible to monitor the site and alter the watering times and frequencies to meet site and climatic conditions.

G. Prior to the start of the maintenance period, fill all seam joint gaps greater than 1/8 inch and less than 0.5 inch with washed concrete sand. Fill any joint gaps of 0.5 inch or greater width with a minimum two-foot-long replacement sod section in order to achieve a tight joint.

H. Replace dead or distressed sod with equivalent material as directed by the Landscape Architect.

I. Do not install turfgrass inside the watering basin of new trees planted in turf areas, or within a 3' radius of existing tree trunks located in turf areas.

3.13 CLEAN-UP AND REPAIR

A. All areas shall be maintained in a neat and orderly condition at all times. All reasonable precautions shall be taken to avoid damage to existing planting and structures. Disturbed and/or damaged areas, whether a part of this work or from the work of other trades, shall be restored to their original condition.

B. Plants and/or turfgrass shown to remain and damaged or removed by construction operations and/or utility/electrical/drainage lines shall be replaced with plants that match as closely as possible to the existing plant species, variety and size. The replacement turfgrass sod variety shall be the same as shown in the Planting Legend if for new work, or shall match the existing turfgrass variety where the turfgrass is existing. Adjust the finish grade so that the new turfgrass sod abuts flush to the existing turfgrass or to hardscape. The replacement plants and/or turfgrass sod shall be maintained as part of the original scope of work.

C. After the planting operations are completed, the Contractor shall remove all trash, excess soil, empty containers or any other debris accumulated by the work from the site. All damage caused by the work shall be repaired at the Contractor's expense and the site shall be left in a neat and orderly condition to the satisfaction of the Owner.

3.14 PRE-MAINTENANCE REVIEW

A. A general review will be held prior to the start of the maintenance period upon conclusion of the planting operations, irrigation system installation and after clean-up has occurred. The Owner's Representative shall be informed in writing a minimum of seven (7) working days prior to the time the work is ready for review in order to arrange a suitable time and date for such review.

B. At the time of review, Contractor shall have all planting areas free of weeds and neatly cultivated and fine graded. All plant basins shall be in good repair. All trees shall be properly staked and tied. All planting areas shall be clear of weeds.

C. The establishment of turfgrass is herein defined as being all work necessary to grow a full, healthy, uniform stand of smooth and even texture and grade with clean straight edges without weeds, distressed areas or bare spots, and has been mowed at least twice per the specifications. The establishment of turfgrass is further defined as being all work necessary to develop a minimum rooting depth of 2 inches into site soil for a majority of the profile sample section.

D. Work requiring corrective action or replacement in the judgment of the Owner's Representative shall be performed within five (5) days after the inspection. Corrective work and materials replacement shall be in accordance with the drawings and specifications and shall be made by the Contractor at no cost to the Owner. A subsequent review shall then be arranged.

E. If after the review, the Landscape Architect is of the opinion that all the work has been performed as per the Contract Documents, and a uniform stand of healthy dense turfgrass has

been established without weeds or bare spots, the Contractor will be given written notice that the maintenance period may begin.

3.15 MAINTENANCE - GENERAL

A. After all work indicated on the drawings or herein specified has been completed, reviewed, and approved, and the turfgrass has been successfully established per the requirements below, the Contractor shall commence a sixty (60) calendar day maintenance period in which the Contractor shall continuously maintain all areas included in the contract during the progress of the work and throughout the maintenance period, or until Final Acceptance of the project, whichever is greater.

B. Establishment and maintenance work includes monitoring the site to control all watering, replanting, fertilizing, mulching, weeding, cultivating and mowing necessary to bring the planted areas to a healthy and vigorous growing condition, and any additional work needed to keep the areas neat, edged, weed and trash free, and attractive.

C. All trees, shrubs, ground cover shall be kept at optimum growing condition by watering weeding, replanting, fertilizing, cultivating, tree stake repair, spraying for diseases and insects, replace dead or dying materials, pruning as directed, maintaining proper grades of plants, and providing any other reasonable operations of maintenance and protection required for successful completion of the project.

D. Any date when the Contractor fails to adequately water, replace unsuitable planted areas and other work determined to be necessary by the Owner, will **NOT** be credited as part of the establishment/maintenance period.

E. No additional payment will be made for additional time necessary for turfgrass establishment. The maintenance period shall not start until all contract work has been completed and all close-out documents and materials have been submitted. Turfgrass will be considered weed-free if there is a maximum of one percent undesirable turfgrass species, and nine weeds or less per 50 square yards (one per 50 square feet).

F. During the progress of the maintenance period, the Contractor and the Owner's Representative shall conduct reviews at no more than 21-day intervals to determine that ongoing maintenance activities have been conducted by the Contractor. If in the opinion of the Owner, ongoing maintenance has not been conducted by the Contractor in a satisfactory manner the maintenance period shall be suspended. The Contractor shall provide remedial work as directed by the Owner's Representative to correct the found deficiencies and schedule another review. If after the subsequent review the work is deemed acceptable, the maintenance period shall resume.

3.16 MAINTENANCE – MOWING AND DRESSING

A. The first two mowings of warm-season Bermudagrass varieties grown from seed/stolons shall commence when the grass is two (2) inches tall and cut down to one and one-half (1.5) inch. Mowing height for the second two mowings shall be when 1.75 inch tall and cut down to 1.25 inch. For all subsequent mowing and for new sod, mow when 1.4 inch tall and cut down to 1.0 inch.

B. The first three mowings of Tall Fescue cool-season grass varieties shall commence when the grass is three and one-half (3.5) inches tall and cut down to three (3.0) inches. For all subsequent mowings, mow when 3.25 inches tall and cut down to 2.5 inches.

C. The first three mowings of temporary or overseeded cool-season grass varieties shall commence when the grass is two and one-half (2.5) inches tall and cut down to one and three quarters (1.75) inches. For all subsequent mowings, mow when the grass is 2.25 inches tall and cut down to one and one-half (1.5) inch.

D. Turfgrass areas shall be mowed during the growing season a minimum of twice a week for warm-season varieties and a minimum of once a week for cool-season varieties, or at any time the grass reaches 1.4 times its mowing height. Turfgrass shall be edged weekly. The Contractor shall coordinate the Contractor's watering and weed control schedules to accommodate the Contractor's mowing schedule. If the Contractor is unable to mow the turf areas on the required day, he has until 5:00 pm of the next day to do the work. After that time, the Owner reserves the right to secure the services of an alternate mowing entity to perform the work. The cost for the alternate mowing will be deducted from monies owed to the Contractor. The Contractor will remain responsible to perform all scheduled mowings and maintenance of the site. The turfgrass shall be mowed and edged, and all trash and debris removed prior to Final Acceptance.

E. Thirty days after the start of the maintenance period, team sports fields shall be top-dressed and dragged with USGA topdressing sand at a rate of 1.15 tons per 1,000 square feet (+0.25-inch depth). Drag and roll all top-dressed turfgrass areas with a lightly weighted turf roller in order to provide a smooth and even mowing surface. Additional topdressing may be required later in the maintenance period if the finish grade planarity is not acceptable.

3.17 MAINTENANCE - FERTILIZATION

A. The Contractor shall fertilize the warm-season turfgrass (Bermudagrass) at the start of the maintenance period and every twenty-eight (28) days with the turfgrass maintenance fertilizer at a rate of 1.5 lb. of actual N, and/or P and/or K /1,000 s.f. and as modified by the soil fertility recommendations and as directed by the Landscape Architect. The Contractor shall allow for at least three separate fertilizer formulation applications in each fertilization operation. The Contractor shall continue the fertilizer applications until the established turf is accepted.

B. The Contractor shall fertilize the temporary cool-season turfgrass at the start of the maintenance period every twenty-eight (28) days with the turfgrass maintenance fertilizer at a rate of 1.0 lb. of actual N, and/or P and/or K /1,000 s.f. and as modified by the soil fertility recommendations and as directed by the Landscape Architect. The Contractor shall allow for at least three separate fertilizer formulation applications in each fertilization operation. The Contractor shall continue the fertilizer applications until the established temporary turf is accepted.

