

**PROJECT MANUAL
FOR**

**MANTECA FIRE DEPARTMENT
MANTECA FIRE STATION No. 5**

PROJECT # 0353-01-CI15

**30% SCOPING DOCUMENTS
CONSTRUCTION DOCUMENT TECHNICAL SPECIFICATIONS**



**City of Manteca Fire Department
154 S. Union Road
Manteca, CA 95337**

**City of Manteca Public Works Department
1001 West Center Street
Manteca, CA 95337**



September 2017

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Section 00 4323

Alternates Form

PARTICULARS

1.01 THE FOLLOWING IS THE LIST OF ALTERNATES REFERENCED IN THE BID SUBMITTED BY:

1.02 (Bidder) _____

1.03 TO (City): Manteca

1.04 Dated _____ and which is an integral part of the Bid Form.

ALTERNATES LIST

2.01 THE FOLLOWING AMOUNTS SHALL BE ADDED TO OR DEDUCTED FROM THE BID AMOUNT. REFER TO SECTION 01 2300 - Alternates.

ALTERNATE # 1: ADD / (DEDUCT) \$ _____

END OF ALTERNATES FORM

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 01 1000

Summary

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Manteca Fire Department - Fire Station #5
- B. City's Name: Manteca.
- C. Architect's Name: RRM Design Group.
- D. The Project consists of the construction of a new fire station, including building and site improvements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 01 2300

Alternates

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of Alternates.
- B. Procedures for pricing Alternates.
- C. Documentation of changes to Contract Price and Contract Time.

1.02 RELATED REQUIREMENTS

- A. Document 00 2113 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.
- B. Document 00 4323 - Alternates Form: List of Alternates as supplement to Bid Form.
- C. Document 00 5200 - Agreement Form: Incorporating monetary value of accepted Alternates.

1.03 ACCEPTANCE OF Alternates

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at City's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.04 SCHEDULE OF Alternates

- A. Alternate No. 01 - 001:
 - 1. Base Bid Item: Section 07 3113 and Drawing number A-4.0 including A-5.0 & A-5.1 addressing Asphalt Shingles over the main building roof elements..
 - 2. Alternate Item: Section 07 4114 and Drawing number A-4.0 including A-5.0 & A-5.1 using pre-finished Standing Seam Metal Roofing over the main building roof elements..

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 01 2500

Substitutions

PART 1 - GENERAL

1.01 "Or Equal" Substitutions

- A. One Product Specified: Unless the Specifications state that no substitution is permitted, whenever in the Contract Documents any specific article, device, equipment, product, material, fixture, patented process, form, method, or type of construction is indicated or specified by name, make, trade name, or catalog number, with or without the words "or equal", such specification shall be deemed to be used for the purpose of facilitating description of material, process, or article desired and shall be deemed to be followed by the words "or equal". Contractor may, unless otherwise stated, offer any material, process, or article, which shall be substantially equal or better in every respect to that so indicated or specified and will completely accomplish the purpose of the Contract Documents.
- B. Two or More Products Specified: When two or more acceptable products are specified for an item of the Work, the choice will be up to the Contractor. Contractor shall utilize the same product throughout the Project. If a timely substitution request as set forth in Section 1.02.A. is not provided and an "or equal" substitution is requested, the City may consider the substitution only if the product specified is no longer commercially available.
 - 1. The burden of proof as to the equality of any material, process or article shall rest with the Contractor, and the Contractor shall submit all data substantiating a request for an "or equal" substitution item as provided in Section 3400 of the Public Contract Code, Specification Section 01 3300 and other specific sections of the specifications prior to Award of Contract.

1.02 Request for Substitutions

- A. Substitute Request Form: Requests for substitutions of products, materials, or processes other than those specified must be made on the Substitution Request form attached. Requests must be submitted fourteen (14) calendar days prior to the date of the Bid Opening to be considered. An addendum will be issued seven (7) calendar days prior to Bid Opening, identifying all equipment and materials deemed equivalent to those specified and approved by the Architect.
- B. Substitution Request Content: A substitution request must constitute a representation that the subcontractor/general contractor:
 - 1. Has investigated proposed product and determined that it is equal in quality and serviceability of the specified item.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other work, which may be required for the work to be complete with no additional cost to General Contractor / Owner.
 - 4. Will be acceptable in consideration of the required design and artistic effect.
 - 5. Will require no excessive or more expensive maintenance including adequacy and availability of replacement parts.
 - 6. Waives claims for additional costs or time extension, which may subsequently become apparent.
 - 7. Will reimburse City for review or redesign services by the Architect and re-approval fees by authorities, agencies, or the City.
- C. Substitution Submittal Procedure:
 - 1. Contractor shall furnish four (4) copies of the requested information sufficient to determine whether the proposed substitution is equivalent including, but not limited to, all

drawings, specifications, samples, performance data, calculations, and other information as may be required to assist the Architect and the City in determining whether the proposed substitution is acceptable.

2. The final decision shall be the City's. City may condition its approval of the substitution upon delivery to City of an extended warranty or other assurances of adequate performance of the substitution.
3. If the Substitution is Permitted: The Contractor shall be solely and directly responsible for fitting approved substituted material and equipment into the available space in a manner acceptable to the City and for the proper operation of the substituted equipment with all other equipment with which it may be associated. The Contractor shall bear all costs of meeting the above requirements for presenting a proposed substitution, and if the substitution is accepted, the Contractor must bear all costs involved including costs of Construction Manager's, Architect's, and Engineer's services required in adapting the substituted material or equipment to the installation to the complete satisfaction of the City.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SUBSTITUTION OF "OR EQUAL" PRODUCT

Date:

Company:

Contact Person:

Address:

Telephone:

Fax:

Plan Sheet:

Specification Section:

Listing of Proposed "Or Equal" Products:

End of Section

Section 01 2613

Interpretation of Contract Documents (Prior to Bid)

PART 1 - GENERAL

1.01 Interpretation of Contract Documents

- A. If any firm contemplating submitting a bid for the proposed contract is in doubt as the true meaning of any part of the drawings, specifications, or other Contract Documents, or finds discrepancies in, or omissions from the drawings or specifications, he or she shall submit to the Architect a written request (use attached "Request for Interpretation" form) for an interpretation or correction thereof. The person submitting the request will be responsible for its prompt delivery. Any interpretation or correction of the Contract Documents will be made only by Addendum and will be faxed or e-mailed and/or mailed to each person receiving set of such documents. City will not be responsible for any other explanation or interpretation of the Contract Documents.

1.02 Requests for Interpretation

- A. Page 2 of Section is a form titled, "Request for Interpretation". Bidders are to use this form to submit written requests for interpretations or corrections by fax or e-mail to the City's Architect:

RRM Design Group
(805) 543-4609 Fax
Attention: Mr. Mike Scott
E-mail address: mlscott@rrmdesign.com

To expedite the interpretation process, interpretations may be faxed or e-mailed to bidders as addenda, follow-up hard copies may be delivered by mail.

- B. All information must be filled out on the form as pertains to the Contractor's information: Company name, address, phone number, fax number, e-mail, contact person, date, and time of request. Questions or Requests for Clarification are to be printed or typed on these forms. If bidders have several questions, which will not fit on one form, the bidder is to photo copy the form, number each page, and submit multiple forms.
- C. Deadline for Requests for Interpretation: All requests for interpretation must be received by noon on the tenth (10th) calendar day preceding the bid date.

END OF SECTION

REQUEST FOR INTERPRETATION OF CONTRACT DOCUMENTS

Date:

Time:

Company:

Contact Person:

Address:

Telephone:

Fax:

E-mail:

Plan Sheet:

Specification Section:

Interpretation Requested:

Reply: See Addendum # _____ item # _____

Issued:

End of Section

Section 01 3119

Project Meetings

PART 1 - GENERAL

1.01 Preconstruction Conference

- A. Prior to commencement of work, a preconstruction conference will be held to discuss procedures to be followed during the progress of the work.
- B. Location: A convenient site for all parties designated by the City.
- C. Attending shall be:
 - 1. City's Representative
 - 2. Architect or Architect's designated representative.
 - 3. Contractor
 - 4. Contractor's Superintendent
 - 5. Major Listed Subcontractors
 - 6. Others subcontractors as appropriate
 - 7. Testing Lab and Inspection

1.02 Labor Compliance Program Meeting

- A. Prior to commencement of work, a labor compliance conference will be held to discuss procedures to be followed during the progress of the work.
- B. Location: A convenient site for all parties designated by the City.
- C. Attending shall be:
 - 1. City's Representative
 - 2. Architect or Architect's designated representative.
 - 3. Contractor
 - 4. Contractor's Superintendent
 - 5. All Subcontractors
 - 6. Testing Lab and Inspection

1.03 Proposed Progress Meetings

- A. Weekly progress meetings will be conducted by the Construction Manager.
- B. Location: Construction Manager's field office
- C. Attending shall be:
 - 1. Construction Manager/Project Inspector
 - 2. Contractor's Project Manager
 - 3. Contractor's Superintendent
 - 4. Subcontractors, as appropriate to the issues to be reviewed
 - 5. Suppliers, as appropriate to the issues to be reviewed
 - 6. Others, as appropriate to the issues to be reviewed
 - 7. City's Representative
 - 8. Architect or Architect's designated representative.
 - a. Consultants, as appropriate to the issues to be reviewed, as determined by the Construction Manager
- D. Construction manager will take and distribute meeting notes to the attendees. Attendees taking exception to anything in the meeting notes shall state same in writing, directed to Construction Manager within five (5) working days following receipt of meeting notes.

1.04 Billing Meetings

- A. As part of the last progress meeting each month, the Construction Manager may schedule and hold a billing meeting for the purpose of agreeing on the percentage of the work completed up to that date and establishing the amount to be requested in the Application for Payment.
- B. Location: Construction Manager's field office
- C. Attending shall be:
 - 1. Construction Manager
 - 2. City's Representative
 - 3. Contractor
 - 4. Architect or Architect's designated representative.
- D. Prepare an itemized draft of the month's proposed billing for review with the Project Team at the billing meeting.
- E. Following review of the proposed billing, revise as required, prepare Application for Payment, and submit to the Construction Manager. The Construction Manager will review, certify, and forward it to the City, who will authorize payment upon receipt of partial waivers of lien from the Contractor for previous payment, monthly certified payroll, and updated progress schedule.

1.05 Guarantee/Warranties, Bonds, and Service and Maintenance Contracts Review Meeting

- A. Eleven months following date of final completion and acceptance of the Owner, the Contractor shall arrange for and hold a meeting at the Project Site for the purpose of review of guarantees/warranties, bonds, and service and maintenance contracts for materials and equipment. Contractor shall notify the following attendees of the date and time at least seven (7) days in advance. Contractor shall take action as appropriate to implement repair or replacement of defective items, and to extend service and maintenance contracts.
- B. Attending shall be:
 - 1. The City's Representative
 - 2. Construction Manager
 - 3. Architect or Architect's designated representative.
 - 4. Contractor
 - 5. Subcontractors, as appropriate to the agenda
 - 6. Suppliers, as appropriate to the agenda
 - 7. Others, as appropriate to the agenda

PART 2 - PRODUCTS - NOT USED.

PART 3 - EXECUTION - NOT USED.

End of Section

Section 01 3216
Construction Progress Schedule

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work under this section shall consist of furnishing a computerized Critical Path Method (CPM) contract schedule showing in detail how the Contractor plans to execute and coordinate the work and shall include:
 - 1. Initial Construction Schedule.
 - 2. Complete Construction Schedule, with network analysis diagrams and reports
 - 3. Construction Progress Schedules
 - 4. Recovery Schedule, if required

1.02 RELATED SECTIONS

- A. General Conditions
- B. Section 01 3300 - Submittals

1.03 SUBMITTALS

- A. Within 10 calendar days after date of Notice to Proceed, submit initial schedule defining planned operations for the first 90 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 calendar days of receipt of comments.
- C. Within 20 calendar days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
 - 2. Construction Manager will review the CPM contract schedule for conformance with the requirements of the contract. Within ten (10) calendar days after receipt, Owner's Representative will accept the CPM contract schedule or will return it with comments. If the proposed CPM contract schedule is not accepted, Contractor shall revise the schedule to incorporate comments and resubmit the schedule for acceptance within ten (10) calendar days after receiving it.
- D. Submit updated construction progress schedule and CD ROM with each Application for Payment.
- E. Submit under transmittal letter form specified in Section 01 3000.

1.04 QUALITY ASSURANCE

- A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with five years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.
- B. Contractor shall designate an authorized representative who will be responsible for the preparation of the Project Construction Schedule, review and report progress of the project to the City. The Contractor's representative shall have complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification and such authority will not be interrupted throughout the duration of the Project.

1.05 DEFINITIONS

- A. Initial Construction Schedule - Construction Network Diagram detailing the first ninety (90) calendar days of the Project and displaying the remainder of the Project in summary.
- B. Construction Schedule - Computer generated graphical representation of the CPM Construction Schedule that indicates the relationship that exists between the different activities utilizing Precedence Diagram Method (PDM), drawn to time scale. Relationships between activities are displayed with the use of restraints.
- C. Activity - A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
- D. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
- E. Predecessor activity is an activity that must be completed before a given activity can be started.
- F. CPM: Critical path method, which 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.
- G. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- H. Event: The starting or ending point of an activity.
- I. Float: The measure of leeway in starting and completing an activity. Float is a resource that belongs to the Project. Contractor shall provide the City with written notice of Contractor's intent to use Float.
- J. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- K. Major Area: A story of construction, a separate building, or a similar significant construction element.
- L. Milestone: A key or critical point in time for reference or measurement.
- M. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.
- N. Progress Schedule: For the purposes of this Contract, "Progress Schedule" and "Construction Schedule" are synonymous.

1.06 CONSTRUCTION SCHEDULE REQUIREMENTS

- A. The Construction Schedule must be computer plotted. This schedule must be time scaled and demonstrate a logical progression of all work activities.
- B. The schedule must be created in a clear logical format, flowing vertically and from left to right. All work activities must be grouped together with related items: i.e., substructure - superstructure - tenant improvements - close out. Also, procurement (submittal) items must be grouped together or on a separate plot with restraints (relationships) tying them back to the work activities.
- C. The Construction Schedule shall be graphically organized in a format, which demonstrates the logical progression of the workflow. Beginning with the site mobilization (located in the upper left corner of the schedule) and culminating with the punchlist - acceptance - demobilization

(located in the lower right corner of the schedule), the network will facilitate the ease of reading and interpreting the Project progress.

- D. Groups or clusters of work activities relating to a particular milestone, area, or function of work shall be subtitled to facilitate the ease of reading and interpreting the schedule.
- E. Shown on the Construction Schedule will be the sequence and interdependence of activities required for complete performance of all items of work. In preparing the time scaled Construction Schedule, the Contractor shall:
 - 1. Exercise sufficient care to produce a clear, legible, and accurate diagram including all copies. Group activities related to specific physical areas and/or phases of the Project, on the diagram, for ease of understanding and simplification.
 - 2. Show the following on each work activity:
 - a. Activity number.
 - b. Concise description of the work represented by the activity.
 - c. Performance responsibility or trade codes (four characters or less): GEN, MECH, ELEC, CARP, or other acceptable abbreviations.
 - d. Activity duration (in calendar days).
 - e. Work location or area code (five characters or less), descriptive of the area involved. Use alphanumeric coding or other acceptable coding structure for designating work on different levels in different areas of the building.
 - f. Network (CPM) legend format is mandatory and shall be followed in preparing the Initial Construction Schedule and Construction Schedule.
 - 3. Show such activities as:
 - a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery, and similar pre-construction work.
 - b. The placement of orders for all significant material and equipment.
 - c. The City's review and approval of shop drawings, equipment schedules, samples, templates, or similar items. Unless a longer period is specified elsewhere in the contract documents, allow a maximum of thirty (30) calendar days review for each submittal.
 - d. Mock-ups. Refer to Section 01400.
 - e. Interruption of the City's utilities, delivery of City furnished equipment, milestones, and any other specification requirements.
 - f. Test, balance, and adjustment of various systems and pieces of equipment.
 - 4. Show not only the activities for actual construction work for each trade category of the project, but also include trade restraints to indicate the movement of trades from one area, or floor to another area or floor for all trades who are performing major work under this Contract.
 - 5. Break up the work into activities of a duration no longer than fourteen (14) calendar days each, except non-construction activities: i.e., (procurement of materials, delivery of equipment, concrete, and asphalt curing) and any other activities for which the City may allow the showing of longer duration. The duration for the City's approval of any required submittal, shop drawing, or other submittals shall not be less than twentyone (21) calendar days. The Project Contract Time, as determined by the Construction Network Diagram, from early start to late finish for all sub-phase, phase, or the entire Project shall not exceed the Contract Time (s) specified or shown.
 - 6. Uniquely number each activity with event numbers. The diagram should be generally numbered in sequence; left to right; top to bottom.

7. Show all contractual milestone dates required by the Contract Documents. Using proper restraints and relationships, tie each activity representing work, which must be completed by each milestone to the activity representing that milestone. Assign activity codes to all activities related to each milestone to allow sorting of all activities tied to that milestone. In addition to any contractual milestones called for in the Contract Documents, select no less than five (5) additional significant events as milestones and code in a similar manner. Contractor's progress against milestones will form the basis for determining the overall schedule status.
8. Tie activities to their related work using logical relationship, restraints or constraints to prevent excessive float. Flag, asterisk, or otherwise highlight the use of constrained dates to allow easy identification.
9. With each Construction Schedule submission provide a tabular report showing the following:
 - a. Activity number.
 - b. Activity description.
 - c. Original and remaining durations.
 - d. Early start and finish dates.
 - e. Actual start and finish dates.
 - f. Total float.
 - g. Predecessor and successor activities.
- F. Submit the following supporting data in addition to the plotted diagrams, tabular schedule reports and CD ROM. Failure of the Contractor to include this data will delay the review of the submittal until the City is in receipt of the missing data:
 1. All calendars developed within the schedule software applicable to the project schedule showing the proposed number of working days per week. Include where necessary a description of which calendars apply to which activities.
 2. The holidays to be observed during the life of the Contract (by day, month, and year).
 3. The planned number of shifts per day.
 4. The number of hours per shift.
 5. The major construction equipment to be used on the Site.
- G. Failure of the Schedule to include any element of the Work or an inaccuracy in the Schedule, regardless of whether the Schedule is accepted by the City shall not relieve the Contractor of the responsibility for accomplishing the Work in a timely fashion in accordance with the Contract.
- H. CD ROM requirements: Submit to the City CD-ROM containing all the data used to produce the schedule, reflecting all the activities of the Construction Schedule being submitted using the software indicated.
- I. Furnish copies of subcontractor's schedules upon which the CPM was built.
 1. Also furnish for each major subcontractor, as determined by the City, submitted on subcontractor's letterhead, a statement certifying that Baseline CPM schedule and that subcontractor's related schedules have been reasonably incorporated, including activity duration and resource loading.
 2. Subcontractor's schedules shall be independently derived and not a copy of Contractor's Baseline CPM Schedule.
- J. Within seven (7) calendar days of the official Contract start date stated in the Notice to Proceed, the City will conduct a Schedule Orientation Meeting to review the requirements of the Contract Documents for preparing, submitting, updating and revising the various project

schedules. This is a separate meeting from the Pre-construction Meeting and is dedicated exclusively to discussions about the scheduling requirements for the project. Contractor must review the requirements of the Contract Documents related to scheduling prior to the meeting and be prepared to discuss its general approach to meeting the requirements.

1.07 Computer Produced Schedules

- A. The Construction Schedule shall be computer generated. A hand drawn network will not be considered an equal substitution for the purposes of this specification.
- B. Contractor shall use Primavera Project Planner, the latest commercial version available unless otherwise approved by the City.

1.08 Initial Construction Schedule

- A. The Contractor shall submit to the City for review four (4) xerographic copies of the time scaled Initial Construction Schedule. The Initial Construction Schedule shall be plotted on a minimum media size of (24"x36") and shall be accompanied by a compact optical (CD-ROM) disk(s) and two (2) copies of computer generated tabular report of the Initial Construction Schedule shall include a minimum:
 - 1. Procurement - Submittals, review and approval, fabrication and delivery of all items necessary to accomplish the work depicted in the Initial Construction Schedule as well as long lead items.
 - 2. Detailed activities required to execute the work within the first ninety (90) calendar days of the Project.
 - 3. The calendar structure(s) to be used for the schedule.
 - 4. The activity coding structure and dictionaries to be used for the schedule.
 - 5. Display remainder of the Project in summary.

1.09 Construction Schedule

- A. The Contractor shall submit for the City's review two (2) copies of the complete Construction Schedule on a minimum of "D" sized media (24x36), including all required compact optical (CD-ROM) disk(s). The submittal shall also include two (2) copies of the tabular schedule report showing the Project duration; Completion dates; all restraints; and other pertinent data. Each activity on the computer produced schedule report shall contain, at a minimum, activity numbers, activity duration, trade, building level, area and responsibility codes, activity description, early start, early finish date, late start date, late finish date, and total float.
- B. Submit three (3) separate tabular reports sorted by:
 - 1. Overall early start and total float.
 - 2. Area or building and early start.
 - 3. Responsibility and early start.
- C. The complete working Construction Schedule shall reflect the Contractor's approach to scheduling the complete project, taking into account the accuracy of the logic and the experience gained from the Initial Construction Schedule. This diagram in its original form will contain no Contract changes or delays, which may have been incurred during the Initial Construction Schedule review period. These changes/delays shall be entered into the first update after the Construction Schedule has been submitted and reviewed. The Contractor should provide a request/time extension analysis for Contract time as a result of these Contract changes/delays after this update and in accordance with the General Conditions.
- D. Within thirty (30) calendar days after receipt of the Construction Schedule, the City will either accept such submittal or request a meeting with Contractor at the jobsite to review the City's comments. Within fifteen (15) calendar days after a joint review, the Contractor shall revise

and resubmit six (6) copies of the schedule, six (6) copies of the revised tabular schedule reports and a revised compact optical (CD-ROM) disk(s) to the City, and, if found to be as previously agreed upon, the Construction Schedule will be accepted by the City.