C. The Contractor shall fertilize the turfgrass areas during the last week of the maintenance period with the turfgrass maintenance slow-release N fertilizer (43-0-0) at a rate of three and one-half (3.5) lbs./1,000 s.f. and as modified by the soil fertility recommendations and as directed by the Landscape Architect. The Contractor shall allow for at least three separate fertilizer formulation applications in each fertilization operation.

D. The Contractor shall fertilize the non-turf planted areas during the last week of the maintenance period with the mixed pre-planting fertilizer (14-6-11.6) at a rate of six (6.0) lbs./1,000 s.f. and as modified by the soil fertility recommendations and approved by the Landscape Architect. The Contractor shall allow for at least three separate fertilizer formulation applications in each fertilization operation.

3.18 MAINTENANCE – REPAIR AND WEEDING

A. Between the twenty-first (21) day and the twenty-eighth (28) day after turfgrass planting, the Contractor shall perform the following: replant all spots or areas where normal germination or growth is not evident; remove all rocks or other debris that would constitute a hindrance to mowing or cultivating; repair all damage done by the Contractor's operations. Where poorly compacted trench backfill shows settlement, remove turfgrass or plants, fill all depressions and eroded channels with sufficient conditioned topsoil to raise to proper grade, compact lightly and replant the filled areas. Roll all planted or replanted turfgrass areas with a lightly weighted turf roller in order to provide a smooth and even mowing surface.

B. Visible weeds shall be removed at least weekly during the maintenance period. At the end of the maintenance period, all planting areas shall be without weeds. If weeds are present, the Contractor shall manually remove the weeds and shall then apply a granular, selective pre-emergent herbicide at manufacturer's approved rates. Coordinate application with the Owner's Representative and provide certificates of application to Owner's Representative. The turfgrass will be considered weed-free if there are 9 weeds or less per 50 square yards (one per 50 square feet).

3.19 FINAL REVIEW

A. A Final Review will not be scheduled until all Close-out Documents and materials have been submitted and accepted.

B. A Final Review will be performed before the end of the Maintenance Period or upon the pending Final Acceptance of the work, whichever is earlier, provided all deficiencies revealed during the maintenance period have been corrected. If deficiencies have not been corrected by the end of the stated maintenance period, the Contractor shall continue to fully maintain the project at the Contractor's own expense. After all deficiencies have been corrected, a Final Review will be held with the Landscape Architect, Owner's Representative, and Contractor.

C. Final Acceptance of turfgrass is contingent on a weed free, healthy uniform stand without dead, bare or distressed areas with a minimum rooting depth of five (5) inches into site soil.

D. If after the Final Review, the Landscape Architect and Owner's Representative are of the opinion that the work is acceptable and complete, the Contractor's maintenance responsibility shall terminate on an agreed upon date.

3.20 WARRANTY AND REPLACEMENT

A. All trees and plants provided under this Contract shall be guaranteed to be in good, healthy, disease/pest free and in a flourishing condition one growing year from the date of Final Acceptance of the work, provided the Owner maintains the plants properly and in accordance with accepted horticultural practices. Species and size of any tree and/or plant replacements, either prior to or after Final Acceptance, shall be equal to that of the same adjacent trees and/or plants at the time of replacement as determined by the Landscape Architect.

B. The Contractor shall be responsible to replace all lost plants due to theft, vandalism or any other preventable causes till Final Acceptance of the work by the Owner. Replacement trees and plants shall be planted as originally specified and detailed. Replacement trees and plants shall be guaranteed as specified above from the date of replacement. The maintenance period may be extended for a duration of not more than the original maintenance period duration for the establishment of replacement plants.

C. The Contractor shall be held responsible for repair and/or replacement of damages to new or existing improvements resulting from the defects or actions of trees, plants, materials, equipment or workmanship one year from the date of Final Acceptance or the Notice of Completion, whichever is later.

END OF SECTION

SECTION 33 12 00 WATER UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Pipe and fittings for on-site domestic piping.

B. Valves and valve boxes.

C. Accessories.

1.2 RELATED SECTIONS

A. Contract General Conditions and Division 1 Specifications.
B. Section 311100 - Site Clearing.
C. Section 312000 - Earthwork: Excavation, Filling, and Grading
D. Section 312222 - Soil Materials.
E. Section 312333 - Trench Excavation and Backfill.
F. Section 321313 - Site Concrete Improvements.

1.3 REFERENCES

A. ASTM Test Method D1557.

B. ANSI/ASTM D2466 - Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.

C. ANSI/AWWA C110 - Ductile Iron and Grey-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids.

D. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

E. ANSI/AWWA C500 - Gate Valves, 3-inch through 48-inch NPS, for Water and Sewage Systems.

F. ANSI/AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12-inch, for Water.

G. ASTM D1785 - Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and Class 200.

H. ASTM D2855 - Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings.

I. ASTM D3139 - Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section SUBMITTALS and the Contract General Conditions.

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Contract General Conditions and Division 1 Specifications.

B. Accurately record actual locations of piping mains, valves, connections and appurtenances, referenced to permanent surface features.

C. Identify and describe discovery of uncharted utilities or utilities found at locations different than indicated on plans.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with product manufacturer's recommendations and these Contract Documents.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle all products required.

PART 2 - PRODUCTS

2.1 WATER PIPE

A. Ductile Iron Pipe (for iron pipe larger than 3 inches in diameter, above ground): ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, thickness Class 50, with cement - mortar lining and seal coating per ANSI/AWWA C104/A21.4.
   1. Fittings: ANSI/AWWA C110/A21.10, ductile iron.
   2. Joints: Flanged.

B. PVC Pipe (for pipe 3 inches and smaller, underground): ASTM D1785, Schedule 40.
   1. Fittings: ASTM D 2464, Schedule 80 PVC (ASTM D 2466, Schedule 40 PVC for pipes 1-1/2 inches and smaller).
   2. Joints: ASTM D 2855, solvent weld.

C. PVC Pipe (for pipe 4 inches and larger, underground): ANSI/AWWA C900 Class 305.
   1. Fittings: ANSI/AWWA C111, ductile iron.
   2. Joints: ASTM D 3139 compression gasket ring.

D. Locator Tape: Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be six inches wide and be printed “CAUTION - WATER LINE BELOW”.

2.2 VALVES - UP TO 2 INCHES (50 MM)

A. Use full port ball valves for 2 inches and smaller and resilient wedge gate valves for 2-1/2 inches and larger size.

B. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends.

2.3 GATE VALVES - 2-1/2 INCHES (63 MM) AND OVER

A. ANSI/AWWA C509, Iron body, bronze trim, non-rising stem with square nut or control handle wheel, resilient single wedge, threaded or flanged.

2.4 VALVE BOXES

A. Precast concrete with cast iron lid marked for service. Christy No. G5 or approved equal.

B. Valve boxes shall have a minimum 6 inch wide by 4 inch (6” inches in vehicular areas) thick concrete collar.

2.5 ACCESSORIES

A. Concrete for Thrust Blocks and Valve Box Surface Collars: Concrete type specified in Specification Section SITE CONCRETE IMPROVEMENTS.

B. Valve Boxes and Covers: Christy No. G5 traffic box or approved equal. Cover marking shall read "Water". A one-piece PVC riser extension shall be provided as necessary to allow unobstructed access to valve operating nut.

C. Solvent Cement and Primer for PVC Pipe and Fittings: Per ASTM F656 and ASTM D2564.

D. Non-Firming Anticorrosion Wrap: Trenton Wax-Tape #1 or approved equal for application on belowground metal surfaces, pipe, or fittings in corrosive soils.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions. All plot dimensions are approximate. Before proceeding with any work, carefully check and verify all dimensions and report any variations to the Engineer.

B. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc., which may be required. Carefully investigate the structural and finished conditions affecting all work, and plan work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. Unless dimensions are shown, drawings are generally diagrammatic and indicative of the work to be installed in the most direct and workmanlike manner, so that conflicts between water systems, planting, and architectural features will be minimized.

C. Do not install the facilities as indicated on the drawings when it is obvious in the field that unknown obstructions might not have been considered in the engineering. Such obstructions or differences should be brought to the attention of the Engineer before proceeding.

3.2 PREPARATION

A. Prepare for pipe installation by assembling all needed materials.

B. Cover all PVC pipe during storage.

3.3 BEDDING

A. Excavate trench, pit or hole in accordance with Specification Section TRENCH EXCAVATION AND BACKFILL.

B. Where trench or pit has been overexcavated, place bedding material at bottom of excavations, level soil materials in continuous layers not exceeding 8-inches loose uncompacted depth.

C. Backfill around sides and to a level 12-inches above the top of pipe with bedding sand, tamped in place.

D. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE AND FITTINGS

A. Install pipe at locations and depths indicated on plans.

B. Install pipe, fittings, and associated materials in accordance with manufacturer's recommendations.

C. Route pipe in straight line, whenever possible. All changes in direction of pipes shall be made with fittings, not by bending.

D. Install pipe to allow for expansion and contraction without stressing pipe or joints.

E. Form and place concrete for thrust blocks at each elbow, tee, angle or other significant change of direction in loose-joint pipe, per detail on plans.

F. Establish elevations of buried piping to ensure not less than 30-inches of cover, except at connections to existing lines, which may be shallower or deeper, or where shown otherwise on plans.

G. When two water pipes are to be installed in same trench, maintain a minimum 4-inch horizontal clearance between pipes.

H. Backfill trench or other excavation in accordance with Specification Section TRENCH EXCAVATION AND BACKFILL.

3.5 INSTALLATION - VALVES

A. Set valves on solid bearing.

B. Where valves are installed below finish surface grade, center and plumb valve box and any necessary extensions over valve. Set box cover flush with finished grade.

C. Pour concrete collar around top of valve box per detail on plans.

D. Furnish and install valves and valve boxes in addition to those shown on plans as required for isolation of lines for construction and disinfection, while minimizing disruption of service to buildings, at no additional cost to the Owner.

3.6 INSTALLATION - THREADED CONNECTIONS

A. Assemble all plastic and galvanized steel threaded pipe and fittings using an approved Teflon tape applied to the male threads only. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved Teflon tape will be required.

B. At all plastic (PVC) pipe connections, work the ductile iron connections first. Connections shall always be plastic into steel, never steel into plastic.

C. A non-hardening sealant and lubricant similar to Permatex #51 or LASCO blue pipe sealant may be used in lieu of Teflon tape. Apply sealant to clean male threads brushing into grooves and to the first three threads of the female threads.

3.7 PRESSURE TESTING OF SITE WATER PIPING SYSTEM

A. General: Unless otherwise directed, tests shall be witnessed by Inspector. Work to be concealed shall not be covered until prescribed tests are made. Should any work be covered before such tests, the Contractor shall, at his expense, uncover, test and repair his work and that of other contractors to original conditions. Leaks and defects shown by tests shall be repaired and entire work re-tested. Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the test.

B. Water Piping: Pressure test all onsite water piping systems in accordance with AWWA Standard C605, “Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings”. The pressure testing process shall be performed in cooperation with the authority having jurisdiction and witnessed by the Owner’s Inspector. The constructor shall supply an affidavit of compliance to the Owner as required by AWWA Standard 605. Maintain 150 PSIG water pressure for a duration of four (4) hours. There shall be no drop in pressure during test except that due to ambient temperature changes. Flush all lines prior to pressure test.

C. Backflow Preventer: All backflow preventers shall be tested according to manufacturer’s recommendations and the USC Cross Connection Control and Hydraulic Research Manual latest edition and per local AHJ requirements. Testing shall be performed by an AWWA Certified Backflow Prevention Assembly Tester. Contractor shall provide written certification to the Architect sowing the date in which the backflow preventers were tested and confirmation that unit passed all test requirements.

3.8 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfect all domestic water piping systems in accordance with AWWA Standard C651, "Disinfecting Water Mains", and in accordance with administrative authority. Disinfection process shall be performed in cooperation with health department having jurisdiction and witnessed by the Owner’s Inspector. During procedure, signs shall be posted at each water outlet stating, "Chlorination - Do Not Drink". After disinfection, water samples shall be collected for bacteriological analysis. Certificate of Bacteriological Purity shall be obtained and delivered to the Owner by the Owner’s Inspector.

3.9 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of the Contract General Conditions and Division 1 Specifications.

B. Compaction testing of bedding and backfill will be performed in accordance with ANSI/ASTM D1557.

C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest. Any retests required due to failure of initial tests shall be paid for by the Contractor.

END OF SECTION 33 12 00

SECTION 33 30 00 SITE SEWER SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Sanitary Sewer Pipelines and Fittings

B. Site Accessories

1.2 RELATED SECTIONS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division-1 Specifications sections, apply to the work of this section.
B. Section 311100 - Site Clearing
C. Section 312000 - Earthwork: Excavation, Filling, and Grading
D. Section 312222 - Soil Materials
E. Section 312333 - Trench Excavation and Backfill
F. Section 321313 - Site Concrete Improvements

1.3 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies
   1. Safety Regulations: Work shall comply with all Federal, State and Municipal regulations regarding safety, including the requirements of the following:
      a. William-Steiger Occupational Safety & Health Act of 1970.
      b. State of California, California Administrative Code, Title 8 Industrial Relations, Chapter 4, Subchapter 4, "Construction of Safety Orders" and other State and local agencies having jurisdiction.
      c. All trenching work shall conform to Trench Construction Safety Orders of California State Industrial Accident Commission.

1.4 REFERENCES

A. American Water Works Association (AWWA).

B. American Society for Testing and Materials (ASTM):
   1. Designation D3034 - Polyvinyl Chloride (PVC) pipe.

C. California Plumbing Code, Latest Edition (CPC).

D. Local County Health Department Standards.

1.5 SUBMITTALS

A. Submit under provisions of Specification Section - SUBMITTAL PROCEDURES.
Certificates of compliance for material

B. Product Data: Provide data indicating pipe, accessories, and associated equipment to be furnished.

C. Submit manufacturer's data and/or fabrication drawings for Sanitary Sewer Pipelines, Sanitary Sewer Manholes and Sanitary Sewer Fittings, installed under this Section. No items shall be incorporated into the work until submittals are approved by the Engineer.

1.6 COORDINATION

A. Verify location of existing utilities have been indicated at by local utility authorities.

1.7 EXISTING UTILITIES

A. The Engineer has made a diligent attempt to indicate on the plans the location of all main and trunkline utility facilities which may affect the Work. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

B. Service laterals and appurtenances have also been shown where information was available as to their location. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. At new work location, expose by hand methods all existing utilities along the route of the new work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand methods to locate all existing facilities as indicated on the plans, and as indicated at the work site by local utility authorities.

D. Maintain all existing utility mains and service lines in constant service during construction of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sanitary sewer pipelines for pipes 4 inches and larger shall be polyvinyl chloride (PVC) pipe conforming to ASTM Designation 3034, SDR-35, with elastomeric gasket joints per ASTM D 3212 and F477.

B. Sanitary sewer pipelines for pipe less than 4 inches shall be Schedule 40 PVC pipe, ASTM D1785.

C. All sanitary sewer fittings shall be watertight connections using PVC sewer fittings as approved by the California Plumbing Code, or approved equal to be determined by the Civil Engineer.

D. Surface cleanout shall be precast concrete with cast iron lid marked for service Christy G5 or approved equal and constructed as per detail drawing and current plumbing code.

E. Locator Tape: Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be six inches wide and be printed “CAUTION - SEWER LINE BELOW”.