- E. The reviewed and approved Construction Schedule and the computer-produced schedule(s) there from shall constitute the Project Construction Schedule until subsequently revised in accordance with requirements of this Section.
- F. The City is not required to accept an earlier (advanced) schedule.
- G. The Construction Schedule will be the basis for evaluating job progress, planning future activities and analyzing time extension requests. Responsibility for developing the schedule and monitoring actual progress as compared to the Contract completion dates rests with the Contractor. Maximum input planning shall be provided by the Contractor's Project Manager and supervisory personnel. The Contractor warrants that the Schedule is the Contractor's committed plan to complete the Work within the Contract time and the Contractor assumes full responsibility for the execution of the Work as indicated. If the schedule shows an early completion date, City's acceptance of the schedule shall not constitute any revisions of the available Contract Time, remaining contract time shall be considered Project Float.
- H. Failure of the contract schedule to include any element of the work, or any inaccuracy in the contract schedule, will not relieve the Contractor from responsibility for accomplishing all the work in accordance with the contract.

1.10 Rain Delays

- A. Allow as part of the Construction Schedule the number of rain days when work at the Project site cannot be performed due to rain as identified in the General Conditions section, beginning of work and time of completion subsection.
- B. No excusable rain delays will be allowed except for the number of days exceeding the number of days as identified in the General Conditions section.
- C. Each time work cannot be performed due to rain, submit a letter to the City detailing the specific activities that cannot be performed, whether these activities are on the critical path, and the impact the delay in performing these activities will have on the overall Construction Schedule. The City will return a letter to the Contractor acknowledging agreement or disagreement.
- D. Notwithstanding the requirement for the Contractor to allow a certain number of rain days, no claim for weather related delays will be considered until and unless Contractor has taken all reasonable steps to mitigate the schedule impacts due to weather. Such mitigating measures include, but are not limited to installation of temporary protection, water diversion trenches and collecting ponds, application of visqueen tarpaulin ground covers, soil stabilization or conditioning with fabric, gravel, or lime treatment and the installation of temporary enclosures. Contractor shall employ one or more of said methods or may employ his own proactive methods as appropriate to the particular conditions, at no additional cost to the City.

1.11 Changes to Construction Schedule

- A. Whenever any of the following reasons impact the critical path of the schedule, the Contractor shall submit a revised Construction Schedule and a tabular list of any activity changes within fifteen (15) calendar days of such schedule impact:
 - 1. Delay in completion of any activity or group of activities, indicate an extension of the Project completion. Such delays, which may be involved with Contract changes, strikes, unusual weather, and other delays, will not relieve the Contractor from the requirements specified in the Contract Documents, unless the conditions are shown on the project schedule as the direct cause for delaying the Project beyond the completion date.

2. Delays in submittals, or deliveries, or work stoppage, which are, encountered which make planning or rescheduling of the work necessary.
 3. The schedule does not represent the actual prosecution and progress of the Project.
- B. When a Cost Request Bulletin is issued which has the potential to impact specified completion dates, a network window shall be prepared by the Contractor to reflect the impact of such changes, said network window shall be submitted to the Owner's Representative and Construction Manager. After the network window has been accepted, by the Owner's Representative and Construction Manager, and the Contractor ordered to proceed with the Cost Request Bulletin, it shall be incorporated into the contract schedule. Time extensions will be considered only to the extent there is insufficient remaining float to accommodate these changes, and pursuant to Part 1 of these specifications. No additional cost beyond that provided in the General Conditions will be allowed for the incorporation of approved Cost Request Bulletin into the contract schedule.

1.12 Updating the Construction Schedule

- A. The Contractor will update the Construction Schedule each month, reflecting actual or anticipated progress as of the 15th day of the month or as otherwise agreed to by the City and shall submit the same to the City concurrent with Contractor's monthly Payment Request. The monthly update will be made as follows:
1. The schedule update shall consist of updated (revised and/or status) Construction Schedule computer reports as further described within this Section. The Construction Schedule reports shall report progress, based upon percent complete of actual time and remaining duration.
 2. The schedule update shall reflect an up-to-date status of the Contract work as completed, and materials furnished and in permanent place that qualify for payment.
 3. The schedule update shall include all approved change orders and time extensions for the progress month.
 4. The updated Construction Schedule shall include all delays of the critical path for the progress month. Any delay incorporated into the updated schedule which the Contractor has not given proper notice to the City per the General Conditions shall be deemed to be the Contractor's responsibility and will be treated and evaluated as such by the City.
- B. Within fourteen (14) calendar days from the City's receipt, the City will review the Construction Schedule and will return the same to the Contractor with comments.
- C. The Contractor shall then revise and resubmit (if required) the updated Construction Schedule to the City for review. The Construction Schedule, including approved time extensions, then becomes the new Project Construction Schedule.
- D. At each weekly progress meeting, the Contractor shall provide short interval schedule reports, which include a "four week look ahead" or predicted status report, covering the work within the next four (4) week period, with activities sorted by early start. The schedule report shall include a listing of the activities begun, completed, and in progress in the past week and the activities scheduled to begin, be completed or be in progress for the succeeding four (4) week period.
- E. The Contractor shall use Primavera Claim Digger, v3.0 , or approved equal, to provide a comprehensive schedule comparison report accompanying each submitted construction schedule as well as an accompanying narrative report as needed to explain changes to the schedule, changes to the critical path and will include a list of critical activities, which require action from the Architect or the City. Reports will be provided in Word format and on CD-Rom. The accompanying narrative report will include a listing of all delays which affected

the critical path and will clearly explain the impact such claimed delay(s) had on the critical path, and will include an account audit of days lost/gained. Claim Digger comparison report will be provided showing an analysis of the following elements:

1. Autocost and schedule logic rule changes.
 2. Activities that have been added or deleted.
 3. Changes to the original and remaining durations.
 4. Changes to the constraint types, percent complete, total and free float.
 5. Changes to activity calendars.
 6. Changes to descriptions.
 7. Changes to activity logs.
 8. Changes to actual start and finishes.
 9. Adding or deleting resources.
 10. Changes to resources and cost budgeting actuals and forecasts.
 11. Changes to resource percents.
 12. Activities that have moved off or on the critical path.
 13. Added or deleted, or changed relationships.
 14. Changes to driving relationships, activity codes and WSB changes.
 15. Activities that should have started or finished in a reporting period
- F. Subject to all other requirements of the Contract Documents, nothing in these requirements will be deemed to be an usurpation of the Contractor's authority and responsibility to plan and schedule the work as the Contractor sees fit.

1.13 Reports

- A. Daily Field Reports shall be prepared and submitted by the Contractor. This report shall be on a form approved by the City and shall indicate Supervisors, Journeymen, Laborers or Apprentices and, by crew, the activities, related to the Contractors' schedule, that are being performed. The Daily Field Reports shall be delivered to the City at the job-site by 9:00 a.m. on the next succeeding business day. Daily Field Reports shall also include but not be limited to the following:
1. List of subcontractors at Project site.
 2. Work being performed, including location.
 3. List of separate contractors at Project site.
 4. Approximate count of personnel at Project site.
 5. High and low temperatures and general weather conditions.
 6. Accidents.
 7. Meetings and significant decisions.
 8. Unusual events.
 9. Stoppages, delays, shortages, and losses.
 10. Meter readings and similar recordings.
 11. Emergency procedures.
 12. Orders and requests of authorities having jurisdiction.
 13. Change Orders received and implemented.
 14. Construction Change Authorizations received.
 15. Services connected and disconnected.
 16. List of major equipment at site.
 17. Equipment or system tests and start-ups.
 18. Partial completions and occupancies.
 19. Significant material deliveries.

- B. Prepare a Materials Status Report on the form approved by the City and submit this report, as soon as possible, but not later than thirty (30) days after award of the Contract. The Material Status Report shall be updated monthly. Delivery dates provided on the Materials Status Report shall conform to the approved Construction Schedule. The updated Material Status Report shall accompany each application for payment.

1.14 Additional Provisions

- A. The Contractor may submit an Initial Construction Schedule which shows the work completed in less time than the specified contract time. However, the acceptance of such a schedule will not change the contract time. The contract time shall control in any determination of liquidated damages or extension of the contract time. Float, slack time, or contingency within the schedule (i.e., the difference in time between the Project's early completion date and the required Contract Final completion date), and total float within the overall schedule, is not for the exclusive use of either the City or the Contractor, but is jointly owned by both and is a resource available to and shared by both parties as needed to meet the contract completion date.
- B. Comments made by the City on the Contractor's Initial Construction Schedule during review will not relieve the Contractor from compliance with the requirements of the contract documents. The review is only for general conformance with the scheduling requirements of the contract documents. Upon the City's request, the Contractor shall participate in the review of the Contractor's Initial Construction Schedule submissions (including original submittal, all update submittals, and any resubmittals). The City may request the participation of subcontractors in these reviews, as determined necessary by the City. All revisions to the Contractor's Schedule shall be resubmitted within fifteen (15) calendar days after the City's review.
- C. The submittal of a fully revised and acceptable Contractor's complete Construction Schedule shall be a condition precedent to the procession of the third monthly payment application, unless the City grants a time extension due to unusual circumstances.
- D. Float or Slack Time is the amount of time between the earliest start date and the late start date or between the earliest finish date and the latest finish date of activities of the contract schedule. No time extensions or delays costs will be allowed for delays caused by the Owner, on paths or activities containing float time, providing such delay does not exceed the float time per the latest updated version of the contract schedule.
- E. No time extensions shall be granted nor delay damages paid unless the delay can be clearly demonstrated by the Contractor on the updated construction schedule current as of the month the change is issued of the delay occurred and which delay cannot be mitigated, offset, or eliminated through such actions as revising the intended sequence of work or other means.
- F. As a condition precedent to the release of retained funds, the Contractor shall, after completion of the work has been achieved, submit a final Contractor's construction schedule which accurately reflects the manner in which the project was constructed and includes the actual start and completion dates for all work activities on the construction schedule.
- G. The Owner's Representative and Construction Manager shall have no obligation to consider any time extension request unless the requirements of the contract documents are complied with; the Owner shall not be responsible or liable to the Contractor for any construction acceleration due to failure of the Owner to grant time extensions under the contract documents should the Contractor fail to substantially comply with the submission requirements and the justification requirements of this contract for time extension requests. The Contractor's failure

to perform in accordance with the contract schedule shall not be excused because the Contractor has submitted time extension requests; until, and unless, such requests are approved by the Owner.

1.15 Recovery Schedule

- A. If the contractor's work on the critical path is fourteen (14) days or more behind on the updated construction schedule and will impact the end date of the work past the contract completion date (create negative float), the Contractor shall submit in writing, a plan acceptable to the City for completing the work on or before the current contract completion date. The plan shall take some or all of the following actions:
 - 1. Increase construction manpower in such quantities and crafts as shall substantially eliminate the backlog of work and meet the current Contract completion date.
 - 2. Increase the number of working hours per shift, the number of shifts per day, the number of work days per week, or the amount of construction equipment, or any combination of the foregoing sufficient to substantially eliminate the backlog of work.
 - 3. Reschedule work items to achieve concurrent accomplishment of work activities.
- B. Under no circumstances will adding equipment or construction forces, increasing the working hours, or employing any other method, manner, or procedure to return to the contractually required completion date be justification for a compensable acceleration, unless prior written approval is received from the City.

1.16 Payments Withheld

- A. Progress payment may be withheld in whole or in part should the Contractor fail to comply with the requirements of this section.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

End of Section

Section 01 3300

Submittals

PART 1 - GENERAL

1.01 Description

- A. To ensure that specified products are furnished and installed in accordance with plans and specifications, transmittal procedures have been established for submittals for review by the Construction Manager, the Architect, and the Owner.
- B. Make all following submittals in strict accord with provisions of this Section and with requirements of the General Conditions:
 - 1. Progress Schedule.
 - 2. Schedule of Values
 - 3. Certification.
 - 4. Shop Drawings.
 - 5. Descriptive Data/Material Lists.
 - 6. Samples.
 - 7. Alternatives (Substitutions).

1.02 Related Requirements

- A. General Conditions.
- B. Section 01 7700 - Contract Closeout:
- C. Section 01 3216 - Construction Progress Schedule
- D. Test Reports: Pertinent Specification Sections.

PART 2 - PRODUCTS

2.01 Progress Schedule -- Prepare and submit progress schedule of procurement and fabrication activities, and component deliveries as required by Section 01 3216 and within the time of completion identified in Notice to Bidders.

2.02 Shop Drawings

- A. Submittals shall include eight complete copies of each original, name and location of project, name of Contractor, and contract numbers and cross references to contract documents. Number shop drawings consecutively. Make drawings legible and complete in every respect. Refer to General Conditions.
- B. If shop drawings show variations from Contract requirements because of standard shop practice or other reason, make specific mention of such variations in letter of transmittal, as well as on drawings, in order that (if acceptable) suitable action may be taken for proper adjustment of Contract. Unless specific changes have been noted and accepted, no deviations from Contract Documents will be permitted.

2.03 Product Data/Material Lists

- A. Manufacturer's Standard Schematic Drawings:
 - 1. Modify drawings to delete information, which is not applicable to Project.
 - 2. Supplement standard information to provide additional information applicable to Project.
- B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data:
 - 1. Clearly mark each copy to identify pertinent materials, products, or models.
 - 2. Show dimensions and clearances required.

3. Show performance characteristics and capacities.
4. Show wiring diagrams and controls.
5. Include calculations when applicable.

2.04 Samples -- Where required by the specifications and by change orders, the Contractor shall provide at no additional cost:

- A. Physical examples to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged.
- B. Where size of samples is not specified, office samples should be of sufficient size and quantity to clearly illustrate:
 1. Functional characteristics of product or material, with integrally related parts and attachment devices.
 - a. After review, samples may be used in construction of project.

PART 3 - EXECUTION

3.01 Submission Requirements

- A. Schedule submissions at least eight weeks before dates reviewed submittals will be needed. Some submissions may be required to be submitted even earlier.
- B. Identification: Identify all submittals with names and location of project, name of Contractor and contract numbers.
 1. Submittals shall be accompanied by letter of transmittal addressed to Construction Manager following format and procedures established at the Preconstruction Conference.
 2. Each submittal shall be consecutively numbered and shall contain list of items submitted, properly identified as to drawing numbers, Specifications Section or other identification.
 3. Submittals not adequately identified will be returned to Contractor for correction and resubmittal.
- C. Architect will review submittals for conformance with Contract Documents and acceptance by Architect covers only such conformance. Responsibility for accuracy and correction and resubmittal shall be the Contractor's.
- D. Acceptance of submittals will be general and shall not relieve Contractor from responsibility for proper fitting and construction of work, nor from furnishing materials and work required by Contract, which may not be indicated on submittals.
- E. No portion of work requiring submittals that affect the construction shall be commenced until submittal has been reviewed and accepted by Architect. All such portions of work shall be in accordance with accepted submittals.
- F. Number of copies required by Architect: Provide copies as follows; or greater quantity where so specified in individual Specification Section. Add number of copies required by Contractor for distribution to the following numbers:
 1. Schedule of Values: Two (2) copies AIA form G107 with back up sheets.
 2. Certification: Three (3) copies
 3. Samples: As specifically indicated in pertinent Specification Section.
 4. Samples for Color/Pattern Selection. Three (3) sets of manufacturer's complete range for initial selection; and additional samples as requested of selected color/pattern for inclusion in final color schedule.
 5. Alternatives: Six (6) copies of all required related data and information.

3.02 Submittals shall include (where applicable):

- A. Date and revision dates.
 1. Project title and work order number.

2. Names of Contractor, subcontractor and supplier or manufacturer.
3. Identification of product or material.
4. Relation to adjacent structure or material.
5. Field dimensions, clearly identified as such.
6. Specification Section number.
7. Consecutive submittal number.
8. Blank space for Architect's stamp and approving agency as required.
9. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents.

END OF SECTION

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Job Name: Manteca Fire Department – Manteca Fire Station #5

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Section 01 4213

Abbreviations

PART 1 - GENERAL

1.01 Abbreviations

- A. The following abbreviations may be used in the contract documents:
- AAMA Architectural Aluminum Manufacturers' Association
 - AASHTO American Association of State Highway and Transportation Officials
 - ACI American Concrete Institute
 - AIA American Institute of Architects
 - AIMA Acoustical and Insulation Materials Association
 - AISC American Institute of Steel Construction
 - ANSI American National Standards Institute
 - APA American Plywood Association
 - ASHRAE American Society of Heating, Refrigerating, and air-conditioning Engineers
 - ASME American Society of Mechanical Engineers
 - ASTM American Society for Testing and Materials
 - AWI Architectural Woodwork Institute
 - AWPI American Wood Preservers' Association
 - AWS American Welding Society
 - BHMA Builders Hardware Manufacturers' Association
 - BTU British Thermal Unit
 - CAC California Administrative Code
 - CBCC California Building Code
 - CEC California Electric Code
 - CAL/OSHA State of California Construction Safety Orders
 - CLFMI Chain Link Fence Manufacturers' Institute
 - CMCC California Mechanical Code
 - CPCC California Plumbing Code
 - CRSI Concrete Reinforcing Steel Institute
 - CALTRANS State of California, Business and Transportation Agency, Department of Transportation, "Standard Specifications"
 - ESO Electrical Safety Orders
 - FAA Federal Aviation Administration
 - FGMA Flat Glass Marketing Association
 - FM Factory Mutual System, Factory Mutual Engineering Corporation
 - FS Federal Specifications
 - IBC International Building Code
 - MM State of California, Business and Transportation Agency, Department of Transportation, "Materials Manual"
 - NEC National Electrical Code
 - NEMA National Electric Manufacturers' Association
 - NFPA National Fire Protection Association
 - PS United States Department of Commerce Product Standard
 - RIS Redwood Inspection Service
 - SFM State of California, Office of State Fire Marshal
 - SMACNA Sheet Metal and Air Conditioning Contractors National Association, Inc.

TCATile Council of America
UBCUniform Building Code
ULUnderwriters Laboratories, Inc.
USSUnited States Standard
WCLIBWest Coast Lumber Inspection Bureau
WIWoodwork Institute

B. Additional abbreviations used only on the drawings are listed and defined thereon.

PART 2 - PRODUCTS - NOT USED.

PART 3 - EXECUTION - NOT USED.

End of Section

Section 01 4300
Quality Requirements

PART 1 - GENERAL

1.01 Definitions

- A. Soils Engineer and Testing Laboratory: The City will retain a qualified soils engineer and testing laboratory to perform tests and report on work as specified in the contract documents, and as otherwise required.
- B. Testing Agency: An organization other than the testing laboratory, retained and paid by the City to perform tests and report on whether or not designated items of work comply with the requirements of the contract documents.

1.02 Tests

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

1.03 Testing Laboratory

- A. General: Services of a testing laboratory are required for work specified in various individual specification Sections.
- B. Contractor Responsibilities:
 - 1. Contractor shall cooperate with testing laboratory personnel.
 - 2. Furnish copies of product test reports as specified.
 - 3. Furnish incidental labor and facilities:
 - a. To provide access to work to be tested
 - b. To obtain and handle samples at the project site or at the source of the product to be tested as requested by the testing lab
 - c. To facilitate inspections and tests
 - d. To facilitate storage and curing of test samples
 - e. To fabricate testing samples as indicated

1.04 Test Reports

- A. The testing laboratory will distribute reports as follows:
 - 1. Construction Manager (1 copy)
 - 2. Architect (1 copy)
 - 3. Applicable Consultants (1 copy each)
 - 4. State Agencies as appropriate
 - 5. City's Project Inspector

- B. The Owner shall distribute reports in the same manner and number as for the testing laboratory.

1.05 Retesting

- A. The City Representative shall have the right to order additional tests as instructed if he has reasonable doubt that materials comply with Specification requirements.
 - 1. If additional tests establish that materials comply with Specification requirements, costs for such tests will be paid by the City.
 - 2. If additional tests establish that materials do not comply with Specification requirements, costs for such retests shall be paid by the Contractor.

1.06 Inspection by the City

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

PART 2 - PRODUCTS - NOT USED.

PART 3 - EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.

- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

3.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.
 - 1. Submit qualifications of observer to Architect 30 days in advance of required observations.
 - 2. Observer subject to approval of Architect.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.05 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 01 5000

Construction Facilities & Temporary Controls

PART 1 GENERAL

1.01 Work Included

- A. This Section includes requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Water service and distribution.
 - 2. Temporary electric power and light.
 - 3. Sanitary facilities, including drinking water and washing facilities.
 - 4. Storm and sanitary sewer.
- C. Support facilities include, but are not limited to, the following:
 - 1. Temporary enclosures.
 - 2. Waste disposal services.
 - 3. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Temporary fire protection.
 - 2. Enclosure fence for the site.

1.02 Quality Assurance

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. Building code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, fire department, and rescue squad rules.
 - 5. Environmental protection regulations.
- B. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits. Installer - Work to be performed only by workers thoroughly skilled and specifically trained in the techniques of installing prefinished interior panels. Installer to be currently approved by Manufacturer of prefinished panels.

1.03 Standards - Comply with the following listed standards

- A. NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations
- B. ANSI A10 Series standards for "Safety Requirements for Construction and Demolition
- C. NECA Electrical Design Library "Temporary Electrical Facilities
- D. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."
- E. NFPA 10 "Standard for Portable Fire Extinguishers"
- F. NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

1.04 Project Conditions

- A. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work

progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 PRODUCTS

2.01 Materials

- A. General: Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. Open-Mesh Fencing: Provide 0.120-inch- (3-mm-) thick, galvanized 2-inch (50-mm) chain link fabric fencing 6 feet (2 m) high with galvanized barbed-wire top strand and galvanized steel pipe posts, 1-1/2 inches (38 mm) I.D. for line posts and 2-1/2 inches (64 mm) I.D. for corner posts.

2.02 Equipment

- A. General: Provide new equipment. If acceptable to the Architect, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 3/4-inch (19-mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet (30 m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- E. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material. Provide self contained washing facilities, stocked with soap, disposable towels, and drinking cups; Use only potable water in Health Dept. approved containers.
- F. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 EXECUTION

3.01 Installation

- A. Use qualified personnel for installation of temporary facilities. 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.

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

3.02 Temporary Utility Installation

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
 - 1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
 - 3. Obtain easements to bring temporary utilities to the site where the City's easements cannot be used for that purpose.
 - 4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the City or Architect. Neither the City nor Architect will accept cost or use charges as a basis of claims for Change Orders.
- B. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switchgear.
 - 1. Install electric power service underground, except where overhead service must be used.
 - 2. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, ac 20 Ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

3.03 Support Facilities Installation

- A. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.
- B. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
- C. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

3.04 Security and Protection Facilities Installation

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Architect.