PART 3 - EXECUTION

3.1 CLEARING OF WORK SITE FOR SITE IMPROVEMENTS

A. Clear site for improvements per construction drawing demolition plan and in accordance with Specification Section SITE CLEARING.

3.2 TRENCH EXCAVATION

A. Trench excavation and backfilling shall be in accordance with Specification Section TRENCH EXCAVATION AND BACKFILL and construction drawing detail.

3.3 SOIL MATERIALS

A. Excavated materials and imported materials shall meet engineering recommendations in accordance with Specification Section SOIL MATERIALS.

3.4 PIPE INSTALLATION

A. Pipe Laying: Alignment and elevation stakes shall be set at intervals with offsets and cut to the invert of the pipe.
   1. Proper facilities shall be provided for stringing and lowering sections of pipe into the trench. The pipe shall be laid carefully to lines and grades given.
   2. The grade line shown on the plans indicates the flow line or invert of the pipe and all cuts, unless otherwise indicated, refer to this line.
   3. After the trench for pipe has been brought to the proper line and grade, the pipe shall be laid in the following manner.
      a. Pipe laying shall proceed upgrade with the bell ends of bell and spigot pipe placed upstream. Each section of pipe shall be laid to line and grade as herein specified and in such a manner as to form a watertight, concentric joint with the adjoining pipe. The interior of the pipe shall be cleared of all dirt and debris and excess joint sealing material as the work progresses. Pipe shall not be laid when the condition of the trench or weather is unsuitable. All open ends of pipe and fittings shall be adequately and securely closed whenever the work is discontinued for more than one-half hour. If pipe with elliptical or quadrant reinforcement is used, care shall be taken to properly orient the axis.
   4. All joint surfaces shall be cleaned before joints are made.
   5. The Contractor shall furnish and use, for grade and alignment control, a laser beam system which complies with OSHA requirements. The laser system shall have good visibility when used with suitable target material. The laser system must be of the self-leveling type so that the laser beam is automatically compensated for minute grade disturbances.
   6. The laser system must also have an early warning system that instantly warns the pipe layer when the laser is off grade. The laser system is to be provided by the Contractor and shall have a minimum accuracy of ±0.01 foot per one hundred feet (100') on line; and a minimum visible range of one thousand feet (1000'). When conditions are such that this method is impractical, such as on short pipe runs, the Contractor shall have an Engineer on the ground to set grade of each joint of pipe by means of an Engineer's level.

B. Sewer Systems Plugs: Temporary plugs of brick or mortar shall be installed on all sewer projects at points of connection to existing facilities. These plugs shall remain in place until completion of the balling and flushing operation. The plugs, intended to prevent water from the balling and flushing operation, drainage, or any other condition from entering the existing system, shall be installed or removed in the presence of and under the direct supervision of the Engineer. Until the system has been pumped clear of accumulated water, the plugs shall not be removed. This water must not be allowed to enter adjacent sewer or drainage systems.

C. Internal Inspection: Upon completion of construction and prior to final inspection, the Contractor shall clean the entire new pipeline of all dirt and debris. Any dirt or debris in previously existing pipes or ditches in the area, which in the opinion of the Engineer resulted from the new installation, shall also be removed by the Contractor. Sewer pipes shall be cleaned by the controlled balling method. Temporary plugs shall be installed and maintained during cleaning operations at points of connection to existing facilities to prevent water, dirt, and debris from entering the existing facility. Temporary plugs for sewer systems shall also conform to

Subsection B, above. Water from the drainage system operations shall be routed through a suitable trap to collect any dirt and debris prior to discharging into any downstream facility. The Contractor shall notify the Architect immediately after completion of the pipe cleaning operations. Cleaning of drainage pipes by the controlled balling method will not be required.

D. As soon as possible after the completion of the pipe cleaning, and prior to final acceptance, the Architect or Engineer may make a visual internal inspection of the new pipeline either manually or with television equipment.

3.5 COORDINATION

A. Coordinate with the campus for the shutdown of the existing sewer system to make new sewer connection. Install sewer pipelines before making tie-in to the existing sewer pipeline. Tie-in work may proceed during the campus non-use of the existing sewer system such as on weekends.

3.6 TESTING OF SANITARY SEWERS

A. After cleaning per Section 3.4-C, each section of sewer constructed shall be tested in accordance with acceptable "Low Pressure Air Test for Sanitary Sewers" methods such as presented in the Journal of Sanitary Engineering, Division ASCE, April 1964, to test the point of effluent disposal. All lines and components shall be leak proof.

3.7 INSPECTION OF SANITARY SEWERS

A. System components shall be properly identified as to the manufacturer.

3.8 CLEAN-UP

A. Remove from the site all rubbish, debris, etc. in a lawful manner, resulting from work in this Section. The clean-up shall include the replacement and repair of any damaged or disturbed property.

END OF SECTION 33 30 00

SECTION 33 40 00 STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY:

A. This section includes the following:
1. Provide all materials, labor, equipment and services necessary to furnish and install Storm Drainage System, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. RELATED SECTIONS:

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Divisions 00 and 01 sections, apply to this work.
2. Section 312222 – Soil Materials
3. Section 312333 – Trench Excavation and Backfilling.
4. Section 321313 – Site Concrete Improvements.

1.3 REFERENCES

A. ANSI/ASTM C76 - Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.

B. ANSI/ASTM C443 Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

C. ANSI/ASTM C478 Precast Reinforced Concrete Manhole Sections.

D. ASTM D1557

1.4 DEFINITIONS

A. Bedding: Fill placed under, around, beside and directly over pipe, prior to subsequent backfill operations.

B. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.5 SUBMITTALS

A. Submit under provisions of Division 01.

B. Certificates of compliance for material.

C. Product Data: Provide data indicating pipe, accessories, and associated equipment to be furnished.

D. Submit manufacturer's data and/or fabrication drawings for all pipes, and appurtenances installed under this Section. No items shall be incorporated into the work until submittals are approved by the Architect/Engineer

1.6 COORDINATION

A. Coordinate work with Owner's personnel.

B. Verify that the location of existing utilities have been indicated at work site by utility authorities and Owner's personnel.

C. Coordinate work with other project work.

1.7 EXISTING UTILITIES

A. The Engineer has made a diligent attempt to indicate on the plans the location of all main and trunkline utility facilities which may affect the Work. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

B. Service laterals and appurtenances have also been shown where information was available as to their location. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. At new work location, expose by hand methods all existing utilities along the route of the new work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand methods to locate all existing facilities as indicated on the plans, and as indicated at the work site by Owner's personnel.

D. Maintain all existing utility mains and service lines in constant service during construction of the Work

1.8 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 01.

B. Accurately record actual locations of utilities encountered.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforced Concrete Pipe for pipe larger than fifteen (15) inches: ANSI/ASTM C76, Class 3, with rubber gasket joints per ANSI/ASTM C443.

B. Storm drainage sewer pipeline shall be polyvinyl chloride (PVC) pipe for storm sewer conforming to ASTM designation 3034, SDR 35, with elastomeric gasket joints per ASTM D 3212 for pipe fifteen (15) inches or less.

C. Storm drainage pipeline shall be polyvinyl chloride (PVC) pipe for storm sewer conforming to ASTM D1785, Schedule 40, for pipe three (3) inches or less.

D. Poured in Place Concrete: Specification Section SITE CONCRETE IMPROVEMENTS.

E. Mortar: Composed of one part, by weight, portland cement (Type II low alkali per ASTM C150), 2 parts, by weight, sand, and water.

F. Manhole Frames, Covers and Grates: Cast Iron per ASTM A48, Class 25.

G. Soil Fill for Concrete Pipe Bedding Envelope: Specification Section TRENCH EXCAVATION AND BACKFILL.

H. Catch basins and drain inlets shall be constructed as per detail drawing.

I. Concrete collar shall be constructed as per detail drawing.

J. Cleanout shall be precast concrete with cast iron lid marked for service Christy G5 or approved equal and constructed as per detail drawing.