- B. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- C. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.
- D. Provide open-mesh, chainlink fencing with posts set in a compacted mixture of gravel and earth or portable fencing, if appropriate, with sufficient hold down weight to prevent overturning.
- E. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- F. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- G. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.05 Operation, Termination, and Removal

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when 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 the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.
 - 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. 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 the temporary entrances, as required by the governing authority.

3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:

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Section 01 5713

Temporary Erosion and Sediment Control

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Performance bond.
- E. Compensation of City for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 PERFORMANCE REQUIREMENTS

- A. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.
- B. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
- C. Provide to City a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 100 percent of the cost of erosion and sedimentation control work.
- D. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- E. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
 - 1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
 - 2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.
- F. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
 - 1. Control movement of sediment and soil from temporary stockpiles of soil.
 - 2. Prevent development of ruts due to equipment and vehicular traffic.
 - 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to City.
- G. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
 - 1. Prevent windblown soil from leaving the project site.
 - 2. Prevent tracking of mud onto public roads outside site.
 - 3. Prevent mud and sediment from flowing onto sidewalks and pavements.
 - 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to City.
- H. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.

1. If sedimentation occurs, install or correct preventive measures immediately at no cost to City; remove deposited sediments; comply with requirements of authorities having jurisdiction.
 2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
- I. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to City; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- J. Open Water: Prevent standing water that could become stagnant.
- K. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Erosion and Sedimentation Control Plan:
1. Include:
 - a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
 - b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
 - c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
 - d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
 - e. Other information required by law.
 - f. Format required by law is acceptable, provided any additional information specified is also included.
 2. Obtain the approval of the Plan by authorities having jurisdiction.
 3. Obtain the approval of the Plan by City.
- C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.
- D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Mulch: Use one of the following:
1. Straw or hay.
 2. Wood waste, chips, or bark.
 3. Erosion control matting or netting.
- B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.

- C. Bale Stakes: One of the following, minimum 3 feet long:
 - 1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot.
 - 2. Wood, 2 by 2 inches in cross section.
- D. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
 - 1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
 - 2. Permittivity: 0.05 sec^{-1} , minimum, when tested in accordance with ASTM D4491.
 - 3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
 - 4. Tensile Strength: 100 lb-f, minimum, in cross-machine direction; 124 lb-f, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
 - 5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
 - 6. Tear Strength: 55 lb-f, minimum, when tested in accordance with ASTM D4533.
 - 7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
- E. Silt Fence Posts: One of the following, minimum 5 feet long:
 - 1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot.
 - 2. Softwood, 4 by 4 inches in cross section.
 - 3. Hardwood, 2 by 2 inches in cross section.
- F. Gravel: See Section 32 1123 for aggregate.
- G. Riprap: See Section 31 3700.
- H. Concrete: See Section 03 3000.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
 - 1. Width: As required; 20 feet, minimum.
 - 2. Length: 50 feet, minimum.
 - 3. Provide at each construction entrance from public right-of-way.
 - 4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- C. Linear Sediment Barriers: Made of silt fences.
 - 1. Provide linear sediment barriers:
 - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
 - 2. Space sediment barriers with the following maximum slope length upslope from barrier:
 - a. Slope of Less Than 2 Percent: 100 feet..
 - b. Slope Between 2 and 5 Percent: 75 feet.

- c. Slope Between 5 and 10 Percent: 50 feet.
- d. Slope Between 10 and 20 Percent: 25 feet.
- e. Slope Over 20 Percent: 15 feet.
- D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
 - 1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
 - 2. Straw bale row blocking entire inlet face area; anchor into pavement.
- E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.
- F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
- G. Soil Stockpiles: Protect using one of the following measures:
 - 1. Cover with polyethylene film, secured by placing soil on outer edges.
 - 2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.
- H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
 - 1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.
- I. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

- A. Traffic-Bearing Aggregate Surface:
 - 1. Excavate minimum of 6 inches.
 - 2. Place geotextile fabric full width and length, with minimum 12 inch overlap at joints.
 - 3. Place and compact at least 6 inches of 1.5 to 3.5 inch diameter stone.
- B. Silt Fences:
 - 1. Store and handle fabric in accordance with ASTM D4873.
 - 2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
 - 3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
 - 4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
 - 5. Install with top of fabric at nominal height and embedment as specified.
 - 6. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
 - 7. Fasten fabric to wood posts using one of the following:
 - a. Four nails per post with 3/4 inch diameter flat or button head, 1 inch long, and 14 gage, 0.083 inch shank diameter.
 - b. Five staples per post with at least 17 gage, 0.0453 inch wire, 3/4 inch crown width and 1/2 inch long legs.
 - 8. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.

9. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.
- C. Temporary Seeding:
 1. When hydraulic seeder is used, seedbed preparation is not required.
 2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
 3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
 4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
 5. Incorporate fertilizer into soil before seeding.
 6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
 7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
 8. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.
- C. Silt Fences:
 1. Promptly replace fabric that deteriorates unless need for fence has passed.
 2. Remove silt deposits that exceed one-third of the height of the fence.
 3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Clean out temporary sediment control structures weekly and relocate soil on site.
- E. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Architect.
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

End of Section

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Section 01 6000
Product Requirements

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Transportation, handling, storage and protection.
- B. Product option requirements.
- C. Substitution limitations and procedures.
- D. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 4000 - Quality Requirements: Product quality monitoring.
- B. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. DO NOT USE products having any of the following characteristics:
 - 1. Made using or containing asbestos
- C. Where all other criteria are met, Contractor shall give preference to products that:
 - 1. If used on interior, have lower emissions, as defined in Section 01 6116.
 - 2. If wet-applied, have lower VOC content, as defined in Section 01 6116.
 - 3. Have a published GreenScreen Chemical Hazard Analysis.

2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

- A. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- B. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Agrees to provide the same warranty for the substitution as for the specified product.

3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to City.
 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- C. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

3.02 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

End of Section

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Section 01 7000

Execution and Closeout Requirements

PART 1 GENERAL

1.01 QUALIFICATIONS

- A. For survey work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

1.02 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.

- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations; and site wall top of footing elevations.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

3.04 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-conforming work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.

- G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.
- I. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.06 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.07 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.08 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.09 FINAL CLEANING

- A. Use cleaning materials that are nonhazardous.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean filters of operating equipment.
- F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, drainage systems, and _____.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.10 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to City-occupied areas.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

End of Section

Section 01 7123
Field Engineering

PART 1 - GENERAL

1.01 Description

- A. Lay out and install the work to the lines and grades indicated and specified.
- B. Retain and pay expenses of a qualified civil engineer or land surveyor to establish on the site the required reference points and bench marks. Establish building lines and elevations, check structural framework for plumbness, and establish the required basic grid lines from which work of other SECTIONS shall be laid out.

1.02 Qualifications of Engineer or Surveyor - The engineer or land surveyor shall be licensed in the State of California and shall be acceptable to the Owner.

1.03 Survey Reference Points

- A. Existing basic horizontal and vertical control points for the Project are indicated on the Horizontal Control Plan and Grading and Drainage Plan .
- B. Locate and protect control points prior to starting site work, and preserve permanent reference points during construction.
 - 1. Make no changes or relocations without prior written notice from the City's Representative and Architect.
 - 2. Report to the City's Representative and Architect if a reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 - 3. Require the civil engineer or land surveyor to replace control points which become lost or destroyed; base replacements on original survey control.

1.04 Project Survey Requirements

- A. Establish and maintain lines and levels, locate and lay out:
 - 1. Site Improvements
 - a. Stakes for grading, fill, and topsoil placement
 - b. Utility slopes and invert elevations
 - 2. Batter boards for structures
 - 3. Building foundations, column locations, floor level, and retaining walls.
 - 4. Controlling lines and levels required for mechanical and electrical work
- B. From time to time verify layouts

1.05 Records

- A. Maintain a complete, accurate log of control and survey work as it progresses.

1.06 Submittals

- A. Submit name and address of civil engineer or land surveyor.
- B. Upon request, submit documentation to verify accuracy of field engineering work.

PART 2 - PRODUCTS - NOT USED.

PART 3 - EXECUTION - NOT USED.

End of Section

Section 01 7135

Restroration of Improvements

PART 1 - GENERAL

1.01 Structures

- A. The Contractor shall carefully cut and or remove such existing structures, utilities, and improvements as required to complete the work, including but not limited to: curbs, gutters, pipelines, sidewalks and utility poles, as may be necessary for the performance of the work and shall rebuild the structures thus removed in as good a condition as found. The Contractor shall also repair existing structures or improvements, which may be damaged as a result of the work under this contract.

1.02 Roads and Streets

- A. Unless otherwise specified, roads and streets in which the surface is removed, broken, or damaged, or in which the ground has caved or settled during the work under this contract, shall be resurfaced and brought to the original grade and section by the Contractor. Roadways used by the Contractor shall be cleaned and repaired to local County and State Standards. Before resurfacing material is placed, edges of pavements shall be trimmed back far enough to provide clean solid, saw-cut vertical faces, and shall be free of loose material.

1.03 Cultivated Areas and Other Surface Improvements

- A. Cultivated or planted areas and other surface improvements which are damaged by actions of the Contractor shall be restored to their original condition or better.
- B. Existing guard posts, barricades, and fences shall be protected and replaced if damaged.
- C. Special attention shall be given to avoid trees, bushes and shrubs not indicated for removal.

1.04 Protection of Existing Installations

- A. The Contractor shall immediately correct or replace existing equipment, controls or systems that are damaged as a result of his operations.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

End of Section

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Section 01 7329
Cutting and Patching

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Procedures for cutting and patching as may be required to complete the work of this project.

1.02 RELATED SECTIONS

- A. Section 01 5000 - Construction Facilities and Temporary Controls
- B. Section 01 7135 - Restoration of Improvements
- C. Section 01 7420 - Cleaning
- D. Section 01 7419 - Construction Waste Management & Disposal

1.03 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 surfaces to original conditions after installation of other Work.

1.04 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- C. Miscellaneous Elements: Do not cut or patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
- D. Visual Requirements: Do not cut or patch in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.01 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 in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. 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.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.03 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 1. Cut 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. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original installer, comply with original installer's written recommendations.
 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean, piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

End of Section

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Section 01 7419

Construction Waste Management and Disposal

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. City requires that this project generate the least amount of trash and waste possible with the goal of diverting 70% of waste from the landfill.
- B. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- C. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- D. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- E. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
- F. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. Section 01 5000 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.
- C. Section 01 6000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- D. Section 01 7000 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.03 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

- A. Submit Waste Management Plan within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to landfilling.
- B. Waste Management Plan: Include the following information:
 - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
 - 2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
 - 3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
 - 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
 - 5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
 - 6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
- C. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
 - 1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.

2. Submit Report on a form acceptable to City.
3. Landfill Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
 - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
4. Recycled and Salvaged Materials: Include the following information for each:
 - a. Identification of material, including those retrieved by installer for use on other projects.
 - b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
 - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
5. Material Reused on Project: Include the following information for each:
 - a. Identification of material and how it was used in the project.
 - b. Amount, in tons or cubic yards.
 - c. Include weight tickets as evidence of quantity.
6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

- A. Waste management and diversion goals may be achieved by the following methods:
 1. Roll Off Waste Container: Contractor may hire a company which provides a roll off waste container which is then sorted off site.
 2. On Site Sorting: Contractor to sort waste on site.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, City, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
 1. Pre-bid meeting.
 2. Pre-construction meeting.
 3. Regular job-site meetings.

- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 - 1. Provide containers as required.
 - 2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 - 3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

End of Section

Section 01 7420

Cleaning

PART 1 GENERAL

1.01 Section Includes

- A. Cleaning throughout the construction period, and final project cleaning prior to the acceptance tour.

1.02 Related Sections

- A. Section 01 5000 - Construction Facilities and Temporary Controls

1.03 Quality Assurance

- A. Inspection: Conduct daily inspection, and more often if necessary, to verify that requirements of cleanliness are being met.
- B. Codes and Standards: In addition to the requirements specified herein, comply with pertinent requirements of authorities having jurisdiction.

PART 2 PRODUCTS

2.01 Cleaning Materials and Equipment

- A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.02 Compatibility

- A. Use cleaning materials and equipment that are compatible with the surfaces being cleaned, as recommended by the manufacturer of the material to be cleaned.

PART 3 EXECUTION

3.01 Progress Cleaning

- A. General:
 - 1. Retain stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.
 - 2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this work. Debris shall be removed from the site and disposed of in a lawful manner. Disposal receipts or dump tickets shall be furnished to Architect upon request.
 - 3. At least twice each month, and more often if necessary, remove scrap debris, and waste material from the job site.
 - 4. Provide adequate storage for items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.
- B. Site:
 - 1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove items to the place designated for their storage. Combustible waste shall be removed from the site. Flammable waste shall be kept in sealed metal containers until removed from the site.
 - 2. Weekly, and more often if necessary, inspect, arrangements of materials stored on the site; restack, tidy, or otherwise service arrangements to meet the requirements specified above.
 - 3. Maintain the site in a neat and orderly condition.
- C. Structures:

1. Weekly, and more often if necessary, inspect the structures and pick up scrap, debris, and waste material. Remove items to the place designated for their storage.
 2. Weekly, and more often if necessary, sweep interior spaces clean.
 - a. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a handheld broom, i.e., "broom-clean".
 3. As required preparatory to installation of succeeding materials, clean the structures of pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the required cleanliness.
 4. Following the installation of finish floor materials, clean the finish floor daily, and more often if necessary, and while work is being performed in the space in which finish materials have been installed.
 - a. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from foreign material that, in the opinion of the Architect, may be injurious to the finish floor material, i.e., "vacuum-clean".
 - b. Final Cleaning
- D. General: The General Conditions require general cleaning during construction. Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste, conduct final progress cleaning as described below.
- E. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions. Unless otherwise specifically directed by the Architect, water and broom clean paved areas on the site and public paved areas directly adjacent to the site. Remove resultant debris
- F. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
1. Remove labels that are not permanent labels.
 2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
- G. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces. Sweep and mop vinyl and rubber surfaces.
- H. Structures:
1. Exterior: In areas affected by the work under this contract, visually inspect exterior surfaces and remove traces of soil, waste material, smudges, and other foreign matter. Remove traces of splashed material from adjacent surfaces. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure.
 2. In the event of stubborn stains not removable with water, the Architect may require light sandblasting or other cleaning at no additional cost to the City.
- I. Interior: In areas affected by the work under this contract, visually inspect interior surfaces and remove traces of soil waste material, smudges, and other foreign matter. Remove traces of splashed materials from adjacent surfaces. Remove paint drippings, spots, stains, and dirt from finished surfaces. Use only the cleaning materials and equipment instructed by the manufacturer of the surface material.

- J. Glass: Clean glass inside and outside.
- K. Polished surfaces: On surfaces requiring the routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished. Glossy surfaces shall be cleaned and shined as intended by the manufacturer
 - 1. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - 2. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
- L. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests.
- M. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- N. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the City's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.
- O. Extra Materials: Where extra materials of value remain after completion of associated Work, they become the City's property. Dispose of these materials as directed by the Owner.
- P. Timing: Schedule final cleaning as accepted by the Architect to enable the City to accept a completely clean project.
- Q. Cleaning During City's Occupancy
 - 1. Should the City occupy the work or any portion thereof prior to its completion by the Contractor and acceptance by the City, responsibilities for interim and final cleaning of the occupied spaces shall be determined by the Architect in accordance with the General Conditions of the Contract.

End of Section

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Section 01 7700
Contract Closeout

PART 1 - GENERAL

1.01 Requirements Included

- A. Closeout Procedures.
- B. Project Record Documents.
- C. Operation and Maintenance Data.
- D. Guaranties, Warranties, Bonds and Waivers.
- E. Spare Parts and Maintenance Materials.

1.02 Related Requirements

- A. General Conditions: Fiscal provisions, legal submittals and other administrative requirements.
- B. Section 01 1100 - Summary of Work
- C. Section 01 3300 - Submittals
- D. Section 01 7135 - Restoration of Improvements
- E. Section 01 7420 - Cleaning

1.03 Closeout Procedures

- A. Comply with procedures stated in General Conditions of the Contract.
- B. When Contractor considers work has reached substantial completion, submit written certification that work is ready for inspection.

1.04 Removal of Utilities, Facilities, and Controls

- A. Each trade/subcontractor responsible for installation shall be responsible for and not limited to the following:
 - 1. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to final application for payment inspection.
 - 2. Remove unused or temporary underground utilities or installations completely.
 - 3. Clean and repair damage caused by installation or use of temporary work.
 - 4. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.05 Project Record Drawings and Specifications

- A. General
 - 1. Maintain, on daily basis, record drawings showing "as-builts" conditions of project; subject to monthly review by Architect, Construction Manager, or City.
 - 2. Store documents separate from those used for construction.
 - 3. At time of installation, installed locations of all work relating to above and underground utilities, architectural, structural, heating, ventilation, air conditioning, plumbing, electrical, and other scopes of work as may be required, shall be recorded on prints by Contractor, and reviewed with the Owner. Do not conceal work until required information is recorded.
 - 4. The Contractor will transfer installed locations to reproducible prints and submit prints for review by Architect through the Construction Manager.
 - a. All information entered on reproducible prints shall be neat, legible, and emphasized by drawing "balloons" around changed items.

- b. Locate and dimension all work, including stubs for future connections, with reference to permanent landmarks or buildings and indicate approximate depth below finish grade.
 - c. Symbols and designations used in preparing record drawings shall match those used in Contract Drawings.
 5. Prior to final inspection, submit project record documents with transmittal letter containing date, project title, Contractor's name and address, list of documents and signature of Contractor.
 - a. Failure of the Contractor to comply with this section in total or in part may constitute reason for the withholding of all or part of the monthly progress payment due the Contractor for that month.
 6. Prior to processing the Contractor's monthly payment request, Construction Manager, Architect, or City's Representative will meet with the Contractor to review and verify that the Record Documents have been updated.
 7. Label and date each Record Drawing "RECORD DOCUMENT" in legibly printed letters.
- B. Record Drawing Information:
 1. Record the following information:
 - a. Locations of work buried under or outside each building, such as plumbing and electrical lines and conduits.
 - b. Actual numbering of each electrical circuit.
 - c. Locations of significant work concealed inside each building whose general locations are changed from those shown on the Contract.
 - d. Locations of all items, not necessarily concealed, which vary from the Contract Documents.
 - e. Installed location of all cathodic protection anodes.
 - f. Deviations from the sizes, locations and other features of installation shown in the Contract Documents.
 - g. Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stubouts, invert elevations, etc.
 - h. Sufficient information to locate work concealed in each building with reasonable ease and accuracy; in some instances, this may be by dimension. In others, it may be in relation to the spaces in the building near which it was installed.
 2. Provide additional drawings as necessary for clarification.
- C. Record Specifications
 1. City's Representative will provide Contractor with one (1) set of Contract Specifications, which shall be labeled "Record Document" in legible letters.
 2. Mark each section legibly to record manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.

1.06 Operation and Maintenance Data

- A. Provide data for other Sections as required by the Contract Documents.
- B. Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch three ring side binders with durable plastic covers; with identification on, or readable through, front cover stating general nature of manual.
- C. Provide a separate volume for each system, with a table of contents and index tabs for each volume; all material neatly typewritten; each volume containing:

1. Part 1: Directory, listing names, addresses and telephone numbers of City's Representative and Contractor; and index furnishing complete information as to location in manual of all emergency data regarding installation.
2. Part 2: Operation and maintenance instructions, arranged by system. For each system, give names, addresses and telephone numbers of subcontractors and suppliers; and include the following:
 - a. List of equipment.
 - b. Parts list; including complete nomenclature and names and address of nearest vendor of parts.
 - c. Detailed operating instructions.
 - d. Maintenance instructions, equipment, including routine maintenance cards with time frequency of routine maintenance noted.
 - e. Maintenance instructions, finishes.
 - f. Shop drawings and product data, including changes made during construction.
 - g. Copies of Guaranties/Warranties.
- D. Extraneous Data: Where contents of manuals include manufacturers' catalog pages, clearly indicate precise items included in this installation and delete, or otherwise clearly indicate, all manufacturer's data with which this installation is not concerned.
- E. Final inspection will not be scheduled until all maintenance/operating manuals are delivered to the District Representative.
- F. Contractor will be responsible for training of City's personnel for operation of all building systems.

1.07 Guaranties, Warranties, and Bonds

- A. Standard Guarantee: Guarantee all work executed under this Contract to be free of all defects of work quality and materials for a period of one (1) year after completion and acceptance by the City. Refer to General Conditions.

1.08 Spare Parts and Maintenance Materials Extra Stock

- A. Provide products, spare parts, and maintenance materials in guaranties specified in each section, in addition to that used for construction of work. Coordinate with the Construction Manager and deliver to project site. Provide with a detailed transmittal and obtain receipt prior to final payment.

End of Section

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Section 01 7900

Demonstration and Training

PART 1 GENERAL

1.01 SUMMARY

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures; except:
 - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
 - 2. Submit one copy to the Commissioning Authority, not to be returned.
 - 3. Make commissioning submittals on time schedule specified by Commissioning Authority.
 - 4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2003 preferred.

1.03 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
 - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

End of Section

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Section 02 4100

Demolition

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements such existing concrete, sidewalks and curb/gutter as as shown on the Demo/Site Preparation Plan.
- B. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 5713 - Temporary Erosion and Sediment Control.
- D. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- E. Section 01 7419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.
- F. Section 31 2200 - Grading: Topsoil removal.
- G. Section 31 2323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fill Material: As specified in Section 31 2323 - Fill.

PART 3 EXECUTION

3.01 SCOPE

- A. Remove paving and curbs as required to accomplish new work.
- B. Remove other items indicated, for removal.
- C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 2200.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with other requirements specified in Section 01 7000.
- B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Comply with applicable requirements of NFPA 241.
 - 3. Use of explosives is not permitted.

4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 5. Provide, erect, and maintain temporary barriers and security devices.
 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 8. Do not close or obstruct roadways or sidewalks without permit.
 9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
 10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- C. Do not begin removal until receipt of notification to proceed from City.
- D. Protect existing structures and other elements that are not to be removed.
1. Provide bracing and shoring.
 2. Prevent movement or settlement of adjacent structures.
 3. Stop work immediately if adjacent structures appear to be in danger.
- E. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- F. If hazardous materials are discovered during removal operations, stop work and notify Architect and City; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- G. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to City.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to City.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
1. Verify that construction and utility arrangements are as indicated.
 2. Report discrepancies to Architect before disturbing existing installation.

3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Protect existing work to remain.
 1. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 2. Repair adjacent construction and finishes damaged during removal work.
 3. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

End of Section

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Section 03 0505
Underslab Vapor Barrier

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sheet vapor barrier under concrete slabs on grade.

1.02 RELATED REQUIREMENTS

- A. Section 03 1000 - Concrete Forming and Accessories: Forms and accessories for formwork.
- B. Section 03 2000 - Concrete Reinforcing.
- C. Section 03 3000 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

1.03 REFERENCE STANDARDS

- 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; 2011.
- B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products.
- C. Samples: Submit samples of underslab vapor barrier to be used.
- D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Underslab Vapor Barrier:
 - 1. Water Vapor Permeance: Not more than 0.010 perms, maximum.
 - 2. Thickness: 15 mils.
 - 3. Basis of Design:
 - a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil):
www.stegoindustries.com.
- B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

3.02 INSTALLATION

- A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
- B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.
- C. Lap joints minimum 6 inches.

- D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.
- E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.
- F. Repair damaged vapor retarder before covering with other materials.

End of Section

Section 03 1000

Concrete Forming and Accessories

PART 2 PRODUCTS

1.01 FORMWORK - GENERAL

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

End of Section

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Section 03 2000

Concrete Reinforcing

PART 2 PRODUCTS

1.01 REINFORCEMENT

1.02 FABRICATION

End of Section

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Section 03 3000

Cast-in-Place Concrete

PART 2 PRODUCTS

End of Section

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Section 03 3511

Concrete Floor Finishes

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface treatments for concrete floors and slabs.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with concrete floor placement and concrete floor curing.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

End of Section

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Section 04 2000

Unit Masonry

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete Block.
- B. Mortar and Grout.
- C. Reinforcement and Anchorage.

1.02 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.

2.02 MORTAR AND GROUT MATERIALS

- A. Packaged Dry Material for Mortar for Unit Masonry: Premixed masonry cement and mason's sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Type N.
 - 2. Color: Standard gray.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: Type specified in Section 03 2000; size as indicated on drawings; galvanized finish.
- B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- C. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M, Class 3; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

2.04 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Exterior, non-loadbearing masonry: Type N.

PART 3 EXECUTION

3.01 EXAMINATION

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

- B. Verify that related items provided under other sections are properly sized and located.

3.02 COLD AND HOT WEATHER REQUIREMENTS

3.03 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Mortar Joints: Concave.

3.04 PLACING AND BONDING

- A. Lay hollow masonry units with face shell bedding on head and bed joints.
- B. Remove excess mortar and mortar smears as work progresses.
- C. Interlock intersections and external corners, except for units laid in stack bond.
- D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- F. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

3.05 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

3.06 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

3.07 CUTTING AND FITTING

- A. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.08 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Clean soiled surfaces with cleaning solution.

End of Section

Section 04 7200
Cast Stone Masonry

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural cast stone.
- B. Units required are:
 - 1. Exterior wall units, including wall caps, coping, and sills.

1.02 RELATED REQUIREMENTS

- A. Section 04 2000 - Unit Masonry: Installation of cast stone in conjunction with masonry.
- B. Section 07 9200 - Joint Sealants: Sealing joints indicated to be left open for sealant.
- C. Section 06 1000 (06100) - Rough Carpentry

1.03 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- D. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.
- E. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- F. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- G. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- H. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.
- I. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2010b.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Test results of cast stone components made previously by the manufacturer.
- C. Mortar Color Selection Samples.
- D. Verification Samples: Pieces of actual cast stone components not less than 12 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.
- E. Full-Size Samples: One unit of each shape, for review.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm with a minimum of 5 years of experience in producing cast stone of the types required for project and:
 - 1. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
 - 2. Products previously produced by plant and exposed to weather that exhibit satisfactory appearance.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- B. Store cast stone components and installation materials in accordance with manufacturer's instructions.
- C. Store cast stone components on pallets with non-staining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- D. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- E. Store mortar materials where contamination can be avoided.
- F. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Architectural Cast Stone:
 - 1. Coronado Stone Products.
 - 2. Boral.
 - 3. Architect Preapproved Equal.

2.02 ARCHITECTURAL CAST STONE

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural stone, complying with ASTM C1364.
 - 1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
 - 2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C 1364.
 - 3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
 - 4. Color: Match Aspen.
 - 5. Manufacturer: Coronado Stone Products
 - a. Size: Sizes and Shapes: Random sizes, shapes and textures to duplicate natural stone. Stone module sizes: 1 inches to 4 inches height; 4 inches to 16 inches length and 1-1/4 inches to 2 inches thick.
 - b. Remove cement film from exposed surfaces before packaging for shipment.
 - c. Compressive Strength: ASTM C 192 and ASTM C39, 1800 psi (12.4 MPa), 5 specimen average, 1500 psi (10.3 MPa) minimum for individual unit.
 - d. Bond Between Stone Unit, Type S Mortar, and Backing: ASTM C 482, 50 psi (345 kPa).
 - e. Thermal Resistance: ASTM C 177, R-factor, 0.355 per inch (25.4 mm) of thickness.
 - f. Freeze/Thaw: ASTM C 67, no disintegration and less than 3 percent weight loss.
 - g. Fire Hazard Test, UL 723:
 - 1) Flame spread: 0.
 - 2) Smoke Development: 0.
 - h. Maximum Veneer Unit Weight: 15 psf (73 kg/m2).
 - 6. Architectural Trim: Architectural Trim Stone by Coronado Stone Products
 - a. Light Fixture Box Stones-Chamfered Edge with Grooved Border:

- 1) Color: To match adjacent veneer
 - 2) Size: 9 inches by 15 inches, 8 inches by 10-1/4 inches, or as shown on Drawings.
 - 3) Provide 4 inches by 1-1/2 inches (115 mm) UL approved metal octagon extension box.
 - b. Hose Bib Stone-Chamfered Edge by Coronado Stone Products
 - 1) Color: to match adjacent veneer.
 - 2) Size: 4 inches by 4 inches.
 - 3) Opening size: 1-1/2 inch diameter.
 - c. Electrical Box Stones-Raised Chamfered Edge:
 - 1) Color: to match adjacent veneer.
 - 2) Size: 6-1/4 inches by 8 by 1-1/2 inches.
 - 3) Provide single receptacle 2 inches by 4 inches by 1-1/2 inches UL approved metal extension box.
- B. Shapes: Provide shapes indicated on drawings.
 1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
 2. Unless otherwise indicated on drawings, provide:
 - a. Wash or slope of 1:12 on exterior horizontal surfaces.
 - b. Drips on projecting components, wherever possible.
 - c. Raised fillets at back of sills and at ends to be built in.
- C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.

2.03 MATERIALS

- A. Portland Cement: ASTM C150/C150M.
 1. For Mortar: Type I or II, except Type III may be used in cold weather.
- B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
- D. Admixtures: ASTM C494/C494M.
- E. Water: Potable.
- F. Weather Resistant Barrier: to match cement plaster system. Kraft waterproof building paper UBC Standard No 14-1 at a minimum.
- G. Metal Lath: 3.4 lb (1.8 kg/m²) galvanized expanded rib lath.
- H. Fasteners: Into Wood Studs: Minimum 0.120 inch (3 mm) shank diameter galvanized nails or staples of sufficient length to penetrate 1-3/8 inches (35 mm) minimum into the stud.
- I. Reinforcing Bars: ASTM A615/A615M deformed bars, galvanized.
 1. Galvanized in accordance with ASTM A767/A767M, Class I.
- J. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- K. Mortar: Portland cement-lime, ASTM C270, Type N; do not use masonry cement.
- L. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or

damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

- M. Sealer: Apply sealer at all cast stone. Sealer to be provided by stone manufacturer that provides cast stone.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
- B. Do not begin installation until unacceptable conditions have been corrected.
- C. Protect surrounding work from damage by work in this section.
- D. Verify that all receptacles and miscellaneous items (moldings, hose bibs, etc.) are acceptable

3.02 INSTALLATION

- A. Mechanically anchor cast stone units indicated; set remainder in mortar.
- B. Setting:
 - 1. Drench cast stone components with clear, running water immediately before installation.
 - 2. Set units in a full bed of mortar unless otherwise indicated.
 - 3. Fill vertical joints with mortar.
- C. Joints: Install joints per manufacturers installation instructions.
 - 1. NO VERTICAL STONES.
 - 2. Horizontal Joints: no longer than 4 feet to 6 feet depending on stone.
 - 3. Vertical Joints: no higher than 6 inches higher than largest stone.
- D. Installation Tolerances:
 - 1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
 - 2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
 - 3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
 - 4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.03 CLEANING

- A. Repair chips and other surface damage noticeable when viewed in direct daylight at 10 feet.
 - 1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
 - 2. Repair methods and results subject to Architect 's approval.
- B. Keep cast stone components clean as work progresses.
 - 1. Remove excess mortar and smears using a wire brush or steel wool within 1 to 2 hours of installation.
 - 2. NO ACID CLEANERS.
 - 3. Leave surfaces thoroughly clean and free of mortar and other soiling.

3.04 PROTECTION

- A. Protect completed work from damage.

End of Section

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Section 05 1200

Structural Steel Framing

PART 2 PRODUCTS

1.01 MATERIALS

End of Section

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Section 05 5000
Metal Fabrications

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel and aluminum items.

1.02 RELATED REQUIREMENTS

- A. Section 06100 - Rough Carpentry
- B. Section 06410 - Custom Cabinets
- C. Section 09 9113 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- D. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- H. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- I. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- J. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- D. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

- F. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

- A. Extruded Aluminum: ASTM B 221 (ASTM B 221M), 6063 alloy, T6 temper.
- B. Bolts, Nuts, and Washers: Stainless steel.

2.03 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

- A. Aluminum Tube Trellis Assembly
 - 1. Manufacturer: The design is based on the products of Dittmer, Ditt-Shade, (800-822-1755) as a standard of quality.
 - 2. Type: Extruded aluminum components in dark bronze anodized finish
 - 3. Size: As shown on the drawings.
 - 4. Substitutions: Reviewed per Section 01 6000.
- B. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
- C. All support and opening steel components required for Bi-Folding Apparatus Bay Doors, finish to match bi folding apparatus bay doors.
- D. All support and opening steel components required for Sectional Overhead doors, finish to match adjacent wall surface.
- E. Steel countertop support bracket: 1/4" thick minimum steel angle as detailed on drawings, prime paint finish.
- F. Steel Bracket for Wood Benches: 1/4" thick minimum steel angle as detailed on drawings, prime paint finish.
- G. Fabricated Steel Hanging Rod and Supports: as detailed on drawings. Grind all welds. Prime paint finish all parts, except hanging rod to be stainless steel to fit standard hanger size.

2.05 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete or masonry.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FINISHES - ALUMINUM

- A. Class I Color Anodized Finish: AAMA 611 AA-C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick; dark bronze.

2.07 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS D1.1/D1.1M.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.
- E. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
- F. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply or brush or spray to provide minimum dry film thickness of 0.051 mm (2.0 mils).
- G. At all galvanized products, clean all damaged areas and re-coat using specified galvanizing coating per manufacturer's criteria.

3.04 TOLERANCES

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

End of Section

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Section 05 5213
Pipe and Tube Railings

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall mounted handrails.
- B. Stair railings and guardrails.
- C. Cable guardrail system with tube rails.
- D. Mezzanine railings, guardrails and handrail.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 (06100) - Rough Carpentry
- B. Section 06 2000 - Finish Carpentry: Wood handrail.
- C. Section 09 2116 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.
- D. Section 09 9113 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- B. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.
- C. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- D. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- C. Samples: Submit two, 6 inch long samples of handrail. Submit two samples of elbow, wall bracket, and end stop.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.
- B. Design railing assembly, wall rails, and attachments to resist lateral force of 75 lbs at any point without damage or permanent set. Test in accordance with ASTM E 935.
- C. Allow for expansion and contraction of members and building movement without damage to connections or members.
- D. Dimensions: See drawings for configurations and heights.
 - 1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
 - 2. Intermediate Rails: 1-1/2 inches diameter, round.
 - 3. Posts: 1-1/2 inches diameter, round.

- E. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to stud walls, provide backing plates, for bolting anchors.
- F. Provide slip-on non-weld mechanical fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 STEEL RAILING SYSTEM

- A. Steel Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.
- B. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.03 CABLE GUARDRAIL SYSTEM

- A. Material: 1 x 19, Type 316 stainless steel strand, left-hand lay, per dimensional properties contained in MIL-W-87161.
- B. Finish: Mill, color to be selected from manufacturer's standard selection.
- C. Diameter: 1/4 inch., minimum breaking strength 6,900 pounds.
- D. Orientation: Horizontal
- E. Spacing: 3 inches on center maximum.
- F. Hardware: (Provide all items required for a complete system)
 - 1. Tensioner end receivers: Invisiware system by Ultra-tec or Equal
 - a. Threaded swaging stud for tension
 - 2. Sloped Cable: Provide sloped washer at all areas of sloped cables
 - 3. Intermediate cable bracing: Provide at 26 inches on center maximum.
 - 4. Hardware Material: Stainless Steel, ASTM A276 and A479, SAE/AMS QQ-S-763, Type 316.

2.04 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete with setting templates, for installation as work of other sections.
- C. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Anchor railings securely to structure.
- D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

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

End of Section

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Section 06 1000
Rough Carpentry

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sheathing.
- B. Roofing nailers.
- C. Concealed wood blocking, nailers, and supports.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
- B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

End of Section

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Section 06 1753

Shop-Fabricated Wood Trusses

PART 1 GENERAL

1.01 QUALITY ASSURANCE

PART 2 PRODUCTS

2.01 TRUSSES

- A. Wood Trusses: Designed and fabricated in accordance with TPI 1 and TPI DSB-89 to achieve structural requirements indicated.

2.02 MATERIALS

- A. Lumber:
 - 1. Moisture Content: Between 7 and 9 percent.
 - 2. Lumber fabricated from old growth timber is not permitted.
- B. Truss Bridging: Type, size and spacing recommended by truss manufacturer.

PART 3 EXECUTION

3.01 ERECTION

- A. Install trusses in accordance with manufacturer's instructions and TPI DSB-89 and TPI BCSI 1; maintain a copy of each TPI document on site until installation is complete.
- B. Set members level and plumb, in correct position.
- C. Install permanent bridging and bracing.

End of Section

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Section 06 2000
Finish Carpentry

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood casings and moldings.
- C. Wood Shower Bench Slats

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 06 4100 - Architectural Wood Casework: Shop fabricated custom cabinet work.
- C. Section 09 9113 - Exterior Painting: Painting and finishing of finish carpentry items.

1.03 REFERENCE STANDARDS

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- B. ANSI A208.1 - American National Standard for Particleboard; 2009.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- D. NHLA G-101 - Rules for the Measurement & Inspection of Hardwood & Cypress; 2011.
- E. WI (MAN) - Manual of Millwork; Woodwork Institute; 2003.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
- C. Samples: Submit two samples of wood trim 12 inch long.

1.05 QUALITY ASSURANCE

- A. Grade materials in accordance with the following:
 - 1. Softwood Lumber: In accordance with rules certified by ALSC; www.alsc.org.
 - 2. Plywood: Certified by the American Plywood Association.
 - 3. Hardwood Lumber: In accordance with NHLA Grading Rules; www.natlhardwood.org.
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire retardant requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

1.08 PROJECT CONDITIONS

- A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- B. Coordinate the work with installation of associated and adjacent components.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Unless otherwise indicated provide products of quality specified by AWI Architectural Woodwork Quality Standards Illustrated for Premium grade.
- B. Interior Woodwork Items:
 - 1. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

2.03 LUMBER MATERIALS

- A. Softwood Lumber: pine species, smooth sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
- B. Hardwood Lumber: Birch species, smooth sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
 - 1. Grading: In accordance with NHLA G-101 Grading Rules; www.natlhardwood.org.

2.04 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.05 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. Finish work in accordance with Woodwork Institute Manual of Millwork, Section 5, System #7a - synthetic enamel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Set and secure materials and components in place, plumb and level.
- B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

End of Section

Section 06 4100
Architectural Wood Casework

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Cabinet hardware.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 05500 - Metal Fabrications
- C. Section 07900 - Joint Sealers
- D. Division 15 Plumbing and Mechanical
- E. Division 16 Electrical

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- C. ASTM D 1037 - 99 Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
- D. WI (MAN) - Manual of Millwork; Woodwork Institute; 2003.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes. Shop Drawings shall have WI, Certified Compliance Label affixed to first page of drawing set.
- C. Product Data: Provide data for hardware accessories. Provide MSDS Sheets for all composite wood and agrifiber products, adhesives, and sealants used.
- D. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, locksets, and plastic laminates, demonstrating hardware design, quality, and finish.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with WI Manual of Millwork, Custom quality, unless other quality is indicated for specific items. The millwork supplier shall issue a W.I. Certificate Compliance Certificate indicating the grade of millwork products to be furnished for this job and certifying that they will fully meet all the requirements of the grade specified. Each unit of casework shall bear the W.I. Certificate Compliance label. Each plastic laminate countertop shall bear the W.I. Certified Compliance label. Upon the completion of the installation, a W.I. Certified Compliance shall be issued for the installation. The type of construction used must meet the seismic force requirements of Title 24.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.
- B. Delivery shall only be made when the area of operation is enclosed, all wet work is dry, all overhead work is complete, and the area broom clean.

1.07 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.
- B. The HVAC system shall be on and functioning, and the architectural millwork shall be acclimated to these conditions for 72 hours prior to installation.

PART 2 PRODUCTS

2.01 CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

2.02 LUMBER MATERIALS

- A. Softwood Lumber: NIST PS 20; Graded in accordance with WI Manual of Millwork, Grade II/Custom; average moisture content of 5-10 percent; species as recommended by manufacturer.

2.03 PANEL MATERIALS

- A. Hardwood Faced Plywood: HPVA HP-1; graded in accordance with WI Manual of Millwork, core of lumber; exterior glue ; thickness 3/4";
 - 1. Exposed Open Shelving
 - 2. Semi Exposed Shelving
- B. Particleboard shall not be used
- C. Medium Density Fiberboard (MDF): ANSI A208.2; type as specified in WI Manual of Millwork; composed of wood fibers pressure bonded with moisture resistant formaldehyde free adhesive to suit application; sanded faces; thickness as required.
 - 1. Medex, as manufactured by Sierra Pine or approved equal
 - 2. Located at all casework construction, except as identified above.

2.04 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. Formica Corporation; ____: www.formica.com.
 - 2. Panolam Industries International, IncNevamar; ____: www.nevamar.com.
 - 3. Wilsonart; ____: www.wilsonart.com.
 - 4. Or approved equal, prior to bidding
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for all exposed applications as scheduled.
- C. Melamine finish at all semi-exposed cabinet shelving, divisions an faces.
- D. Interior faces of cabinet doors to be faced with the same material as exposed surfaces.

2.05 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Plastic Edge Banding: Extruded PVC, convex shaped; smooth finish; self-locking serrated tongue; of width to match component thickness.
- C. Fasteners: Size and type to suit application.
- D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

- E. Concealed Joint Fasteners: Threaded steel.
- F. Grommets: Standard plastic grommets for cut-outs, in color to match adjacent surface.

2.06 HARDWARE

- A. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards and coordinated self-rests, satin finish, for nominal 9/16 inch spacing adjustments.
 - 1. Standards, SP-1820, manufactured by Sugatsune or approved equal.
 - 2. Supports; SP-15, manufactured by Sugatsune or approved equal.
- B. Drawer and Door Pulls: matte chrome zinc alloy pull handle.
 - 1. Product: EG-36160 MC manufactured by Sugatsune or approved equal
- C. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with satin finish.
 - 1. Pin tumbler cylinder cam lock, National Lock 8102 Series or approved equal.
 - 2. Keying as selected. All locks shall be installed in a hole shaped the same shape as the cylinder of the lock to eliminate rotation. Round lock cylinders installed in round holes will not be allowed.
 - 3. Cabinet locks are to be installed at the following cabinet doors with the following requirements:
 - a. All locks will be keyed with one master key and one unique key.
 - b. Provide 4 copies of each unique key and a total of eight copies of the master key.
 - c. Bunkroom Lockers: Unique keys for each locker door.
 - d. Kitchen Pantry Cabinets: Unique keys for each separate full height "pantry" cabinet door.
- D. Catches: Magnetic.
 - 1. Product: MC0099 manufactured by Sugatsune
 - 2. Product: 323A92 manufactured by Ives
 - 3. Substitutions: See Section 01600 - Product Requirements.
- E. Drawer Slides:
 - 1. Type: Full extension.
 - 2. Static Load Capacity: Commercial grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Features: Provide self closing/stay closed type.
 - 6. Manufacturers:
 - a. Accuride International, Inc; ____: www accuride.com.
 - b. Knappe & Vogt Manufacturing Company; ____: www.knappeandvogt.com.
 - c. _____.
 - d. Hettich:
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- F. Hinges: European style concealed self-closing type, steel with polished finish.
 - 1. Manufacturers:
 - a. _____.
 - b. Or approved equal,
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- G. Countertop Support Brackets:
 - 1. Product: BTK -480 manufactured by Sugatsune or approved equal
 - a. Color: Black

- b. Capacity: 181 lbs
- H. Silencers: Clear vinyl silencers to be installed at each cabinet door
- I. Countertop Cable Grommets:
 - 1. Color: Black
 - 2. Diameter: 3"
 - 3. Features: Grommet to include cap
- J. Countertop Trash Grommet
 - 1. Stainless Steel, 6" diameter, 6" depth, Manufacturer Doug Mockett & Company or approved equal.
- K. Wardrobe Hook
 - 1. # 582 Double, Aluminum, Manufactured by Ives or approved equal.