K. All metallic pipe, fittings and appurtenances in contact with soil shall be coated or wrapped with an approved material, as required to protect it from corrosive soil.

L. Locator Tape: Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be six inches wide and be printed “CAUTION – STORM SEWER LINE BELOW”.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

3.2 PREPARATION

A. Identify location of proposed storm drainage facilities to be constructed. Expose connection points to existing system.

B. Locate, identify, and protect existing above and below grade utilities from damage.

C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

D. Protect existing structures and other improvements to remain from damage from excavation equipment and vehicular traffic.

E. Employ equipment and methods appropriate to the work site.

F. Protect excavated areas from drainage inflow, and provide drainage to all excavated areas. Dewater existing drainage basins and existing drainage pipeline systems as necessary to accomplish the work.

G. Comply with safety requirements as they pertain to excavations, per Specification Section EARTHWORK.

H. Remove all interfering surface and subsurface improvements authorized for removal.

3.3 EXCAVATION

A. Excavate soil required to locate existing utilities and install the work.

B. Excavate trenches and pits per Specification Section EARTHWORK.

C. Excavate trenches and pits to allow installation and construction of the storm drainage facilities to the alignment, grades, depths and cross-sections as indicated on the construction plans.

D. Excavate trench to depth which is 6 inches below the outside bottom of the pipe barrel to be placed therein.

E. Cut trenches just wide enough to allow the installation of the pipe and pipe bedding as indicated on the plans. Minimize trench width above the pipe.

F. Provide protection to public per Division 01.

3.4 INSTALLATION AND BEDDING OF STORM DRAIN PIPE

A. Install the pipe and fittings to the lines and grades shown on the construction plans.

B. Install pipe and fittings in accordance with the manufacturer's recommendations, and these specifications.

C. Unless otherwise approved by the Engineer, lay all pipe upgrade from structure to structure, with bell or socket ends of pipe upgrade.

D. Excavate suitable bell (or socket) holes in the bedding material, so that the bells do not bear on the subgrade or bedding. Provide uniform bearing of pipe barrel on bedding material.

E. Ensure that all joints are properly "homed" and are watertight.

F. Bed concrete pipe in backfill or sandfill soil envelope, and compact to a minimum of 90% relative compaction. Place and compact the bedding material under, around and over the pipe, filling the trench cavity and extending from the bottom of the trench (6 inches below the outside bottom of the pipe barrel) to a level 12 inches above the outside top of the pipe barrel.

3.5 INSTALLATION OF STORM DRAINAGE STRUCTURES AND APPURTANCANCES

A. Install storm drainage structures as indicated on the construction plans, in accordance with the manufacturer's recommendations, and as specified herein.

B. Construct poured-in-place concrete per Specification Section SITE CONCRETE IMPROVEMENTS.

C. Key top of poured-in-place concrete bases for structures to receive the tongue of precast riser sections.

D. Construct cleanout, outfall structure per detail drawing.

3.6 BACKFILLING TO FINISHED GRADE AND FINISHED GRADING

A. Place and compact backfill per Specification Section TRENCH EXCAVATION AND BACKFILL.

B. Conform finished surface to the lines, grades and cross-sections shown on the plans, or as otherwise directed by the Inspector.

C. In areas to receive paving or a significant thickness of sealing material, temporarily set manhole frame and cover below finish grade, then return after final surfacing and/or pavement sealing and bring manhole frame and cover to final grade, as shown on the plans.

D. Fine grade all finished soil surfaces disturbed to the lines, grades and cross-sections shown on the plans.

E. Rake and smooth all finished dirt surfaces.

3.7 TOLERANCES

A. Pipe laying tolerances:
   1. Above grade: Not to exceed 1/4-inch above planned grade.
   2. Below grade: Not to exceed 1/2-inch below planned grade.
   3. Alignment: Not to exceed 2 inches from planned alignment, if gradual and regular over a distance of 20 feet.

B. Structure finish grade tolerance: Within 1/4 inch of planned grade, but must match adjacent improvements.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 01.

B. Compaction testing of bedding and backfill will be performed in accordance with ASTM D 1557.

C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest at no additional cost to Owner.

END OF SECTION 33 40 00

SECTION 33 46 00.1 - PLAYING FIELD SUB-DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The Prime Contractor (Turf Manufacturer) shall furnish all the skilled labor, materials, equipment, fuel, facilities, transportation, and specialized services to complete drainage and related work as shown on contract documents. The Prime Contractor is fully responsible for all the necessary quantities to construct the full subsurface drainage collection system in accordance with the contract documents.

B. Work Included: The general extent of drainage piping and structures are shown on the drawings and include, but are not necessarily limited to, the following:

1. Nyloplast Drainage Basins and Covers.
2. Geotextile Filter Fabric.
3. Impermeable Liner.
4. Solid Drainage Pipe and Connections.
5. Perimeter Perforated or Slotted Drainage Pipe, and Connections.
6. Playing Field Lateral Slotted Drainage Pipe, Associated Fittings, and Connections.
7. ACO Trench Drain System.

1.2 SUBMITTALS FOR REVIEW

A. Product Data: The Prime Contractor shall provide all shop drawing data indicating pipe sizes, types of pipes, pipe fittings, pipe inverts, rims, each drainage basins, filter fabric, impermeable liner, and stormwater appurtenances for review and approval prior to ordering any material or installation of materials. The Contractor is fully responsible for all quantities of materials necessary to construct a fully operational sub-drainage system.

1.3 SUBMITTALS FOR INFORMATION

A. The Prime Contractor shall follow the Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.

B. Manufacturer's Certificate: The Prime Contractor must certify that products meet or exceed all specified requirements.

1.4 SUBMITTALS AT PROJECT CLOSEOUT

A. The Prime Contractor shall provide signed and sealed as-built drawings for all pipe lengths, pipe sizes, connections, manholes, catch basins, cleanouts, and all invert elevations. The Prime Contractor shall retain a professional land surveyor licensed in the State of California to prepare the signed and sealed as-built documents. The signed and sealed document shall be submitted to the Field Designer, Architect, for review and approval.

PART 2 - MATERIALS

2.1 CEMENT MORTAR:

A. Mortar shall be composed of one (1) part of Portland cement and two (2) parts sand by volume.

2.2 NYLOPLAST DRAINAGE BASINS AND RIMS:

A. Nyloplast Drainage Basin (or approved equivalent) for use with ADS N-12 ST piping perimeter perforated and slotted piping drainage systems. Solid covers shall be cast iron or equal with a 30 MIL PVC impermeable liner placed over the top of the solid cast iron cover.

2.3 GEOTEXTILE FABRICS:

A. Geotextile Filter Fabric shall be Mirafi 140N or approved equivalent.

2.4 IMPERMEABLE LINER:

A. 30 MIL PVC impermeable liner for Nyloplast Drainage Basin cast iron covers.

2.5 **SOLID DRAINAGE PIPE AND CONNECTIONS:**

A. ADS N-12 ST SOLID (HDEP) PIPE (per ASTM F2648) shall have a smooth interior and annular exterior corrugations, 4 - through 60-inch (100 to 1500 mm) shall meet ASTM F2648 with Manning's "n" value for use in design shall be 0.012. The Contractor shall review the civil engineering plans prepared by others. In the event, any conflict existing between the civil engineering outfall drainage structure and the playing field outfall connection. The Prime Contractor shall notify the Field Designer, Architect, Parlier Unified School District Project Manager immediately before ordering any materials and commencement of any work.

2.6 PERIMETER PERFORATED OR SLOTTED DRAINAGE PIPE, AND CONNECTIONS:

A. ADS N-12 ST PERFORATED / SLOTTED pipe (per ASTM F2648) shall have a smooth interior and annular exterior corrugations, 4 - through 60-inch (100 to 1500 mm) shall meet ASTM F2648 with Manning's "n" value for use in design shall be 0.012. Install system-engineered components including, but not limited to, bends, split couplings, side outlets, end caps, end outlets, wyes, Insert-A tees, saddles, and tees.