2.07 FABRICATION

- A. Cabinets shall be fabricated to Woodwork Institute standards
 - 1. Grade: Premium
- B. Cabinet Style: Flush overlay.
- C. Cabinet Doors and Drawer Fronts: Flush style.
- D. Exceptions to WI standards
 - 1. Wall Hung Cabinets : Depth 14 inches
 - 2. Storage, Janitor, Closet and Utility Room Cabinets shall be of the same construction as typical cabinets.
 - 3. Shelves shall be designed as per schools and libraries, for a 50lb per square foot live load as per table 15-1.
 - 4. Exterior Edges: Include doors, drawer fronts, and front edge of vertical end panels and leg panels. Exterior edges are to be edged with heavy-duty 3mm PVC edge banding, color to match door or drawer front.
 - 5. Locate grommets as directed by Owner. Assume one per workstation

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 CASEWORK INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinets to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- G. Secure upper cabinets, counter bases, full height cabinets, and counter partitions to floor and wall using appropriate angles and anchorages to obtain seismic restraint per Title 24 Section 2336

3.03 ADJUSTING

- A. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Defective work shall be repaired or replaced as directed by the Owner or his representative upon completion of installation.
- B. Shop finished surfaces shall be cleaned, touched-up as required and damaged or unrepairable areas shall be refinished or replaced as directed.
- C. Clean cabinetry free of debris. Installer shall be responsible for the immediate removal of all trash, crating, etc., associated with the cabinet installation.

3.05 SCHEDULES

- A. Finishes to be selected by architect from full line of colors and patterns. (Colors and Patterns are based on Formica Brand as a standard of quality unless otherwise noted.)

End of Section

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Section 06 6420
Plastic Paneling

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass reinforced polyester panel system for adhesive mounting.
- B. Moldings, adhesive, and joint sealants.

1.02 REFERENCES

- A. ANSI A135.5 - American National Standard for Prefinished Hardboard Paneling; 2004.
- B. ASTM D 256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2005.
- C. ASTM D 523 - Standard Test Method for Specular Gloss; 1989 (Reapproved 1999).
- D. ASTM D 570 - Standard Test Method for Water Absorption of Plastics; 1998.
- E. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics; 2003.
- F. ASTM D 696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C With a Vitreous Silica Dilatometer; 2003.
- G. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2003.
- H. ASTM D 792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement; 2000.
- I. ASTM D 968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive; 1993 (Reapproved 2001).
- J. ASTM D 1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials; 1999.
- K. ASTM D 1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; 2002.
- L. ASTM D 2197 - Standard Test Methods for Adhesion of Organic Coatings by Scrape Adhesion; 1998 (Reapproved 2004).
- M. ASTM D 2486 - Standard Test Methods for Scrub Resistance of Wall Paints; 2000.
- N. ASTM D 2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor; 1995 (Reapproved 2001).
- O. ASTM D5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
- P. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.

- C. Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
 - 1. Store panels indoors.
 - 2. Lay panels flat. Do not stand panels on edge.
 - 3. Protect panels from moisture.
 - 4. Do not store panels in contact with the floor or against an outside wall.

1.05 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.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity.
- B. Mock-Ups: Provide mockup of sufficient size to demonstrate all typical conditions in the work.
 - 1. Subject to acceptance by owner, mock-up may be retained as part of finish work.
 - 2. If mockup is not retained, remove and properly dispose of mockup.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Kemlite Company, Inc.: www.frpdesignsolutions.com.
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PANEL SYSTEM

- A. Plastic Panel System: Factory finished panels, trim, sealant, and accessories.
- B. Panels: frpSelect.
 - 1. Surface Burning Characteristics: Flame spread index of 200 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E 84 (Class C/III).
 - 2. Surface Pattern: Cardboard Solidz (7813)
 - 3. Color: As selected from manufacturer's standard selection.
 - 4. Thickness: 3/32 inch (2.3 mm), nominal
 - 5. Width: 48 inches.
 - 6. Height: 96 inches.
 - 7. Flexural Strength: 10,000 psi (69Mpa), when tested in accordance with ASTM D 790.
 - 8. Flexural Modulus: 500,000 psi (3445 MPa), when tested in accordance with ASTM D 790.
 - 9. Tensile Strength: 8,000 psi, when tested in accordance with ASTM D 638.
 - 10. Tensile Modulus: 600,000 psi (4134 MPa), when tested in accordance with ASTM D 638.
 - 11. Barcol Hardness: 40, when tested in accordance with ASTM D 2583.
 - 12. Impact Resistance: 6.8 ft-lb/in² (0.19 J/mm²), when tested in accordance with ASTM D 256, Izod method.
 - 13. Coefficient of Thermal Expansion: 0.0000157 in/in/degree F, measured in accordance with ASTM D 696.
 - 14. Water Absorption: 0.22 percent, when tested in accordance with ASTM D 570.

- 15. Taber Abrasion Test: 0.008% weight loss when subjected to 25 cycles with 1000g CS17 wheel.
- C. Panel Trim: Extruded PVC, in manufacturer's standard colors.
 - 1. Outside corners, inside corners, edge trim, and division molding color matched to panels
- D. Sealant: Acrylic latex [color matched to panels]

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Take panels out of cartons and allow to acclimatize to room conditions for at least 48 hours 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. Clean surfaces thoroughly prior to installation.
- D. Protect existing surfaces from damage due to installation.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use the adhesives recommended by the panel manufacturer unless prohibited by local regulations; obtain manufacturer's approval of alternative adhesives.
- C. Install continuous bead of silicone sealant in each joint and trim groove and between trim and adjacent construction, maintaining 1/8 inch expansion space.
- D. Avoid contamination of panel faces with adhesives, solvents, or cleaners; clean as necessary and replace if not possible to repair to original condition.
- E. Protect installed products until completion of project.
- F. Touch-up, repair or replace damaged products after Substantial Completion.
- G. Install panels with minimum number of joints on each wall.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 07 1300
Sheet Waterproofing

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sheet Waterproofing:

1.02 RELATED REQUIREMENTS

- A. Section 07 2100 - Board and Batt Insulation: Insulation used for protective cover.
- B. Section 07 6200 - Sheet Metal Flashing and Trim: Metal parapet, coping, and counterflashing.
- C. Section 22 1006 - Plumbing Piping Specialties: Roof drain and plumbing vent flashing flanges.

1.03 ABBREVIATIONS

1.04 REFERENCE STANDARDS

- A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2006a (Reapproved 2013).
- B. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
- C. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers; 2000 (Reapproved 2012).
- D. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact; 2014.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- F. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for membrane.
- C. Manufacturer's Installation Instructions: Indicate special procedures.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in City's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Membrane Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Contractor shall correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to City.
- C. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water, except where such failures are the result of structural failures of building. Hairline

cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. www.wrmeadows.com.; Product Mel-Rol. www.wrmeadows.com.
- B. Other Acceptable Manufacturers:
 - 1. Grace Construction Products: www.na.graceconstruction.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MEMBRANE MATERIALS

- A. Parapet Walls, Windows, Doors and Skylight Conditions
 - 1. Membrane: Mel Rol
 - 2. Accessories:
 - a. Mel-Prime water based primer
 - b. Sealtight pointing mastic
 - c. Sealtight detail strip
 - d. Additional sealants as required by the manufacturer.
- B. Membrane: Mel Rol.- Polymeric membrane over cross laminated polyethylene carrier film. Adhesive bonded.
 - 1. Thickness:
 - a. Carrier Film: 4mils
 - b. Polymeric Membrane: 56 mils
 - 2. Tensile Strength:
 - a. Carrier Film: 5,900 psi, measured in accordance with ASTM D 412.
 - b. Polymeric membrane: 590 psi, measured in accordance with ASTM D 412.
 - 3. Ultimate Elongation: Polymeric membrane 455% percent, measured in accordance with ASTM D 412.
 - 4. Peel Adhesion - Wet and Dry - 7lb./in.
 - 5. Lap Adhesion - Dry - 5lb./in.
 - 6. Water Absorbtion: .1%, 72 hrs. maz. per ASTM D 1970
 - 7. Puncture Resistance: 67 lb. per ASTM E154
 - 8. Water Vapor Permeability:.019 perm inch, measured in accordance with ASTM E 96/E 96M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.
- C. Verify items that penetrate surfaces to receive waterproofing are securely installed.

3.02 PREPARATION

- A. Protect adjacent surfaces from damage not designated to receive waterproofing.
- B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.
- C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.

- D. Surfaces for Adhesive Bonding: Apply surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.

3.03 INSTALLATION - MEMBRANE

- A. Install membrane waterproofing in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- B. Roll out membrane, and minimize wrinkles and bubbles.
- C. Self-Adhering Membrane: Remove release paper layer, and roll out onto substrate with a mechanical roller to provide full contact bond.
- D. Overlap edges and ends, minimum 3 inches, seal permanently waterproof by method recommended by manufacturer, and apply uniform bead of sealant to joint edge.
- E. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.
- F. Weather lap joints on sloped substrate in direction of drainage, and seal joints and seams.
- G. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.
- H. Seal membrane and flashings to adjoining surfaces.

3.04 PROTECTION

- A. Do not permit traffic over unprotected or uncovered membrane.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 07 2100
Board and Batt Insulation

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Thermal batt insulation and vapor retarder in exterior wall construction - R21.
- B. Thermal batt insulation at sloped roof areas - R38
- C. Rigid foam board insulation at low slope (Flat) roof areas - R30
- D. Rigid foam board insulation - tapered for roof drainage.
- E. Thermal batt insulation at low slope (Flat) roof areas - R38 (In addition to Rigid foam board insulation for a total of R-68)
- F. Sound insulation at all interior demising walls not otherwise thermally insulated - size to fill void 3 5/8" min.
- G. Sound insulation at all T-bar ceilings at demising partitions of offices.
- H. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.
- I. Attic Vent Baffles at all roof areas with insulation tight to the bottom of the structure (areas are above second floor) to provide ventilation per Roof vent calculations on Roof Plan.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Supporting construction for batt insulation.
- B. Section 06 1000 - Rough Carpentry: Installation requirements for board insulation over steep slope roof sheathing or roof structure.
- C. Section 07 2500 - Weather Barriers: Separate air barrier and vapor retarder materials.
- D. Section 09 2116 Gypsum Board Assemblies
- E. Section 09 5100 Acoustical Ceiling

1.03 QUALITY ASSURANCE

- A. Installer - Work to be performed only by workers thoroughly skilled and specially trained in the techniques of insulation, and who are completely familiar with the published recommendations of the manufacturer of the material being used. Installer to take care that facing material of batt insulation is not torn or punctured.
- B. Materials of this section shall provide continuity of thermal barrier at building enclosure elements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.05 PRODUCT HANDLING

- A. Protection
 - 1. Insulating materials to be stored at the job site in a safe, dry place with all labels intact and legible at time of installation.

2. Comply with manufacturer's recommendations for handling, storage and protection during installation. Use all means to protect insulating materials before, during, and after installation. Do not allow products to become wet, damp, or punctured.
- B. Replacements - In the event of damage, including water intrusion, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.06 SEQUENCING

- A. Sequence work to ensure fireproofing and firestop materials are in place before beginning work of this section.

PART 2 PRODUCTS

2.01 FOAM BOARD INSULATION MATERIALS

- A. Polyisocyanurate Board Insulation with Facers Both Sides: Rigid cellular foam, complying with ASTM C1289; Type I, aluminum foil both faces; Class 1, non-reinforced foam core.
 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 2. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 4. Roof Insulation to conform to HH-I-1972
 5. Compressive Strength: 16 psi
 6. Board Size: 48 by 96 inch.
 7. Board Thickness: As required to achieve R value specified.
 8. Board Edges: Square.
 9. Product: Thermax by Dow Chemical Company as a standard of quality.
 10. Manufacturers:
 - a. Atlas Roofing Corporation: www.atlasroofing.com.
 - b. GAF; EnergyGuard Polyiso Insulation: www.gaf.com/sle.
 - c. Hunter Panels, LLC; Xci Class A Foil: www.hunterxci.com/sle.

2.02 BATT INSULATION MATERIALS

- A. Batt Insulation: ASTM C 665; preformed glass fiber batt; friction fit, conforming to the following:
 1. Surface Burning Characteristics: Flame spread index of 25 or less; smoke developed index of 50 or less, when tested in accordance with ASTM E 84.
 2. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 3. Formaldehyde Content: Zero.
 4. Thermal Resistance: (Unless otherwise noted on plans with an increase value)
 - a. At Pitched Roof Area: R-38 FKS faced batts (with vapor not exceeding 1 perm- installed on the warm side of the attic insulation)
 - b. At Flat (Low Slope) Roof Areas: R-38 FKS faced batts (with vapor not exceeding 1 perm- installed on the warm side of the attic insulation) - in addition to Rigid Insulation.
 - c. At Exterior Walls: R-21 Kraft Face Batt. (Also located at interior walls of Apparatus Bays and Fitness Room.)
 - d. Interior Wall Sound Insulation: fiberglass sound control batts 3-5/8" thick. Sound insulation is also located at all second level floors.
 5. Manufacturer shall certify that a minimum of 25% of content of insulation is of recycled materials.

6. Facing: Asphalt treated Kraft paper, one side.
7. Manufacturers:
 - a. CertainTeed Corporation: www.certainteed.com.
 - b. Johns Manville: www.jm.com.
8. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

- A. Provide all other materials and products necessary for the proper completion of the work.
- B. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
- C. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
- D. Attic Rafter Vent Baffles: Raft-R-mate by Owens Corning
- E. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where installation can properly begin.
- C. Verify that specified products may be installed in accordance with the original design and the manufacturer's recommendations.

3.02 BOARD INSTALLATION OVER STEEP SLOPE ROOF SHEATHING OR ROOF STRUCTURE

- A. Installation of board insulation over steep slope roof structure or roof sheathing is specified in Section 06 1000.

3.03 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
- F. Wire all ceiling insulation (that is not supported by gypsum board by running 16 gage wire diagonally or perpendicular to the insulation every 18 inches.
- G. Staple or nail facing flanges in place at maximum 6 inches on center.

3.04 ACOUSTIC BATTS AT T-BAR CEILINGS

- A. On first floor install acoustic batt insulation over all T-bar ceilings.
- B. On second floor install acoustic batt insulation over the T-bar ceiling for a minimum of 3 feet of either side of partition.

End of Section

Section 07 2500
Weather Barriers

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water-Resistive Barrier: Under exterior wall cladding, over sheathing or other substrate; not air tight or vapor retardant.
- B. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Vapor retarder under concrete slabs on grade.
- B. Section 06 1000 - Rough Carpentry: Water-resistive barrier under exterior cladding.
- C. Section 07 2100 - Board and Batt Insulation: Vapor retarder installed in conjunction with batt insulation.
- D. Section 07 5400 - Thermoplastic Membrane Roofing: Vapor retarder installed as part of roofing system.
- E. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

1.03 DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.
- C. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture resistant, to the degree specified, intended to be installed to shed water without sealed seams.

1.04 REFERENCE STANDARDS

- A. ASTM D779 - Standard Test Method for Water Resistance of Paper, Paperboard, and Other Sheet Materials by the Dry Indicator Method; 2003.
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- F. ICC-ES AC308 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc; 2013.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics.

- C. Manufacturer's Installation Instructions: Indicate preparation.

1.06 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

- A. Water-Resistive Barrier: Provide on exterior walls under exterior cladding.
1. Use building paper unless otherwise indicated.
 2. Under Portland cement stucco, use one layer of building paper installed over air barrier.
 3. Under stone veneer use one layer of building paper installed over air barrier.
- B. Air Barrier:
1. On outside surface of sheathing of exterior walls use air barrier coating.

2.02 WATER-RESISTIVE BARRIER MATERIALS (NEITHER AIR BARRIER NOR VAPOR RETARDER)

- A. Building Paper: Asphalt-saturated Kraft building paper complying with requirements of ICC-ES AC38 Grade D.
1. Water Resistance: 60 minutes, minimum, when tested in accordance with ASTM D779.

2.03 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

- A. Air Barrier Sheet, Mechanically Fastened:
1. Air Permeance: 0.004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
 2. Water Vapor Permeance: 5 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant procedure).
 3. Air Permeance: 0.004 cubic feet per square foot, maximum, when tested in accordance with ASTM E2178.
 4. Water Vapor Permeance: 5 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
 5. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 180 days weather exposure.
 6. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 9 months weather exposure.
 7. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
 8. Seam and Perimeter Tape: Polyethylene self adhering type, mesh reinforced, 2 inches wide, compatible with sheet material; unless otherwise specified.
 9. Products:
 - a. DuPont Company; Tyvek CommercialWrap: www.dupont.com.
 - b. Fiberweb, Inc; Typar MetroWrap: www.typar.com.
 - c. VaproShield, LLC; WrapShield: www.vaproshield.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- B. Air Barrier, Fluid Applied: Vapor permeable, elastomeric waterproofing.

2.04 ACCESSORIES

- A. Self-Adhesive Sheet Flashing: ASTM D 1970.

- B. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Water-Resistive Barriers: Install continuous barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.
- C. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- D. Mechanically Fastened Sheets - On Exterior:
1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
 2. Overlap seams as recommended by manufacturer but at least 6 inches.
 3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
 4. Attach to framed construction with fasteners extending through sheathing into framing. Space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.
 5. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
 6. Install water-resistive barrier over jamb flashings.
 7. Install air barrier and vapor retarder UNDER jamb flashings.
 8. Install head flashings under weather barrier.
 9. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.
- E. Openings and Penetrations in Exterior Weather Barriers:
1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
 2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches wide; do not seal sill flange.
 3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
 4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
 5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.

6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.
- B. Do not leave paper- or felt-based barriers exposed to weather for longer than one week.

End of Section

Section 07 3113
Asphalt Shingles

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection, underlayment, and valley protection.
- C. Associated metal flashings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Roof sheathing.
- B. Section 06 1500 - Wood Decking: Roof decking.
- C. Section 07 2100 - Board and Batt Insulation: Nailable rigid insulation.
- D. Section 07 6200 - Sheet Metal Flashing and Trim: Edge and cap flashings.
- E. Section 07 7123 - Manufactured Gutters and Downspouts.

1.03 REFERENCE STANDARDS

- A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
- B. ASTM D3161/D3161M - Standard Test Method for Wind-Resistance of Steep Slope Roofing Products (Fan-Induced Method); 2016.
- C. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules; 2010a.
- D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).
- E. NRCA (RM) - The NRCA Roofing Manual; 2017.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating material characteristics.
- C. Shop Drawings: For metal flashings, indicate specially configured metal flashings.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, by a single manufacturer.
- B. Installer Qualifications: Installer must be approved for installation of all roofing products to be installed under this section.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store all products in manufacturer's unopened, labeled packaging until they are ready for installation.
- B. Store products in a covered, ventilated area, at temperature not more than 110 degrees F; do not store in direct sunlight.
- C. Store bundles on a flat, properly drained surface. Maximum stacking height shall not exceed roofing material manufacturer recommendations. Store all rolls on end.

- D. Store and dispose of solvent-based materials in accordance with all federal, state and local regulations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Asphalt Shingles and Related Steep Roofing System Components:
 - 1. GAF; Timberline HD Reflector Series: www.gaf.com/sle.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ASPHALT SHINGLES

- A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462.
 - 1. Fire Resistance: Class A.
 - 2. Wind Resistance: Class F, when tested in accordance with ASTM D3161.
 - 3. Self-sealing type.
 - 4. Style: Square Manufacturer Standard Tab.
 - 5. Basis of Design: GAF Timberline HD Reflector Series.
 - 6. Color: Charcoal.

2.03 HIP AND RIDGE SHINGLES

- A. High profile self sealing hip and ridge cap shingle complementing the selected roof shingle.
 - 1. Color: Charcoal

2.04 SHEET MATERIALS

- A. Eave Protection Membrane: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
 - 1. Manufacturers:
 - a. GAF Leak Barrier.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Underlayment: Synthetic non-asphaltic sheet, intended by manufacturer for mechanically fastened roofing underlayment without sealed seams.
 - 1. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 - 2. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 - 3. Fasteners: As specified by manufacturer and building code qualification report or approval, if any.
- C. Flexible Flashing: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
 - 1. Manufacturers:
 - a. GAF Leak Barrier.

2.05 ACCESSORIES

- A. Nails: Standard round wire shingle type, of hot-dipped zinc coated steel, 10 wire gage, 0.1019 inch shank diameter, 3/8 inch head diameter, of sufficient length to penetrate through roof sheathing or 3/4 inch into roof sheathing or decking.
- B. Plastic Cement: ASTM D4586/D4586M, asphalt roof cement.

- C. Ridge Vents: Plastic, extruded with vent openings that do not permit direct water or weather entry; flanged to receive shingles; Cobra Ridge Runner Ridge Vent manufactured by GAF.

2.06 METAL FLASHINGS

- A. Metal Flashings: Provide sheet metal eave edge, gable edge, ridge, ridge vents, open valley flashing, chimney flashing, dormer flashing, and other flashing indicated.
 - 1. Form flashings to profiles indicated on Drawings.
 - 2. Hem exposed edges of flashings minimum 1/4 inch on underside.
- B. Bituminous Paint: Acid and alkali resistant type; black color.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify that deck is of sufficient thickness to accept fasteners.
- C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- D. Verify roof openings are correctly framed.

3.02 PREPARATION

- A. Seal roof deck joints wider than 1/16 inch as recommended by shingle manufacturer.
- B. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- C. Broom clean deck surfaces before installing underlayment or eave protection.
- D. Install eave edge flashings tight with fascia boards. Weather lap joints 2 inches and seal with plastic cement. Secure flange with nails spaced 4 inches on center.

3.03 INSTALLATION - EAVE PROTECTION MEMBRANE

- A. Install eave protection membrane from eave edge to minimum 4 ft up-slope beyond interior face of exterior wall.

3.04 INSTALLATION - UNDERLAYMENT

- A. Underlayment At Roof Slopes Up to 4:12: Install two layers of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 4 inches. Stagger end laps of each consecutive layer. Nail in place.
- B. Underlayment At Roof Slopes Greater Than 4:12: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches. Stagger end laps of each consecutive layer. Nail in place. Weather lap minimum 4 inches over eave protection.
- C. Items projecting through or mounted on roof: Weather lap and seal watertight with plastic cement.