2.7 PLAYING FIELD LATERAL SLOTTED DRAINAGE PIPE, ASSOCIATED FITTINGS, AND CONNECTIONS:

A. ADS 1"x12" FLAT PANEL SLOTTED PIPE OR MULTFLOW, without geotextile fabric and with narrow slotted width. Install system-engineered components including, but not limited to, end caps, Insert-A-tees hard connections, etc. Or approved equivalent product. The Contractor shall remove all geotextile fabric from flat panel slotted pipe prior to installation.

2.8 **ACO 4000 TRENCH DRAIN SYSTEM:** (or approved equivalent product)

A. Non-Slope Channel System: 4002 Constant Depth Channel, Part # 06562, Length in (mm) 39.37 (1000), Overall Depth in (mm) 5.65 (143), Weight lbs. 32.9.

B. In-Line Catch Basin, Part # 05620 and In-Line Plastic Trash Basket, Part # 01498

C. Grate System: Longitudinal Plastic, Type 494Q – Black, Part # 97393, ADA Compliance.

D. The Contractor shall install the complete channel drain system in accordance with the manufacturer's requirements.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS:

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

B. The Prime Contractor shall verify existing pipe inverts elevations for storm drain construction before site work. Work for storm drain installation shall begin at the downstream connection point. This will allow for necessary adjustments to be made before the installation of the entire line. If the Prime Contractor fails to begin at the downstream connection point and works up-stream, The Prime Contractor shall be responsible for necessary field adjustments and costs.

C. Uncover and expose existing utility and sewer lines where they are to be crossed above or below by new work being constructed to verify grades and to ensure sufficient clearance. Water lines crossing sewer lines shall have a minimum 24” vertical clearance. Other lines should have sufficient clearance to avoid damage or disruption of service. The pipe shall not be installed until crossings have been verified for clearance. If the Prime Contractor fails to follow this procedure, the Prime Contractor will be solely responsible for all the extra work or material required if modifications to the design are necessary.

D. The Prime Contractor shall take special care in locating and protecting existing utilities. Verify with the Parlier Unified School District Project Manager all existing utilities to be relocated or removed or utilities to be preserved. Correct all damage done to existing utilities at no cost to the owner.

3.2 FIELD MEASUREMENTS:

A. Make necessary field measurements to assure a precise fit in accordance with the approved contract documents.

3.3 GENERAL CONSTRUCTION

A. TRENCHES:

1. Unless otherwise shown, provide separate trenches for pipelines. The minimum cover shall be twelve inches (12").
2. Lay pipe in open trenches except when the engineer of record or owner’s representative permits directional boring or tunneling.
3. Excavate trenches to widths no greater than necessary for proper installation of the work in accordance with the approved pipe manufactures specifications.
4. Material excavated for utility trenches shall be non-classified and shall include earth or other material encountered. The contract price is understood to cover the removal of such materials to depth and extents indicated in contract documents and necessary to complete the work.
5. Grade bottom of trenches evenly in preparation for placement of bedding and to ensure uniform bearing for the full length of pipes. Cut holes as necessary for joints and joint making. Excavate cemented gravel, old masonry, or other hard material to at least six inches (6") below pipe points. Refill such space and other cuts below grade with sand or fine gravel firmly compacted.
6. Install impermeable liner or geotextile filter fabric according to the manufacturer’s instruction at the bottom of the trench and along all sides and extend 12” beyond the top of the trench.
7. Sheet and brace trenches remove water as necessary to fully protect workers and adjacent structures and permit proper installation of the work. Comply with local regulations or, in the absence thereof, with provisions of the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc. Under no circumstances lay pipe or install appurtenances in water and keep trenches free from water until pipe joint material has hardened.
8. The presence of groundwater in the soil or the necessity of sheeting or bracing trenches shall not constitute a condition for which any extra remuneration may be claimed.

B. PIPE INSTALLATION:

1. General: Carefully examine each pipe prior to placing it in the trench.
   a. Promptly set aside defective pipe and damaged pipe.
   b. Identify all product defects. Check for all pipes for slotted and perforations
   c. Do not install a defective pipe or damaged pipe.
   d. Continually remove extraneous material from the pipe.
   e. Do not place the pipe in water, nor place when trench or weather is unsuitable for such work.
2. Pipe of size and type noted on drawings shall be laid on a firm bearing, aligned, and graded in direction of flow. Suitable fittings shall be provided where various lines connect and where changes in pipe sizes occur. Connections shall be made to catch basins, etc. as indicated.
3. Commence pipe installation at the lowest point in the system and install pipe with bell end upgrade. Clean interior and joint surfaces and test pipe for soundness before lowering the pipe into the trench. Lay pipe in straight lines and on uniform grades between points where changes in alignments or grades are shown. Bed and pipe barrel uniformly. Check lines and invert grades of each pipe from top line carried on batter boards not over twenty-five feet (25') apart. Fit pipes to form a smooth uniform invert. Keep a stopper in pipe mouths when pipe installation is not in progress.
4. Flushing: Flush closed lines with water in sufficient volume to obtain free flow through each line. Remove obstructions and correct defects discovered. Remove silt and trash from drainage basins and pipes prior to inspection of work.
5. HDPE pipes shall be installed per manufacturers' recommendations and the following minimum criteria: HDPE pipes shall not be placed directly on rock or other rigid materials.
6. HDPE pipes shall be laid and joined in accordance with generally accepted practice and following provisions to be suitable for purposes intended.
   a. Necessary facilities shall be provided for lowering and properly placing pipe sections into trenches.
   b. The piping shall be laid to line, grade, and slope with sections closely joined.

C. BACKFILL:

1. Backfill trenches only after piping has been inspected, tested and the location of pipe and appurtenances has been recorded.

D. FILTER FABRIC INSTALLATION:

1. Overlap joints a minimum of twelve (12) inches. Joints shall be overlapped in the direction the stone aggregate is to be spread.
2. Joints shall be securely held in place in accordance with the liner manufacturer's recommendations. Joint bonding may be delayed until aggregate placement is completed to minimize joint stress.
3. Place a suitable amount of ballast on the filter fabric to prevent movement by wind. The ballast shall be in a form that will not damage the filter fabric.
4. Direct traffic loading on filter fabric will not be allowed.
5. Overlapping additional filter fabric and jointing shall be in accordance with the manufacturer's recommendations. Repair punctured or torn fabric.

6. The filter fabric must completely cover sub-grades under crushed aggregated and inside all pipe trenching. Refer to playing field construction details.

3.4 JOINTS

A. GENERAL:

1. Before making pipe joints, clean and dry surfaces of the pipe to be joined.
2. Use lubricants, primers, and adhesives recommended by the pipe manufacturer.
3. Place, fit, joint, and adjust joints to obtain the degree of water tightness required.

B. **FLEXIBLE WATERTIGHT JOINTS**:

1. Equal materials may be used when specifically approved in advance by the Architect or owner's representative.
2. Install gaskets and joint materials in accordance with manufacturer's recommendations.
3. Protect from the sun, blowing dust, and other deleterious agents.
4. Align the pipe with a previously installed pipe and pull joints together. If a gasket or joining material becomes loose and can be seen through exterior joint recess when the joint is pulled to within 1" of closure, remove the pipe and remake the joint.
5. Inspect gaskets and replace loose and improperly affixed gaskets and joining materials.

3.5 PIPING INSPECTING:

A. Provide the necessary personnel and equipment, and perform tests required to demonstrate that the work of this section has been completed in accordance with specified requirements.

B. Do not allow or cause any work of this section to be covered up or enclosed until after it has been inspected, and as-builts have been approved by the Field Designer or Architect.

3.6 RECORD / AS-BUILT DRAWINGS:

A. The Prime Contractor will provide and keep up-to-date completed "Record Drawing" records on blueline prints that show every change from the original contract documents, including exact locations, sizes, and kinds of equipment. “Record Drawings” set shall be kept on the job site and used only as a record set.