3.05 INSTALLATION - VALLEY PROTECTION

- A. Install one ply of smooth surfaced roll roofing, minimum 18 inches wide, centered over valleys.
- B. Install flexible flashing in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- C. Weather lap joints minimum 2 inches.
- D. Nail in place minimum 18 inches on center, 1 inch from edges.

3.06 INSTALLATION - METAL FLASHING AND ACCESSORIES

- A. Install flashings in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
- C. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.

3.07 INSTALLATION - SHINGLES

- A. Install shingles in accordance with manufacturer's instructions manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Place shingles in straight coursing pattern with 5-5/8 inch weather exposure to produce double thickness over full roof area. Provide double course of shingles at eaves.
- C. Project first course of shingles 3/4 inch beyond fascia boards.
- D. Extend shingles 1/2 inch beyond face of gable edge fascia boards.
- E. Extend shingles on both slopes across valley in a weave pattern and fasten. Extend shingles a minimum of 12 inches beyond valley center line to achieve woven valley, concealing the valley protection.
- F. Complete installation to provide weather tight service.

3.08 PROTECTION

- A. Do not permit traffic over finished roof surface.

End of Section

Section 07 4114
Preformed Metal Roof Panels

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. The work includes, but is not necessarily limited to, furnishing and installation of all preformed metal wall panels, and accessories as indicated on the drawings and specified herein.
- B. Architectural roofing system of preformed steel panels.
- C. Fastening system.
- D. Factory finishing.
- E. Accessories and miscellaneous components.

1.02 RELATED SECTIONS

- A. Section 06 1000 - Rough Carpentry: Wall sheathing.
- B. Section 06 1500 - Wood Decking: Roof sheathing.
- C. Section 07261 - Weather Resistant Membranes
- D. Section 07 9005 - Joint Sealers: Field-installed sealants.

1.03 REFERENCES

- A. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2004a.
- B. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2003.
- C. ASTM D 523-89(1999) Standard Test Method for Specular Gloss
- D. ASTM A 924-04 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
- E. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2001.
- F. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; 1994.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Summary of test results, indicating compliance with specified requirements.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Specimen warranty.
- C. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in City's name and are registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of wall systems similar to those required for this project, with not less than 10 years of experience.
- B. Panel manufacturers without full supporting literature, Flashings & Details Guides, Guide Specifications and Technical Support shall not be considered equal to the specified product.

- C. Installer Qualifications: Installation of panels and accessories by installers with a minimum of 5 years experience on panel projects of this nature.

1.06 REGULATORY AGENCY REQUIREMENTS

- A. Comply with CBC and local Building Code requirements if more restrictive than those specified herein.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.
- B. Store wall panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.
 - 1. Protect against damage and discoloration
 - 2. Handle panels with non-marring slings.
 - 3. Do not bend panels.
 - 4. Store panels above ground, with one end elevated for drainage.
 - 5. Protect panels against standing water and condensation between adjacent surfaces.
 - 6. If panels become wet, immediately separate sheets, wipe dry with clean cloth, and allow to air dry.
 - 7. Remove any strippable film coating prior to installation and do not allow it to remain on the panels in extreme cold, heat or in direct sunlight.

1.08 WARRANTY

- A. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal wall panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of 10 year period from date of Substantial Completion.
- B. Waterproofing Warranty: Provide manufacturer's warranty for weathertightness of wall system, including agreement to repair or replace paneling that fails to keep out water within specified warranty period of 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Design is based on Standing seam metal roof panels, manufactured by AEP Span.
 - 1. ASC Profiles Inc., 2110 Enterprise Boulevard, West Sacramento, California 95691-3493, 800-726-2727, 916-372-6851, Fax: 916-372-7606
 - 2. Fontana: 10905 Beech Avenue, Fontana, California 92337, 909-823-0401
- B. Acceptable manufacturers are:
 - 1. Architectural Building Components : www.archmetalroof.com.
 - 2. ATAS International, Inc : www.atas.com.
- C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PANELS

- A. Performance Requirements: Provide complete wall panel assemblies, including wall panels, clips, fasteners, connectors, and miscellaneous accessories, tested for conformance to the following minimum standards:
 - 1. Overall: Complete weathertight system tested and approved in accordance with ASTM E 1592.
 - 2. Wind Uplift: Class 90 wind uplift resistance of UL 580.

3. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.
- B. Materials
 1. Painted Panels
 - a. Material: Steel conforming to ASTM A792 Zincalume®, minimum yield 40,000 psi, thickness 24 gauge .
 - b. Protective Coating: Conform to ASTM A792, AZ50 (Zincalume®)
 - c. Finish: DuraTech® 5000 exterior finish includes a 0.2 mil thick corrosion-resistant primer and a 0.8 mil thick finish coat of Polyvinylidene Fluoride (PVF2), full 70% Kynar 500®/Hylar 5000® for a total 1.0 mil dry film thickness with a specular gloss of 10-15% when tested in accordance with ASTM D-523-89 at 60o.
 - d. Colors: As selected by Architect from manufacturer's standard 24 colors
 2. Galvanized Panels
 - a. Material: Steel conforming to ASTM A653 (formerly ASTM A446), G-90 Galvanized, minimum yield 40,000 psi, thickness 24 gauge.
 - b. Protective Coating: Conform to ASTM A924 (formerly ASTM A525) G-90 Galvanized.
 3. Wall Panels: Factory-formed panels with factory-applied finish.
 - a. Panel 5 (P5) : Flush Panel (flat pan)
 - 1) Profile: Standing seam, with minimum 1.0 inch seam height; concealed fastener system for field seaming with special tool.
 - 2) Profile: Concealed fastener raised flat panel
 - 3) : DuraTech 5000.
 - 4) Length: Maximum possible length to minimize lapped joints.
 - 5) Depth: 7/8"
 - 6) Width: Maximum panel coverage of 12 inches.

2.03 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard Zincalume or galvanized concealed fasteners and anchor clips designed for specific wall or soffit system and engineered to meet performance requirements, including anticipated thermal movement.
- B. Exposed System: Provide manufacturer's recommended Zincalume or galvanized fasteners engineered to meet performance requirements and equipped with appropriate sealant separators to provide weathertight connections that will accommodate anticipated thermal movement.

2.04 PANEL FINISH

- A. Fluoropolymer Coating System: Manufacturer's standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 0.9 mil; color and gloss to match sample.

2.05 ACCESSORIES AND MISCELLANEOUS ITEMS

- A. Rib Closures: Provide prefabricated, close-fitting components of closed-cell synthetic rubber, neoprene, or PVC as provided by the manufacturer.
- B. Sealants: As specified in Section 07 9005.
 1. Exposed sealant must cure to rubber-like consistency.
 2. Concealed sealant must be non-hardening type.

2.06 FABRICATION

- A. Panels: Fabricate panels and accessory items at factory, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect installed work of other trades and verify that such work is complete to a point where this work may continue.
- B. Verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions.
- C. Do not begin installation of preformed metal wall panels until substrates have been properly prepared. Notify Architect if work has been delayed due to incomplete preparation of the substrate.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. Overall: Install wall system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of wall system securely in place while allowing for thermal and structural movement.
 - 1. Install wall system with fasteners as recommended by manufacturer.
 - 2. Install wall system with exposed fasteners prefinished to match panels.
 - 3. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited. Where necessary to saw-cut panels, deburr cut edges.
- B. Accessories: Install all components required for a complete wall assembly, including flashings, trim, moldings, closure strips, caps, rib closures, and ridge closures.
- C. Remove protective film from surface of roof panels immediately prior to installation. Strip film carefully, to avoid damage to prefinished surfaces.
- D. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by panel manufacturer.

3.03 CLEANING AND PROTECTION

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.04 PANEL DAMAGE AND FINISH SCRATCHES

- A. Do not apply touch-up paint to damaged paint areas that involve minor scratches.
- B. Panels or flashings that have severe paint and/or substrate damage shall be replaced as directed by the Architect's or Owner's representative.
- C. Replace damaged roof panels or accessories before date of Substantial Completion.

End of Section

Section 07 4646
Fiber Cement Siding

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wood-fiber cement siding.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Siding substrate.
- B. Section 07 2500 - Weather Barriers: Weather barrier under siding.
- C. Section 07 9200 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- D. ASTM C1186 - Standard Specification for Flat Fiber Cement Sheets; 2008 (Reapproved 2012).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's requirements for related materials to be installed by others.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods, including nail patterns.
- C. Test Report: Applicable model code authority evaluation report (e.g. ICC-ES).
- D. Maintenance Instructions: Periodic inspection recommendations and maintenance procedures.
- E. Warranty: Submit copy of manufacturer's warranty, made out in City's name, showing that it has been registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section with minimum 3 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products under waterproof cover and elevated above grade, on a flat surface.

PART 2 PRODUCTS

2.01 SIDING

- A. Lap Siding: Individual horizontal boards made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186 Type A Grade II; with machined edges, for nail attachment.
 - 1. Style: Standard lap style.
 - 2. Texture: Simulated cedar grain.

3. Length: 12 ft, nominal.
 4. Width (Height): 5-1/4 inches.
 5. Thickness: 5/16 inch, nominal.
 6. Finish: Factory Integral Color.
 7. Color: As selected by Architect from manufacturers full range of available colors.
 8. Warranty: 50 year limited; transferable.
 9. Lap Siding Manufacturers:
 - a. Allura, a division of Plycem USA, Inc: www.allurausa.com.
 - b. James Hardie Building Products, Inc: www.jameshardie.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Panel Siding: Vertically oriented panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186 Type A Grade II; with machined edges, for nail attachment.
1. Texture: Simulated cedar grain.
 2. Length (Height): 96 inches, nominal.
 3. Width: 48 inches.
 4. Thickness: 5/16 inch, nominal.
 5. Finish: Factory Integral Color.
 6. Color: As selected by Architect from manufacturers full range of available colors.
 7. Warranty: 50 year limited; transferable.
 8. Panel Siding Manufacturers:
 - a. Allura, a division of Plycem USA, Inc: www.allurausa.com.
 - b. James Hardie Building Products, Inc: www.jameshardie.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- C. Soffit Panels: Panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186 Type A Grade II; with machined edges, for nail attachment.
1. Texture: Simulated Cedar grain - vented.
 2. Length: 96 inches, nominal.
 3. Width: 12 inches.
 4. Thickness: 1/4 inch, nominal.
 5. Finish: Factory Integral Color.
 6. Color: As selected by Architect from manufacturers full range of available colors.
 7. Manufacturer: Same as siding.

2.02 ACCESSORIES

- A. Trim and Battens: Same material and texture as siding.
- B. Fasteners: Galvanized or corrosion resistant; length as required to penetrate minimum 1-1/4 inch.
- C. Exterior Soffit Vents: One piece, perforated, ASTM B221 (ASTM B221M), 6063 alloy, T5 temper, aluminum, with edge suitable for direct application to gypsum board and manufactured especially for soffit application. Provide continuous vent.
- D. Sealant: Elastomeric, polyurethane or silyl-terminated polyether/polyurethane, and capable of being painted.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine substrate and clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Verify that weather barrier has been installed over substrate completely and correctly.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Install sheet metal flashing:
 - 1. Above door and window trim and casings.
 - 2. Above horizontal trim in field of siding.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations.
 - 1. Read warranty and comply with all terms necessary to maintain warranty coverage.
 - 2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.
 - 3. Use trim details indicated on drawings.
 - 4. Touch up all field cut edges before installing.
 - 5. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs.
- C. Allow space for thermal movement between both ends of siding panels that butt against trim; seal joint between panel and trim with specified sealant.
- D. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- E. Joints in Vertical Siding: Install Z-flashing in horizontal joints between successive courses of vertical siding.
- F. Do not install siding less than 6 inches from surface of ground nor closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.
- G. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations shown on the drawings. Provide vent area specified.
- H. After installation, seal all joints except lap joints of lap siding. Seal around all penetrations. Paint all exposed cut edges.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

End of Section

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Section 07 6200
Sheet Metal Flashing and Trim

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.
- B. Sealants for joints within sheet metal fabrications.
- C. Precast concrete splash pads.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood nailers for sheet metal work.
- B. Section 06 1000 - Rough Carpentry: Wood blocking for batten seams.
- C. Section 07 3213 - Clay Roof Tiles: Non-metallic flashings associated with clay roofing tiles.
- D. Section 07 7123 - Manufactured Gutters and Downspouts.
- E. Section 08 1100 (08110) - Steel Doors and Frames
- F. Section 08 4313 (08410) - Metal Framed Storefronts
- G. Section 08 6300 - Metal-Framed Skylights: Integral metal curbs.
- H. Division 15 - Mechanical : Roof curbs for mechanical equipment.
- I. Division 16 - Electrical : Flashing sleeves and collars for electrical items protruding through roofing membrane.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- C. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2012.
- D. CDA A4050 - Copper in Architecture - Handbook; current edition.
- E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Maintain one copy of each document on site.
- C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with ____ years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) thick base metal.
- B. Copper: ASTM B370, cold rolled 16 oz/sq ft (24 gage) (0.0216 inch) thick; natural finish.
- C. Note: Flashing directly contacting the thermoplastic roof membrane is to be flashed with clad metal by the roofing manufacture.

2.02 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
- G. Fabricate flashings to allow toe to extend 2 inches over roofing . Return and brake edges.

2.03 GUTTER AND DOWNSPOUT FABRICATION

- A. Gutters: SMACNA (ASMM), Rectangular profile.
- B. Downspouts: Rectangular profile.
- C. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with SMACNA (ASMM).
- D. Accessories: Profiled to suit gutters and downspouts.
 - 1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
 - 2. Gutter Supports: Brackets.
 - 3. Downspout Supports: Brackets.
- E. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.
- F. Seal metal joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.
- C. In the event of a discrepancy, immediately notify the Architect.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.

- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Secure gutters and downspouts in place with concealed fasteners.
- E. Set splash pads under downspouts, and set in place with _____.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for field inspection requirements.

End of Section

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Section 07 7100
Roof Specialties

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof membrane vents.

1.02 RELATED REQUIREMENTS

- A. Section 07 7200 - Roof Accessories
- B. Section 07 3213 - Clay Roof Tiles
- C. Section 07 6200 (07620) - Sheet Metal Flashing and Trim

1.03 REFERENCE STANDARDS

- A. NRCA (RM) - The NRCA Roofing Manual; 2017.
- B. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- C. Samples: Submit two appropriately sized samples of coping and gravel stop.
- D. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Control and Expansion Joint Covers:
 - 1. Balco Inc.; Products as specified in drawings: www.balcousa.com
- B. Pipe and Penetration Flashings:
 - 1. Portals Plus; _____: www.portalsplus.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- C. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

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Section 07 7123

Manufactured Gutters and Downspouts

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel gutters and downspouts.
- B. Precast concrete splash pads.
- C. Sheet metal splash pans.

1.02 RELATED REQUIREMENTS

- A. Section 07 3113 - Sloped roofing system.
- B. Section 07 6200 - Sheet Metal Flashing and Trim.
- C. Section 09 9113 - Exterior Painting: Field painting of metal surfaces.
- D. Section 07 5400 - Thermoplastic Membrane Roofing

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Conform to SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.
- C. Samples: Submit 6 samples, 12 inch long, illustrating component design, finish, color, and configuration.
 - 1. Samples are to be used by painting contractor to provide samples of special finishing copper paint.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
- B. Prevent contact with materials that could cause discoloration, staining, or damage.

1.07 PROJECT CONDITIONS

- A. Coordinate the work with downspout discharge pipe inlet.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal.

2.02 COMPONENTS

- A. Gutters: Profile as indicated.
 - 1. To match existing

- B. Downspouts: Profile as indicated and to match existing.
- C. Anchors and Supports: Profiled to suit gutters and downspouts.
 - 1. To match existing
 - 2. Anchoring Devices: In accordance with SMACNA requirements.
 - 3. Gutter Supports: Brackets.
 - 4. Downspout Supports: Brackets.

2.03 ACCESSORIES

- A. Splash Pans: Same metal type as downspouts, formed to 18x30 inches size; rolled sides 1 inch high for inverted pan placement.
- B. Splash Pads: Precast concrete type, size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.
- C. Strainer Guard: Install "beehive"-type strainer-guard at downspouts, removable for cleaning.

2.04 FABRICATION

- A. Form gutters and downspouts of profiles and size indicated.
- B. Fabricate with required connection pieces.
- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

2.05 SPECIAL FINISHING

- A. Gutters and Downspouts and all attachment accessories are to be finished with special copper paint prior to installation. Gutter and downspout manufacturer are required to coordinate with painting contractor to provide an acceptable final finish. Refer to specification section 09 9000 - Painting and Coating

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

- A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Slope gutters 1/16 inch per foot, ____ percent minimum.
- D. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

End of Section

Section 07 9005

Joint Sealers

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.

1.02 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- E. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2014.
- F. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Poly(Vinyl Chloride) Foam (Closed-Cell); 2005 (Reapproved 2011).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, color availability, and _____.
- C. LEED Report: Submit VOC content documentation for all non-preformed sealants and primers.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

1.04 QUALITY ASSURANCE

- A. Work to be performed by workers thoroughly trained and familiar with the requirements of joint sealers.

1.05 MOCK-UP

- A. Provide mock-up of sealant joints in conjunction with window under provisions of Section 01 4000.
- B. Construct mock-up with specified sealant types and with other components noted.
- C. Locate where directed.
- D. Mock-up may remain as part of the Work.

1.06 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Polysulfide Sealants:
- B. Acrylic Emulsion Latex Sealants:

2.02 SEALANTS

- A. Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Type 1 - General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25 minimum; Uses M, G, and A; single component.
 - 1. Color: Match adjacent finished surfaces.
 - 2. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Other exterior joints for which no other sealant is indicated.
- C. Type 2 - Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
 - 1. Applications: Use for:
 - a. Concealed sealant bead in sheet metal work.
 - b. Concealed sealant bead in siding overlaps.
- D. Type 3 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
 - 1. Color: Match adjacent finished surfaces.
 - 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
- E. Type 4 - Bathtub/Tile Sealant: White silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
 - 1. Applications: Use for:
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - b. Joints between kitchen and bath countertops and wall surfaces.
- F. Type 5 - Acoustical Sealant for Concealed Locations:
 - 1. Applications: Use for concealed locations only:
 - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
- G. Type 6 - Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single component.
 - 1. Applications: Use for:
 - a. Expansion joints in floors.
- H. Type 7 - Sealant for Continuous Water Immersion: Polysulfide; ASTM C920, Grade NS, Class 25, Uses I, M, and A; approved by manufacturer for continuous water immersion; single component.
 - 1. Color: Match adjacent finished surfaces.

2. Applications: Use for:
 - a. Joints in raised planters.
- I. Type 8 - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single component.
 1. Color: Gray.
 2. Applications: Use for:
 - a. Joints in sidewalks and vehicular paving.

2.03 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Backing: Round foam rod compatible with sealant; ASTM D1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- C. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker where joint backing is not used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- H. Tool joints concave.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

End of Section

Section 08 1113

Hollow Metal Doors and Frames

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Fire-rated hollow metal doors and frames.
- C. Hollow metal borrowed lites glazing frames.
- D. Accessories, including glazing, louvers, and matching panels.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware.
- B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.
- C. Section 09 9113 - Exterior Painting: Field painting.

1.03 ABBREVIATIONS AND ACRONYMS

- A. NFPA - National Fire Protection Association.
- B. SDI - Steel Door Institute.
- C. UL - Underwriters Laboratories.

1.04 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- F. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- G. ITS (DIR) - Directory of Listed Products; current edition.
- H. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- I. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- J. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- K. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes installation requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. De La Fontaine Inc; Hollow Metal Door Model ____: www.delafontaine.com.
 - 2. De La Fontaine Inc; Windstorm-Resistant Steel Door and Frame; door style ____: www.delafontaine.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DESIGN CRITERIA

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
- B. Hollow Metal Panels: Same construction, performance, and finish as doors.
- C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Type AA, Interior Doors, Non-Fire Rated:
 - 1. Door Thickness: 1-3/4 inch, nominal.
- B. Type BB, Fire-Rated Doors:
 - 1. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 - a. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - b. Attach fire rating label to each fire rated unit.
 - 2. Door Thickness: 1-3/4 inch, nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
- C. Door Frames, Fire-Rated: Knock-down type.
 - 1. Fire Rating: Same as door, labeled.
- D. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Install door hardware as specified in Section 08 7100.
- E. Comply with glazing installation requirements of Section 08 8000.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified door and frame standards or custom guidelines indicated.
- B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

End of Section

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Section 08 1416
Flush Wood Doors

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; fire-rated, non-rated, and acoustical.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 7100 - Door Hardware.
- C. Section 08 8000 - Glazing.
- D. Section 09 9000 - Painting and Coating:

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- C. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.
- D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- D. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria.
- E. Warranty, executed in City's name.

1.05 QUALITY ASSURANCE

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 PROJECT CONDITIONS

- A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide warranty for the following term:
 - 1. Interior Doors: Life of installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 DOORS

- A. Doors: Refer to drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
 - 2. Quality Level: Custom Grade, in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Section 1300.

2.02 DOOR AND PANEL CORES

- A. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.
- B. Sound Resistant Doors: Equivalent to type, with particleboard core (PC) construction with core as required to achieve STC rating specified; plies and faces as indicated above.

2.03 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
- C. Fit door edge trim to edge of stiles after applying veneer facing.
- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. Provide edge clearances in accordance with the quality standard specified.

2.04 FACTORY FINISHING - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes and tolerances are acceptable.
- B. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.

1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

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Section 08 3100
Access Doors and Panels

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall and ceiling access door and frame units.
- B. Access door and frame units, non-fire-rated, in wall and ceiling locations.

1.02 RELATED REQUIREMENTS

- A. Section 09 9113 - Exterior Painting: Field paint finish.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Manufacturer's Installation Instructions: Indicate installation requirements.
- D. Project Record Documents: Record actual locations of each access unit.

1.04 PROJECT CONDITIONS

- A. Coordinate the work with other work requiring access doors.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

2.02 MANUFACTURERS

- A. Access Doors:
 - 1. Karp Associates, Inc: www.karpinc.com.
 - 2. Milcor by Commercial Products Group of Hart & Cooley, Inc; Product ____:
www.milcorinc.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESS DOORS AND PANELS

- A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.

2.04 WALL AND CEILING MOUNTED UNITS

- A. Door and Frame Units: Formed steel.
 - 1. Frames and flanges: 0.058 inch steel.
 - 2. Door panels: 0.070 inch single thickness steel sheet.
 - 3. Door/Panel Size: As indicated on the drawings.
 - 4. Hardware:
 - a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
 - b. Hinge: 175 degree stainless steel piano hinge with removable pin.
 - c. Latch/Lock: Screw driver slot for quarter turn cam latch.
 - 5. Galvanized, hot dipped finish.
 - 6. Prime coat with alkyd primer.
 - 7. Finish: One coat baked enamel, match adjacent surface color.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

End of Section

Section 08 3500

Four Fold Apparatus Doors

PART 1 - GENERAL

1.01 Work Included - Work includes, but is not necessarily limited to:

- A. Folding doors with custom tinted high performance dual-glazing lites - insulated steel
- B. Electronically powered automatic electrical door operator.
- C. Access control devices for door operation with external antennae with a 100' distance range minimum.
- D. Door control stations as indicated on the Construction Drawings.
- E. Sensors to be mounted on square bollards.
- F. All low voltage control wiring to be provided door installer in this section and installed under the construction quality and techniques outlined in Division 26. Conduit is provided by electrical.
- G. Coordination with other trades for mounting and electrical requirements.
- H. All associated accessories, attachments, and control devices necessary to provide a complete installation.
- I. Coordination with the installation of concrete masonry at selected locations.
- J. Refer to Specification Section 05 5000, Metal Fabrications, and Drawings for steel angles.

1.02 Related Work Described Elsewhere

- A. Section 03 3000 Cast-in-Place Concrete
- B. Section 05 1200 Structural Steel
- C. Section 05 5000 Metals Fabrications
- D. Section 06 1000 Rough Carpentry
- E. Section 07 2500 Weather Barriers
- F. Section 07 6200 Sheet Metal Flashing and Trim
- G. Section 07 9005 Joint Sealers
- H. Section 08 8000 Glazing
- I. Section 09 2400 Portland Cement Plaster
- J. Section 09 2116 Gypsum Board with Non-Structural Metal Framing
- K. Section 09 9000 Paints and Coatings
- L. Division 26 Electrical

1.03 Quality Assurance

- A. Manufacturer - As specified in Part 2.
- B. Installer - The folding door system installer shall be currently approved by the manufacturer, and have experience of at least five (5) years installing the selected system.
- C. Installer - The door operating equipment installer shall be currently approved by the manufacturer, and have experience of at least ten (10) years installing the selected system.
- D. Single Source Responsibility - Provide doors, mounts, operators, and accessories from one manufacturer.

- E. Inserts and Anchorages: Refer to specification section 05 5000 for steel angles to receive the anchoring devices which must be set in concrete, built into masonry, or attached to steel framing for installation of units. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other Work to avoid delay.
- F. See concrete and masonry Sections of these specifications for installation of inserts and anchorage devices.
- G. Design Criteria: The door panels will be designed such that they will not deflect more than $L/120$ of their span under a minimum wind load of 20 pounds per square foot with calculations based on the premise that the door panels are supported on the two non-spanning edges. Door components shall be designed in accordance with the following specifications of latest adoption:
 - 1. Shapes, Plates, and Bars - AISC Specification for the design, fabrication, and erection of structural steel for buildings.
 - 2. Sheet or Strip Metal - AISI Specification for the design of cold-formed steel structural members.
- H. Seismic Loading: Door construction shall withstand seismic loads defined on the Structural Drawings.

1.04 References - To comply with all pertinent codes and regulations.

- A. Submittals
- B. Product Data - Submit material specifications, manufacturer's installation, and maintenance instructions under provisions of Section 01 3000.
- C. Shop drawings under provisions of Section 01 3000. Drawings to include:
 - 1. Door profile and material description
 - 2. All attachment details
 - 3. Glazing details showing tinted, high performance, dual glazing.
- D. Submit written certification verifying door assembly ability to support specified loads. Certification shall be prepared and sealed by a Structural Engineer licensed in the State in which the project is constructed.
- E. Protection (By General Contractor)
 - 1. Folding doors system and operators to be stored at the job site in a safe, dry place with all labels intact and legible at time of installation.
 - 2. Use all means to protect folding door system and operators before, during, and after installation. Do not allow products to become wet or damp prior to and during installation.
 - 3. Contractor to coordinate with paint contractor to have finish coats of paint applied to the doors immediately after installation.
- F. Replacements - In the event of damage, including water intrusion, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.
- G. Operation and Maintenance Manuals - Under provisions of Section 01 7000:
- H. Door supplier shall furnish two (2) copies of a maintenance and spare parts manual in a binder. Provide recommendation for routine maintenance and spare parts required for normal operation, as well as drawings to identify parts and operating schematic of door and controls.

A complete ladder diagram and schematic shall be included as well as suggested trouble shooting procedures.

1.05 Warranty

- A. Two-year warranty for replacement at no cost to the Owner of any folding door system or operator exhibiting defects in parts or ease of operation.
- B. Refer to provisions under Section 01 7000 warranty of all other components of the folding door assembly.

PART 2 - PRODUCTS

2.01 Manufacturers - The design of the folding doors and operators is based on the products of Electric Power Door (www.electricpowerdoor.com), 800 / 346-5760, as a standard of quality. All substitutions will be reviewed under the provisions of specification Section 01 3300 and Section 01 6000.

2.02 Four-Fold Apparatus Door - System Selected: Electric Power Door, Model #41, insulated steel door with full view custom high performance / tinted / dual-glazing section, commercial heavy duty. Refer to Construction Drawings for further information.

- A. General: Comply with the following standards for forms and type of materials for required items of work.
 - 1. Steel Tubing, Electric Welded: ASTM A513
 - 2. Steel Tubing, Structural Welded: ASTM A500 Grade B
 - 3. Structural Shapes and Plates: ASTM A36
 - 4. Castings, Cast Iron: ASTM A48
- B. Design Criteria: Design doors to limit deflection to more than L/120 of their span under a minimum wind load of 20 pounds per square foot. Door components shall be designed in accordance with the following:
 - 1. Shapes, Plates, and Bars - AISC Specification for the design, fabrication, and erection of structural steel for buildings.
 - 2. Sheet or Strip Metal - AISI Specification for the design of cold-formed steel structural members.
 - 3. Operation Frequency - High frequency, 24-hour per day operation
- C. Door Panel Construction: Custom metal fabrications as indicated.
 - 1. Door panel frames (leaves) shall be 2" thick minimum and constructed of ASTM A500 square steel tubing, or rectangular steel tubing sections of ample size and strength for loads and stresses imposed under the specified conditions. Interior door panel frame members shall be spaced as shown on the drawings.
 - 2. Door panel frames shall be of welded construction and all perimeter joints shall develop the full strength of the framing members. All door panels to be welded to form a structural inner frame with both vertical and horizontal members. Pan style panels with laminated or similar construction will not be acceptable.
 - 3. Door panel frame members shall be true to dimension and square in all directions.
 - 4. Door panels shall not be bowed, warped, or out of line by more than 1/8" in 20 feet.
 - 5. Exposed welds and welds which interfere with the installation of various parts shall be ground smooth.
 - 6. Welds to be 9" O.C.

- D. Custom Glazing - The design of the custom glazing system is based on the products of Pilkington, (www.pilkington.com), as a standard of quality. All substitutions will be reviewed under the provisions of specification Section 01 2500.
- E. Light Bronzetm high performance tinted float glass, 1/4", tempered, safety glass.
- F. Provide 1/2" air space in between outboard and inboard glazing.
- G. Inboard - Optifloat(tm) clear glass, 1/4", tempered, safety glass.
- H. Refer to specification Section 08 8000 for further information on glazing requirements.
- I. Hardware
 - 1. Provide hardware necessary for a complete installation. Hardware shall be heavy duty type, including all bolts and fittings for the hardware as follows:
 - 2. Door Guides:
 - a. The door guides shall be upside channel shapes fabricated from 3/16-inch thick steel plate.
 - 1) Guide Roller Assemblies: The door shall have a minimum of two anti-friction bearing guide rollers. The guide rollers shall be of sufficient size to transmit the windload from the door panel to the steel door guides. Rollers shall be minimum 2-inch diameter with hardened steel face cover and sealed roller bearings.
 - 2) Hinges: Door shall be complete with shop-applied heavy-duty type jamb and folding hinges. Jamb hinges and folding hinges to have welded barrels, gusseted jab hinges supported on two Timken bearings with continuous pintles to form two shear planes. Jamb hinges to be 3-inch wide by 3/8-inch thick with gussets and folding hinges to be 3 inches wide by 1/4" thick. Each hinge shall be supported on Timken roller bearings. Hinges shall be through bolted on panel. Rolled part of hinge leaves shall be welded. Each fold hinge shall have two (2) bearings. Each hinge shall be provided with Zerk type grease fittings. Flat strap hinges without welded barrels and gusset and forming one shear panel will not be acceptable.
 - 3) Hinge Pintles: Jamb hinges shall have continuous 7/8" diameter steel pintles the full height of the opening. Fold hinges shall have a minimum 5/8" diameter steel pintles the height of the hinge assembly.
 - 4) Weatherstrip: Doors shall be completely weatherstripped with impregnated dual durometer snap-on type weatherseal at the jambs and head, cloth inserted rubber sweep at sill, combination reversing edge and rubber seal at meeting edges, and sponge rubber and metal astragal between door sections.
 - 5) Bow Handles: For manual operation, provide two (2) bow handles per opening to suite the door design and weight.
 - 6) Door Stop; 1" EPD angle.
 - 7) Drive and clutch: provide belt drive system with model 7000 adjustable, spring disk clutch assembly with 10" single groove sheave.
 - 8) Electric Door Operator
- J. Operating Unit: Doors shall be electrically operated using with provisions for emergency manual operation. Provide an easy emergency disconnect system so door can be manually operated in case of power failure. Furnish controls as required including one pushbutton enclosure with three (3) pushbuttons marked "OPEN", "CLOSE", "STOP", this unit shall be located away from the doors' travel path for safety.

1. Electric: The top mounted operator shall consist of a motor, two gear reducers with one common shaft powering both gear reducers (single gear box operators will not be allowed), push buttons, limit switches, control panel, bearings, arms, and all necessary brackets and fittings to provide a smooth and satisfactory operation.
 2. Operator shall open or close the door, starting the door in motion smoothly, the accelerating to mid-swing and bring it to an adjustable slow smooth stop.
 3. The operator mechanism shall be instantly reversible and capable of functioning without chatter and/or vibration.
 4. The motor control circuit shall incorporate a manual reset overload relay with a positively adjustable rotary type limit switch, using three individual limit switches.
 5. Provide an emergency override system so door can be operated in case of power failure.
 6. Door panels shall be free to operate manually after emergency override system is activated.
 7. The system shall automatically reset itself after returning to power operation without readjusting any limit switches.
- K. Electric Motors: Electric motors shall be high starting torque type, of sufficient horsepower and torque output to move door in either direction from any position and produce an average door travel speed of not less than 2/3, not more than 1-foot per second, without exceeding the rated capacity. Motors shall conform to NEMA standards, have class B insulation, service factor of 1.0, and shall be suitable for operation on 208/120 V, 3 phase, 60 hertz current. Motors to be 2 horsepower minimum.
- L. Control Panel: Each door shall be furnished with a NEMA 12 control panel enclosure housing a reversing across the line type magnetic motor starter having thermal pro-overload protection. The control panel shall contain a PLC, relays, fuses, terminal strips, and other electronic components as required to provide the specified operating sequences. All components shall be pre-wired to the terminal strip and neatly labeled. Power circuits in excess of 200 volts shall be provided with control transformers to reduce voltage on the control circuit to 120 volts. Control panel assembly shall be UL labeled. Control panel shall be located between 4 and 6 feet above grade.
- M. Pushbuttons: Pushbuttons shall be located on the interior of the building where shown and shall be the three-button type, with the buttons marked "OPEN", "CLOSE", "STOP". The "OPEN" button shall be of the type requiring only momentary pressure by the operator to cause the door to go from the closed to the fully opened position. When the door is in motion and the "STOP" button is pressed, the door shall stop instantly and remain in the stop position; from the stop position, the door may then be operated in either direction by pushing the "OPEN" or "CLOSE" button. Pushbuttons shall be NEMA 12 rated.
- N. Limit Switches: Shall be NEMA rotary cam-type rated micro switches mounted to cylinder actuators.
- O. Sensing Device: Pneumatic-type reversing edges shall be located full length of the door on the leading edges of the two center sections. Reversing edges will automatically reverse the doors should they come in contact with an obstruction during closing. This reversing edge shall not substitute for a limit switch.
- P. Photo Electric Eyes: Each door shall be provided with two (2) industrial grade photo eyes - One (1) located in front and one (1) located to the rear of the door panels when doors are in the open position. Photo eyes to be infrared type with transmitter and receiver. Units to be provided in a NEMA 4X housing. Photo eyes to be non-reflective through-beam with LED

alignment indicators and supervised relay outputs for providing a detect signal in case of power failure. Photo eyes shall be 110 volt AC.

- Q. Reversing Device: Pneumatic-type reversing edges shall be located the full length of the door on the leading edges of the two center sections. Reversing edges will automatically reverse the doors should they come in contact with an obstruction during closing. The reversing edges shall not substitute for limit switches.
- R. Provide a 7-digit cycle counter.
- S. Access Control and Devices
- T. Manufacturer: The design of the access control systems is based on the products of AllStar (800) 441-9300, as a standard of quality. All substitutions will be reviewed under the provisions of specification Section 01 2500 and Section 01 6000.
- U. Design: Each door shall be provided with a radio receiver and two (2) transmitters. Exterior antennae to be mounted per Owner and Architect's direction. Devices to be programmed to operate the rear overhead door and the front folding door which occur in the same bay.
- V. Receiver: Provide remote relay that will be compatible with overhead door system.
- W. Transmitter: To have a selector switch to operate two doors separately.
- X. Contractor to coordinate with specification Section 08 3613 and that contractor / supplier.
- Y. Shop Finishing
- Z. General: Factory primed door. Thoroughly, clean, pre-treat and prime surfaces of door assembly including: trim, support, and closure pieces.
 - 1. Pre-treatment: As required by primer manufacturer.
 - 2. Primer must be compatible with finish coating.
 - 3. Field paint finish to match aluminum storefront and windows. Refer to specification Sections 08 4313 and 08 5113.
 - 4. Refer to specification section 09 9000 for finish paint color.

PART 3 EXECUTION

3.01 Examination

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Beginning of installation means acceptance of existing surfaces.
- C. Take field dimensions and examine conditions of substrates, supports and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 Preparation - Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

3.03 Installation

- A. Folding door system shall be installed in accordance with the Construction Drawings, approved Shop and Detail Drawings, and the manufacturer's directions. All anchors and inserts to guides, brackets, motors, and other required work should be accurately located. Upon completion of the installation, doors shall be free from warp, twist, distortion and shall be lubricated and properly adjusted to operate freely and smoothly. Field wiring and mounting of the electrical components shall be done under the Electrical Section of the specifications and in

accordance with the door manufacturer's instructions. Door installer will provide the final adjustment of the limit switches.

- B. Anchor assembly to masonry wall construction without distortion or stress.
- C. Fit and align door assembly including hardware, level and plumb, to provide smooth operation.
- D. Coordinate installation of electrical service to be provided by electrical contractor. Provide complete power and control wiring from disconnect to unit components. All low voltage wiring to be installed per the provisions of Division 26.
- E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 9005.
- F. Install perimeter trim and closures.
- G. Tolerances
- H. Maintain dimensional tolerances and alignment with adjacent work.
- I. Maximum Variation from Plumb: 1/16 inch.
- J. Maximum Variation from Level: 1/16 inch.
- K. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 feet straight edge.
- L. Installation must be completed by a manufacturer's certified installer.
- M. Prepare and start systems under provisions of Section 01400.
- N. Ensure the operation and adjustments to door assembly for smooth operation.
- O. Adjusting
- P. Adjust work under provisions of Section 01 1700.
- Q. Adjust door assembly to smooth operation.
- R. Cleaning
- S. Clean work under provisions of Section 01 1700.
- T. Clean doors, frames, and glass.
- U. Remove labels and visible markings.
- V. Protection of Finished Work
- W. Protect finished work under provisions of Section 01 5000.
- X. Do not permit construction traffic through folding apparatus door openings after adjustment and cleaning.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 08 3613
Sectional Doors

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead sectional doors, manually and electrically operated.
- B. Electronically-powered automatic overhead door operator and mounting kit
- C. All low voltage control wiring to be provided and installed by this section. Installation is to be under the construction quality and techniques outlined in Division 16.
- D. All accessories, attachments, and control safety devices necessary to provide a complete installation.

1.02 RELATED REQUIREMENTS

- A. Section 04220 - Concrete Unit Masonry
- B. Section 06 1000 - Rough Carpentry: Rough wood framing for door opening.
- C. Division 16 - Electrical: Electrical service to disconnect located near door operator.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- C. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; 2011.
- D. NEMA MG 1 - Motors and Generators; 2014.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
 - 1. Include data for motor and transmission, shaft and gearing, lubrication frequency, spare parts resources.
- D. Samples: Submit two panel finish samples, 6x6 inch in size, illustrating color and finish.
- E. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- F. Operation Data: Include normal operation, troubleshooting, and adjusting.
- G. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.
- B. Installer: Company specializing in performing the work of this section with minimum 5 years of experience and authorized by the manufacturer.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in labeled protective packages. Store and handle in compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures, and construction operations

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty for finish, doors, tracks, and electric operating equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Overhead Door; Product Thermacore 591 Series: www.overheaddoor.com
- B. Raynor Door: www.raynor.com
- C. Approved Equal

2.02 STEEL DOOR COMPONENTS

- A. Steel Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
 - 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
 - 2. Door Nominal Thickness: 2 inches thick.
 - 3. End Styles: 16 gauge
 - 4. Exterior Surface: Ribbed, Textured
 - 5. Exterior Steel: .016" Hot dipped galvanized
 - 6. Springs: High Cycle - 100,00 cycles
 - 7. Insulation CFC-free and HCFC-free polyurethane, fully encapsulated.
 - 8. Thermal Value: R-Value: 14.86, U-Value: .067
 - 9. Air Infiltration: .08 cfm at 15 mph: .13 cfm at 25 mph
 - 10. High Usage Package: Required
 - 11. Weatherstripping: EPDM rubber tube seals fitted inside joints between sections. EPDM rubber bulb-type strip at bottom. (Header seal and jamb weatherstripping).
 - 12. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
 - 13. Track: Provide 3-inch track as recommended by manufacturer to suit loading required and clearances available.

14. Exterior Finish: Factory finished with acrylic baked enamel; color as selected by Architect.
15. Interior Finish: Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.
16. Glazed Lights: Full panel width, Two row; set in place with security glazing stops. Refer to Exterior Elevations and Door Schedule.
17. Operation: Pull rope.

2.03 DOOR OPERATOR

- A. Reference Product: RSX by Overhead door
 1. Electrical: ½ HP, 115-volt, single phase, fully enclosed, instant reversing.
 2. Reduction:
 - a. Primary: Super Belt - auto tension poly-V flex belt with no adjustment requirements
 - b. Secondary: Chain and sprocket
 3. Duty Cycle: 60 cycles per hour during peak usage periods
 4. Clutch: Friction disk type, adjustable
 5. Brakes: DC disk type with selectable progressive braking for smooth stopping
 6. Limit System: The Limit Lock - adjustable magnetic type
 7. Door to be manually operable in case of power failure.
 8. Mounting: Center mount, draw bar.
- B. Door Control Characteristics
 1. Recessed momentary contact OPEN-CLOSE with spring return, mounted in apparatus bay per plans. Coordinate with Electrical Contractor. All low voltage wiring to be installed under this section. Locate on driver's side.
 2. Remote Controls: Digital radio controls for door operation – provide six (6) remote-control units for each opener.
 3. Entrapment Protection – Provide photoelectric sensors.

2.04 REMOTE DOOR OPERATOR

- A. Manufacturer: Linear Radio Receiver Corporation, Multi-Code #109930 9952 300, Carlsbad, CA, .
 1. Product: Universal programmable door timer.
 2. Performance: Automatically close overhead doors within an adjustable time duration (three to eight minutes) of opening. Provide a bypass function so that doors may be left open upon command. The reversing edge function of the operator is to be retained.
- B. Programmable remote operator for all roll up apparatus bay doors.
- C. Door Control: Provide a control wire conduit from motor operator to Z-tron printer to allow ring down to automatically open front Apparatus Bay doors .

2.05 TRAFFIC SAFETY LIGHT - Provide at each roll up apparatus bay door

- A. Manufacturer: Alkco 207V/FR207 with (2) 69 w long life lamps
- B. Provide 110 VAC to unit-duplex. Low voltage wiring to magnetic switches at floor (Armored floor switch) on track at full open.
- C. Locate on driver's side at +7'-0" AFF.
 1. When door is moving, red light on.
 2. When door is open, green light on.
 3. When door closed, lights are off.
 4. Kit should include switches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
- B. Apply primer to wood frame.

3.03 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch.
- B. Maximum Variation from Level: 1/16 inch.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.

3.06 CLEANING

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Clean doors, frames and glazing.
- C. Remove temporary labels and visible markings.
- D. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

End of Section

Section 08 4313
Aluminum-Framed Storefronts

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Weatherstripping.
- D. Door hardware.
- E. All required attachments, trim, and accessories to provide a complete installation.

1.02 RELATED REQUIREMENTS

- A. Section 06100 - Rough Carpentry
- B. Section 08 5113 - Aluminum Windows: Operable sash within glazing system.
- C. Section 08 7100 - Door Hardware: Hardware items other than specified in this section.
- D. Section 08 8000 - Glazing: Glass and glazing accessories.
- E. Section 12 2113 - Horizontal Louver Blinds: Attachments to framing members.