B. These drawings will also serve as work progress sheets, and the Prime Contractor shall make neat and legible annotations thereon daily as the work proceeds, showing the work as actually installed. These drawings shall be available for inspection and shall be kept in a location designed by the engineer of record or owner's representative.

C. As-Built surveys must be signed and sealed by a Licensed Professional Surveyor in the State of California submitted to the Field Designer, Architect, and the Parlier Unified School District Project Manager for final approval prior to the installation of playing field gravel material being placed over entire completed sub-surface drainage collection system.

END OF SECTION - 33 46 00.1

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SECTION 33 47 00 - SYNTHETIC TRACK SURFACING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The contract work to be performed under this section consists of furnishing all required labor, materials, equipment, implements, parts and supplies necessary for the surfacing in accordance with these specifications indicated on the drawings.

1. Rekortan® WBS BSS – A 13 mm, World Athletics certified, polyurethane bound, layered, impermeable running track surface with an aliphatic, water-based structural spray finish, or approved equivalent.

1.2 CODES AND STANDARDS

A. Codes and standards follow the current guidelines set forth by the World Athletics (WA), the National Collegiate Athletic Association (NCAA) or the National Federation of State High School Associations (NFHS).

1.3 SUBMITTALS AND SUBSTITUTIONS

A. Requests for deviations or substitutions from the specifications must be made in writing seven days prior to the bid date. Complete product data including specifications, application rates, mixing instructions and a sample shall be sent with the request to the district and/or its agent for an evaluation. Alternatives will be allowed only by addendum.

1. Submit a set of manufacturer's product data sheets including installation guidelines and maintenance guidelines.
2. Submit a track sample that is representative of the product being installed.
3. Submit Safety Data Sheets (SDS) for all individual components of the system to be installed.

1.4 QUALITY ASSURANCE

A. The track surface installer shall be authorized by Manufacturer and possess a minimum of five (5) years' experience installing Rekortan® systems.

B. The supervisor of the installing company must have five (5) years' experience surfacing Rekortan®systems and must have installed a minimum of ten (10) World Athletics approved track systems within the last three (3) years.

C. The manufacturer must offer a minimum of four (4) World Athletics certified track systems.

D. Submit evidence that the synthetic surfacing contractor is a member of the American Sports Builders Association (ASBA).

E. All material components must be procured from manufacturers, a single source. No substitutes allowed without written approval from manufacturers.

F. All polyurethanes used must be manufactured by an ISO 9001 and ISO 14001 Certified Company. Manufacturer's ISO 9001 and ISO 14001 certificate must accompany bid.

1.5 SITE CONDITIONS

A. Weather: Surfacing shall not begin if rain is imminent, if gusting winds are occurring or when the threat of freezing exists within 24 hours.

B. Site: During any surfacing and striping, sprinkler systems must be shut off or controlled so that no water falls on the track or event area surfaces. Other trades and school district personnel must stay off the wet or curing surface.

C. Only mix and apply when meeting manufacturers' recommended guidelines.

D. The General Contractor shall provide temporary barriers as required to prevent public entry to construction areas and to protect adjacent properties from damage during construction operation.

1.6 WARRANTY

A. Provide manufacturers standard five (5) year warranty.

PART 2 - MATERIALS

2.1 SUPPLIER:

Advanced Polymer Technology/ Manufacturer
109 Conica Lane
Evans City, PA 16033
724-452-1330

2.2 MATERIALS:

A. Rekortan® WBS BSS - A 13mm, impermeable water-based spray coat track system. The first layer consists of a black mat of rubber granules bound in Rekortan® polyurethane. The second layer is a seal coat using Rekortan® two-component polyurethane sealer. The surface layer is an aliphatic, water-based Rekortan® coating mixed with rubber granules and spray applied to provide a structural topcoat.

Materials include:
1. Primer
2. Black Rubber
3. Rekortan® Polyurethane Binder
4. Two Component Rekortan® Polyurethane Sealer
5. Manufacture approved Rubber graded to .5-1.5mm or .5-2mm
6. One Component Rekortan® Aliphatic, Water-based Structural Spray

PART 3 - EXECUTION

3.1 EXAMINATION:

A. The General Contractor shall verify that all asphalt/ concrete paving meets all dimensional accuracy, strength, and compaction. Notify owner of any deficiencies. Recommended compaction of asphalt and subbase is 95%. For further guidance on asphalt requirements, please consult the most recent ASBA running track construction manual.

B. The General Contractor shall verify that all concrete work meets all required tolerances and notify the owner of any deficiencies. No curing compounds are allowed. The manufacturer requires that a proven heavy duty vapor barrier be installed under the concrete slab. The completed concrete substrate shall meet the RH (Relative Humidity) value of 75% or less of dryness.

The completed asphalt or concrete substrate shall meet the industry tolerance standards of evelness ~ ¼" in 10', per the latest American Sports Builders Association construction manual, 4.2.3f Asphalt Acceptance… "The surface course of asphalt shall be installed so that on a localized level, there shall be no bumps or depressions beneath a 10' straight edge exceeding ¼ of an inch." For further guidance on requirements, please consult the most recent ASBA running track construction manual.

C. Upon completion of the asphalt paving, it is the responsibility of the paving contractor to water flood test the surface with the use of a water truck. If after 30 minutes on a 70o F day, depressions are evident in depth more than 1/4" the paving contractor, track surfacing contractor and the owner's representative will determine the best method of correction.

D. The entire surface shall be clean and free of all dirt, oil, grease or any other foreign residue. It is the responsibility of the General Contractor to ensure that the surface is thoroughly clean in all areas of the new and/or existing asphalt or concrete base as necessary to ensure adhesion of the track surface.

E. Minimum curing time for base prior to beginning of surfacing is 14 days for new asphalt paving and 28 days for new concrete. No concrete curing compounds are allowed.

3.2 PRODUCT AND MATERIAL DESCRIPTION:

A. Rekortan® WBS BSS - A 13 mm, impermeable paved mat with a structural spray finish. Its base layer consists of a black mat of rubber granules bond in a Rekortan® polyurethane binder that is sealed using a two-component Rekortan® polyurethane sealer. The top layer is a mixture of the aliphatic, water-based Rekortan® one component coating and colored EPDM rubber that is structurally sprayed

B. Primer: Proper Rekortan® Primer to be used based on substrate (concrete or asphalt).

C. Base mat Rubber: The base mat rubber shall be specifically graded. It is to be dry and in sealed bags

D. Polyurethane Binder: The base mat shall be bound by a moisture-cured, Rekortan® polyurethane compatible with the base mat rubber. No asphaltic emulsions or epoxies are allowed in the base mat. Install the base mat with a specially designed track-paving machine to an average depth of 11 mm. No machine sprayed base mat systems will be allowed.

E. Two-Component Polyurethane: The seal layer shall be made from a two- component Rekortan® full pour polyurethane sealer.

F. Rubber: Manufacture approved rubber graded to .5-1.5mm or .5-2mm. It is to be dry and in sealed bags.

G. One Component Aliphatic Water-based Structural Spray: The sealed base mat shall be coated by an aliphatic, water-based, pigmented, one component Rekortan® polyurethane structural spray.

3.3 APPLICATION PROCEDURES:

A. The entire asphalt or concrete track surface shall be clean and free of dirt, oil, grease or any other residue upon arrival of the installation team. Any dirt, etc. shall be pressure washed off the base by the general contractor.

B. Prime entire surface area with a compatible Rekortan® polyurethane primer. Mask and protect adjacent structures, as required. Primer shall dry to a tack- free condition prior to beginning next application. Do not allow primed surface to become contaminated by rain, dust, debris, etc.

C. Mix the binder and granules until all rubber is thoroughly coated transport onto to the track and apply using a paving machine that is specifically designed for this type of application. Apply to an average of 11 mm thickness.

D. Mix the two component Rekortan® polyurethane two component sealer and apply to the base mat by means of spreading the material with a rubber squeegee to seal off the mat.

E. Top Layer: After the seal layer has cured, mix the water-based structural spray and rubber until thoroughly coated. The mixture should be sprayed in two separate applications. Apply the second coat, in an opposite direction as to the first. Apply specified amounts to achieve proper coverage.

3.4 STRIPING

A. All line marking paint shall be compatible and approved for the synthetic surfacing. Only an experienced track striping specialist shall perform the striping.

END OF SECTION - 33 47 00

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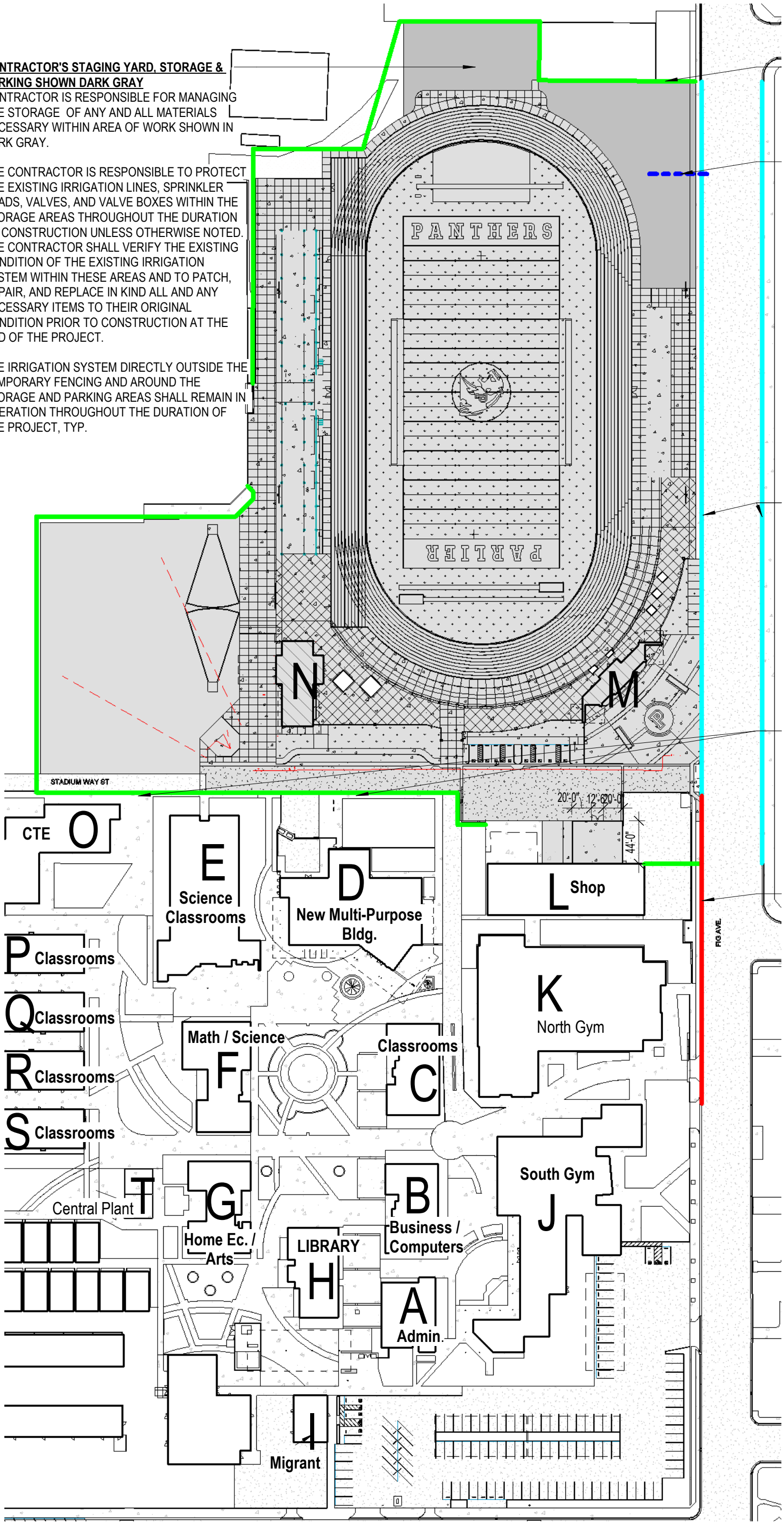
CONTRACTOR'S STAGING YARD, STORAGE & PARKING SHOWN DARK GRAY
CONTRACTOR IS RESPONSIBLE FOR MANAGING THE STORAGE OF ANY AND ALL MATERIALS NECESSARY WITHIN AREA OF WORK SHOWN IN DARK GRAY.

THE CONTRACTOR IS RESPONSIBLE TO PROTECT THE EXISTING IRRIGATION LINES, SPRINKLER HEADS, VALVES, AND VALVE BOXES WITHIN THE STORAGE AREAS THROUGHOUT THE DURATION OF CONSTRUCTION UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL VERIFY THE EXISTING CONDITION OF THE EXISTING IRRIGATION SYSTEM WITHIN THESE AREAS AND TO PATCH, REPAIR, AND REPLACE IN KIND ALL AND ANY NECESSARY ITEMS TO THEIR ORIGINAL CONDITION PRIOR TO CONSTRUCTION AT THE END OF THE PROJECT.

THE IRRIGATION SYSTEM DIRECTLY OUTSIDE THE TEMPORARY FENCING AND AROUND THE STORAGE AND PARKING AREAS SHALL REMAIN IN OPERATION THROUGHOUT THE DURATION OF THE PROJECT, TYP.



TEMPORARY FENCING SHOWN GREEN
CONTRACTOR IS RESPONSIBLE FOR TEMPORARY FENCING, TEMPORARY UTILITY HOOK UPS, AND TO PROVIDE PRIVACY MESH AT ALL TEMPORARY FENCING, TYP.

PROPOSED ACCESS PATH SHOWN DASHED BLUE
CONTRACTOR IS RESPONSIBLE FOR REMOVING PORTION OF CHAIN LINKED FENCE FOR TEMPORARY ACCESS DURING CONSTRUCTION. CONTRACTOR IS RESPONSIBLE TO REPAIR AND REPLACE IN KIND TO ITS ORIGINAL CONDITION PRIOR TO CONSTRUCTION AT THE END OF THE PROJECT. CONTRACTOR IS RESPONSIBLE TO PROTECT CONCRETE PAVING, IRRIGATION LINES, SPRINKLER HEADS, VALVES, AND VALVE BOXES WITHIN AND AROUND THE ACCESS PATH. THE CONTRACTOR SHALL VERIFY THE EXISTING CONDITION OF THE EXISTING IRRIGATION SYSTEM WITHIN THIS AREA AND PATCH, REPAIR AND REPLACE IN KIND ALL AND ANY NECESSARY ITEMS TO THEIR ORIGINAL CONDITION PRIOR TO CONSTRUCTION AT THE END OF THE PROJECT

CONTRACTOR'S PARKING SHOWN CYAN
CONTRACTOR IS RESPONSIBLE FOR FINDING PARKING THAT DOES NOT INTERFERE WITH THE SCHOOLS DAY TO DAY OPERATIONS. PROPOSED ALLOWABLE PARKING LOCATIONS ARE SHOWN IN CYAN

EXISTING WALK
EXISTING WALK TO REMAIN OPEN AND ACCESSIBLE AT ALL TIMES THROUGHOUT CONSTRUCTION, TYP.

EXISTING BUS LOADING/PARENT DROP OFF ZONE SHOWN RED
TO REMAIN OPEN AND ACCESSIBLE AT ALL TIMES, CONTRACTOR NOT TO INTERFERE OR IMPEDE WITH LOADING ZONE AT ANY TIME DURING THE DAY THROUGHOUT THE DURATION OF THE PROJECT, TYP.

PARLIER HS STADIUM REPLACEMENT
PARLIER UNIFIED SCHOOL DISTRICT

LOGISTICS PLANS
SCALE: 1" = 100'-0"