1.03 REFERENCE STANDARDS

- A. AA DAF-45 - Designation System for Aluminum Finishes; The Aluminum Association, Inc.; 2003.
- B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- D. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.
- E. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- F. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- I. 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; 2004 (Reapproved 2012).
- J. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 PERFORMANCE REQUIREMENTS

- A. Design and size components to withstand the following load requirements without damage or permanent set, when tested in accordance with ASTM E 330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - 1. Design Wind Loads: Comply with requirements of California Building code.
 - a. 70 mph wind speed, exposure C
 - 2. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
- B. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
- C. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E 283.
- D. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 6.00 lbf/sq ft.
- E. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- F. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- D. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- E. Samples: Submit two samples 6 inches long illustrating finished aluminum surface .
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in City's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
- B. Installer - The storefront installer shall be currently approved by the manufacturer, and have experience of at least five (5) years installing the selected system.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

- C. Replacements - In the event of damage, including water intrusion, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the University.

1.09 FIELD CONDITIONS

1.10 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. All storefront and entrances system components shall be the product of a single manufacturer and represent an integrated system.
- B. The aluminum storefront system was designed based on the product of Kawneer as a standard of quality.
- C. Aluminum-Framed Storefront and Doors:
 - 1. EFCO Corporation; _____: www.efcocorp.com/sle.
 - 2. Kawneer North America; _____: www.kawneer.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 STOREFRONT

- A. Glazing: Refer to Section 08 8000.
- B. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Position: Front-set.
 - 2. Condensation Resistance Factor: 40 minimum
 - 3. Finish: Superior performing organic coatings.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 - 4. Finish Color: Black.
 - 5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 - 8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- C. Performance Requirements:
 1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Design Wind Loads: Comply with requirements of ASCE 7.
 - b. Member Deflection: Limit member deflection to 1/175 in any direction, with full recovery of glazing materials.
 2. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.
 3. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 1. Framing members for interior applications need not be thermally broken.
 2. Fabrication Method – Shearblock or equal. Use of exposed fasteners and stacking system with receptor sill not acceptable.
 3. Glazing Stops: Flush.
- B. Doors: Glazed aluminum. Series 500 wide Stile
 1. Thickness: 1 3/4 inches.
 2. Top Rail: 6 inches wide.
 3. Vertical Stiles: 6 inches wide.
 4. Bottom Rail: 10 inches wide.
 5. Glazing Stops: Square.
 6. Finish: Same as storefront.
 7. Pull Handles: See Section 08 7100
 8. Hinges: Kawneer 4 1/2 x4 ball bearing butt hinge with non-removable pin or equal electrified hinge where required.
 9. Exit Device: See Section 08 7100

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.05 FINISHES

- A. Comply with AA DAF-45 for aluminum finishes required.
- B. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.

2.06 HARDWARE

- A. General: Refer to Section 08 7100 "Door Hardware" for requirements for hardware items other than those indicated to be provided by the aluminum entrance manufacturer.
 - 1. Coordinate with hardware provider regarding electronic access control - provide components required for a complete system.
- B. Provide heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required; finish to match door.
 - 1. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
 - 2. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
- C. Other Door Hardware: Storefront manufacturer's standard type to suit application.
 - 1. Finish on Hand-Contacted Items: Polished chrome.
 - 2. For each door, include weatherstripping, sill sweep strip, threshold, pivots, narrow stile handle latch, and closer.
 - 3. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
 - 4. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

2.07 FABRICATION

- A. Develop drainage holes with moisture pattern to exterior.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Install hardware using templates provided.
- K. Install glass and infill panels in accordance with Section 08 8000, using glazing method required to achieve performance criteria.
- L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.
- B. Opening force for doors not to exceed 5 lbs of force

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

End of Section

Section 08 5113
Aluminum Windows

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum windows with fixed sash and operating sash.
- B. Factory glazing.
- C. Operating hardware.
- D. Insect screens.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Rough opening framing.
- B. Section 07 2500 - Weather Barriers: Sealing frame to weather barrier installed on adjacent construction.
- C. Section 07411 - Preformed Metal Wall Panels
- D. Section 07620 - Sheet Metal Flashing and Trim
- E. Section 07650 - Flexible Flashing
- F. Section 08 4313 - Aluminum-Framed Storefronts: Operable sash within framing system.
- G. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

- A. AA DAF-45 - Designation System for Aluminum Finishes; The Aluminum Association, Inc.; 2003.
- B. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.
- C. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
- D. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- E. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- I. 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; 2004 (Reapproved 2012).
- J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

1.04 PERFORMANCE REQUIREMENTS

- A. Design and size windows to withstand the following load requirements, when tested in accordance with ASTM E 330 using test loads equal to 1.5 times the design wind loads with 10 second duration of maximum load:
 - 1. Design Wind Loads: Comply with requirements of CBC code.
 - 2. Positive Design Wind Load: 70 lbf/sq ft.
 - 3. Negative Design Wind Load: 70 lbf/sq ft.
 - 4. Member Deflection: Limit member deflection to 1/175 in any direction, with full recovery of glazing materials.
- B. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
- C. Thermal Resistance: Not more than .59 BTU/her/sf/deg F when tested in accordance with AAMA 1503.1
- D. Air Infiltration: Limit air infiltration through assembly to 0.1 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E 283.
- E. Condensation Resistance Factor: CRF of 53 when measured in accordance with AAMA 1503.1.
- F. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 12 lbf/sq ft.
- G. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, or migrating moisture occurring within system.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
- C. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, and installation requirements.
- D. Samples: Submit two samples, 12 by 12 inch in size illustrating typical corner construction, accessories, and finishes.
- E. Submit two samples of operating hardware.
- F. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
 - 1. Evidence of AAMA Certification.
 - 2. Evidence of WDMA Certification.
 - 3. Evidence of CSA Certification.
 - 4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.
- G. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

- B. The architectural aluminum supplier shall have a quality system registered to one of the ISO 9000 series of standards. The quality system shall be certified by a Registrar approved by the Accreditation Board (RAB) or another, international approval authority.
 - 1. The certificate shall be current and in good standing with the Registrar which issued it.
 - 2. The supplier shall furnish, upon request, a copy or copies of the current certificate.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide 10 year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: _____.
- B. Aluminum Windows:
 - 1. EFCO, a Pella Company: www.efcocorp.com/sle.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- C. Substitutions: See Section 01310 - Substitutions

2.02 WINDOWS

- A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
 - 1. Frame Depth: 3-1/2 inches.
 - 2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
 - 3. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 - 4. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
 - 5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 - 6. Air Infiltration: Limit air infiltration through assembly to .30 cu ft/min/sq ft of wall area, measured at a specified differential pressure across assembly in accordance with ASTM E283.
 - 7. Water Infiltration Test Pressure Differential: 15 pounds per square foot.
 - 8. Condensation Resistance Factor: 58 minimum.
 - 9. Overall U-value, Including Glazing: .60, maximum.

10. Life Cycle Requirements: No damage to fasteners, hardware parts or other components that would render operable windows in operable and not reduction in air and water infiltration resistance when tested according to AAMA 910.
- B. Performance Requirements: Provide products that comply with the following:
 1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
 - a. Performance Class (PC): R.
- C. Fixed, Non-Operable Type:
 1. Construction: Thermally broken.
 2. Glazing: Double; clear; low-e.
- D. Horizontal Sliding Type:
 1. Construction: Thermally broken.
 2. Provide screens.
 3. Glazing: Double; clear; low-e.
- E. Single-Hung Type:
 1. Construction: Thermally broken.
 2. Provide screens.
 3. Glazing: Single; clear; transparent.

2.03 COMPONENTS

- A. Frames: 4" inch wide, of 0.090 inch thick section; thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.
- B. Glazing: As specified in Section 08 8000.
- C. Thermal Barrier. The thermal barrier shall be a minimum 3.8" (9.5) separation consisting of a two-part, chemically curing high density polyurethane which is mechanically and adhesively bonded to the aluminum.
- D. Sills: Provide a Kawneer "Full Depth Sill" at all sills
- E. Sill Extension: Provide a Kawneer "Sub Sill" as shown on drawings. Size per drawings.
- F. Insect Screens: 14/18 mesh, steel strands.
- G. Operable Sash Weatherstripping: Nylon pile; permanently resilient, profiled to achieve effective weather seal.
- H. Glazing Materials: As specified in Section 08 8000.
- I. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

2.05 HARDWARE

- A. Single Hung Windows
 1. Aluminum Auto Lock
 2. Standard Sweep Lock
 3. Heavy Duty Balances
- B. Horizontal Slider Windows
 1. Steel Roller Assembly
 2. Standard Sweep Lock
 3. Aluminum Auto Lock

2.06 FABRICATION

- A. Fabricate components with smallest possible clearances and shim spacing around perimeter of assembly that will enable window installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices.
- D. Arrange fasteners and attachments to ensure concealment from view.
- E. Prepare components with internal reinforcement for operating hardware.
- F. Provide internal drainage of glazing spaces to exterior through weep holes.

2.07 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick; dark bronze.
- B. Apply 1 coat of bituminous coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- E. Install operating hardware not pre-installed by manufacturer.
- F. Install glass and infill panels in accordance with requirements specified in Section 08 8000.
- G. Dissimilar Materials: Provide separation of aluminum materials and other corrodible surfaces from sources of corrosion or electrolytic action contact points by complying with AAMA 101, Appendix, titled "Dissimilar Materials."

3.03 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.05 CLEANING

- A. Adjust hardware for smooth operation and secure weathertight closure.
- B. Remove protective material from factory finished aluminum surfaces.

- C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

End of Section

Section 08 7100
Door Hardware

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood, aluminum, hollow metal, and _____ doors.
- B. Hardware for fire-rated doors.
- C. Lock cylinders for doors that hardware is specified in other sections.
- D. Thresholds.
- E. Weatherstripping, seals and door gaskets.
- F. Gate locks.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 1416 - Flush Wood Doors.
- C. Section 08 4313 - Aluminum-Framed Storefronts: Hardware for same except cylinders; installation of cylinders.

1.03 REFERENCE STANDARDS

- A. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.
- B. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2011.
- C. BHMA A156.3 - American National Standard for Exit Devices; 2014.
- D. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.
- E. BHMA A156.6 - American National Standard for Architectural Door Trim; 2010.
- F. BHMA A156.18 - American National Standard for Materials and Finishes; 2012.
- G. BHMA A156.21 - American National Standard for Thresholds; 2014.
- H. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- I. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.
- J. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; 2004.
- K. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; 1993; also in WDHS-1/WDHS-5 Series, 1996.
- L. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- M. NFPA 101 - Life Safety Code; 2015.
- N. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Submit six copies of hardware schedule at earliest possible date prior to delivery of hardware. Organize schedule into "Hardware Sets" with an index of doors and heading, indicating complete designations of every item required for each door or opening.

- C. Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - 1. Type, style, function, size, and finish of each hardware item.
 - 2. Name and manufacturer of each item.
 - 3. Fastenings and other pertinent information.
 - 4. Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - 5. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 6. Mounting locations for hardware.
 - 7. Door and frame sizes and materials.
 - 8. Keying information.
- D. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- E. Keys: Deliver with identifying tags to City by security shipment direct from hardware supplier.
- F. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in City's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.06 COORDINATION

- A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
- B. Furnish templates for door and frame preparation.
- C. Coordinate City's keying requirements during the course of the Work.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year warranty for door closers and _____.
- C. Provide seven year warranty for locks and cylinders.
- D. Provide two year warranty for all other hardware.

1.08 MAINTENANCE PRODUCTS

- A. Provide special wrenches and tools applicable to each different or special hardware component.

PART 2 PRODUCTS

2.01 MANUFACTURERS - BASIS OF DESIGN

2.02 GENERAL REQUIREMENTS

- A. Provide door hardware specified, or as required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.
- B. Provide items of a single type of the same model by the same manufacturer.
- C. Provide products that comply with the following:
 - 1. Applicable provisions of federal, state, and local codes.

2. Fire-Rated Doors: NFPA 80.
3. Fire-Rated Doors: NFPA 80.
4. Hardware on Fire-Rated Doors, Except Hinges: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.
5. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide hardware that enables door assembly to comply with air leakage requirements of the applicable code.

2.03 LOCKS AND LATCHES

- A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
 1. If no hardware set is indicated for a swinging door provide an office lockset.
 2. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
 3. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.
- B. Lock Cylinders: Manufacturer's standard tumbler type, six-pin standard core.
 1. Provide cams and/or tailpieces as required for locking devices required.
- C. Keying: Grand master keyed.
- D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.04 HINGES

- A. Hinges - Basis of Design: _____.
- B. Hinges: Provide hinges on every swinging door.
 1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
 2. Provide ball-bearing hinges at all doors having closers.
 3. Provide hinges in the quantities indicated.
 4. Provide non-removable pins on exterior outswinging doors.
 5. Where electrified hardware is mounted in door leaf, provide power transfer hinges.

2.05 MORTISE LOCKSETS

- A. Cylinders: Schlage Primus, with 6 pin with F keyway interchangeable core
 1. Schlage: www.schlage.com.

2.06 CLOSERS

- A. Manufacturers - Surface Mounted Closers:
 1. C. R. Laurence Company, Inc; _____: www.crl-arch.com/sle.
 2. LCN, an Allegion brand; _____: www.allegion.com/us.

2.07 FIRE DEPARTMENT LOCK BOX

- A. Door Stops:
 1. Ives: www.iveshardware.com
- B. Door Bottom:
 1. Pemko Manufacturing Co: www.pemko.com.
- C. Threshold:
 1. Pemko Manufacturing Co: www.pemko.com.
 2. Width of threshold to match frame opening
- D. Silencer:

1. Pemko Manufacturing Co: www.pemko.com.
- E. Push Button Mechanical Combination Locks
 1. Kaba - Simplex 5000, non-powered
- F. Lockbox
 1. Knox Company

2.08 GENERAL REQUIREMENTS FOR DOOR HARDWARE PRODUCTS

- A. Finishes: Identified in schedule at end of section.
- B. Proprietary Products: References to specific proprietary products are used to establish minimum standards of utility and quality. Unless otherwise approved by the Architect, provide only the specific products. Design is based on the materials specified. Other materials may be considered by the Architect in accordance with the provisions of Section 01030.
- C. Fasteners:
 1. Furnish all finish hardware with all necessary screws, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
 2. Furnish fastenings where necessary with expansion shields, toggle bolts, sex bolts, and other anchors approved by the Architect, according to the material to which the hardware is to be applied and the recommendations of the hardware manufacturer.
 3. All fastenings shall harmonize with the hardware as to material and finish.
- D. Finishes: All hardware shall match the finish of the locksets, unless specified otherwise. Take special care to coordinate all of the various manufactured items furnished under this Section, to ensure acceptably uniform finish.

2.09 MATERIALS

- A. Locksets: Locksets and latchsets shall be Schlage - . Strikes shall be 16 gage curved steel, bronze or brass with 1" deep box construction, and have lips of sufficient length to clear trim and protect clothing.
 1. Locks shall have minimum ¾-inch throw.
 2. Comply with requirements of local security ordinances.
 3. Provide approved fusible links at levers for labeled doors.
- B. Cylinders - Furnish interchangeable core cylinders with all necessary blocking rings, cams, and other attachments. Coordinate with specified entrance locking mechanisms and other keyed locks.
- C. Hinges: Outswinging exterior doors shall have non-removable (NRP) pin. Hinge open widths shall be minimum, but of sufficient size to permit door to swing 180 degrees. Furnish hinges with steel pins and flush bearings of sufficient throw to clear trim.
 1. Furnish 3 hinges per leaf to 7 feet 0 inches height. Add one for each additional hinge for each 12 inches in height or fraction thereof.
 2. Provide 5-inch heavy weight hinges on doors over 3 feet 0 inches in width.
 3. Provide concealed circuit hinges where required for powered locks.
- D. Panic Hardware and Exit Devices: Furnish sets at wood doors with sex bolts unless otherwise specified. Lever handle trim shall match locksets. Device push bar must release with 15 lbs. maximum pressure is applied in the direction of travel. Products shall comply with UBC Standard 10-4 and shall be mounted between 30" and 44" above the finished floor. Hardware shall also comply with CBC Section 1003.3.1.9.
- E. Surface Door Closers: Full rack and pinion type with removable non-ferrous case. Provide sex bolts and grommets at all wood doors. Place closers inside building, stairs, and rooms.

Closers shall be non-sized, non-handed and adjustable. Provide hold open feature and or spring stop where indicated in schedule.

1. Provide drop brackets, shoe supports, and blade stop spacers as required at narrow top rails.
 2. Doors to have 5 lbs. maximum pressure to open.
- F. Kick Plates: Provide with four beveled edges, .050" gauge, 12" high by width less 2". Furnish with machine or wood screws of stainless steel to match other hardware.
- G. Seals: Seals shall be finished to match adjacent frame color. U.L. label shall be applied on all rated doors.
- H. Door Stops – Furnish floor mounted doorstops of height to engage the doors. Locate wall mounted door stops to engage door hardware and to protect wall and door. Coordinate location of flat blocking in wall at locations to receive wall stops.
- I. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 6 for pairs of doors. Omit where sound or light seals occurs, or for fire-rated door assemblies.
- J. Screws: Exposed screws shall be Phillips head.
- K. Miscellaneous – All other items, not specifically described but required for a complete and proper installation of finish hardware, shall be as selected by the Contractor subject to the approval of the Architect.

2.10 KEYING

- A. Master Keying – Key all cylinders and locks as directed by the Owner.
- B. Number of Keys – Furnish three keys for each level of keying, as directed by Owner.
- C. Construction Keying – Furnish a construction master key system with 15 keys for locks and cylinders. Use only the construction keys during construction.
- D. Identification and Delivery – Factory stamp permanent keys as directed by Owner. Identify permanent keys with tags and delivery directly to the Owner.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available to power operated devices and of the correct characteristics.

3.02 Hardware Locations

- A. All hardware shall be mounted to comply with current ADA and CBC requirements.
1. Lock: 38 inches from finished floor to center of lever.
 2. Door Pull: 40 inches from finished floor to center of pull.
 3. Panic: 40 inches from finished floor to center of pad.
 4. Deadlock Strike: 44 inches from floor, centered.
 5. Floor Stop: Where occurs in path of travel, locate within 4 inches of adjacent wall.

3.03 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.

- C. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.
- E. Mounting heights for hardware from finished floor to center line of hardware item. As indicated in the following list; unless noted otherwise in Door Hardware Sets Schedule or on the drawings.

3.04 FINISHES:

- A. All finishes are: Satin Chrome Plated (626) or Anodized Aluminum (628)
- B. Unless otherwise noted

3.05 SCHEDULE.

End of Section

Section 08 8000

Glazing

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass.
- B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 2500 - Weather Barriers.
- B. Section 08 1113 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- C. Section 08 1416 - Flush Wood Doors: Glazed lites in doors.
- D. Section 08 3613 - Sectional Doors: Glazed lites in doors.
- E. Section 08 4313 - Aluminum-Framed Storefronts: Glazing furnished by storefront manufacturer.
- F. Section 08 5113 - Aluminum Windows: Glazed windows.
- G. Section 08 8300 - Mirrors.
- H. Section 10815 - Glass Tub and Shower Enclosures

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- D. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- E. GANA (GM) - GANA Glazing Manual; 2009.
- F. GANA (SM) - GANA Sealant Manual; 2008.

1.04 PERFORMANCE REQUIREMENTS

- A. Provide glass and glazing materials for continuity of building enclosure vapor retarder and air barrier:
 - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
 - 2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- C. Samples: Submit two samples 12 by 12 inch in size of glass and plastic units, showing coloration and design of glass units, showing coloration.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.

- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

PART 2 PRODUCTS

2.01 GLASS MATERIALS

- A. Manufacturers:
 - 1. AFG Industries, Inc: www.afgglass.com.
 - 2. Pilkington Building Products North America: www.pilkington.com.
 - 3. PPG Industries, Inc: www.ppg.com.
 - 4. Substitutions: Refer to Section 01 6000 - Product Requirements.
- B. Clear Float Glass (Type PPG): Clear, annealed.
 - 1. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
 - 2. 6 mm thick.
 - 3. Total Thickness: Single Pane
 - 4. Location: All interior Glazing
- C. Safety Glass : Clear; fully tempered with horizontal tempering:
 - 1. Color and Thickness:
 - a. Interior: To match Clear Float Glass
 - b. Exterior: To match Low E Glass
 - 2. Comply with 16 CFR 1201 test requirements for Category II.
 - 3. 6 mm minimum thick.
 - 4. Provide this type of glazing in the locations required by code.
 - a. Glazed lites in doors .
 - b. Glazed sidelights to doors.
- D. Low E Glass (Type PPG Solarban 60 Solarbronze +Clear): Float type, annealed, in bronze color.
 - 1. Visible light transmittance of 42 percent, UV light transmittance of 8 percent, shading coefficient of .31.
 - 2. U-Value: Winter Nighttime: .29, Summer Daytime: .27
 - 3. Visible light reflectance of 7 percent.
 - 4. 6 mm minimum thick.
 - 5. Total thickness: Double Pane 1" thick
 - 6. Location: All Exterior Glazing (Including Apparatus Bay Doors)
- E. Low E Glass (Type PPG Solarban 60 "Clear+Clear"): Float type, annealed, clear.
 - 1. Visible light transmittance of 70 percent, UV light transmittance of 19 percent, shading coefficient of .44.
 - 2. U-Value: Winter Nighttime: .29, Summer Daytime: .27
 - 3. Visible light reflectance of 11 percent.
 - 4. 6 mm minimum thick.
 - 5. Total thickness: Double Pane 1" thick
 - 6. Location: All Exterior Glazing (Including Apparatus Bay Doors)

2.02 SEALED INSULATING GLASS UNITS

- A. Manufacturers:
 - 1. Any of the manufacturers specified for float glass.
 - 2. Substitutions: Refer to Section 01 6000 - Product Requirements.
- B. Sealed Insulating Glass Units: Types as indicated.
 - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 2. Edge Spacers: Aluminum, bent and soldered corners.
 - 3. Edge Seal: Glass to elastomer with supplementary silicone sealant.
 - 4. Purge interpane space with dry hermetic air.

2.03 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; hardness range of 5 to 30 cured Shore A durometer; coiled on release paper; black color.
- D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; _____ color.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

- A. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.03 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 08 8300

Mirrors

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass mirrors.

1.02 RELATED REQUIREMENTS

- A. Section 06 2000 - Finish Carpentry: Wood mirror frames.

1.03 REFERENCE STANDARDS

- A. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- B. GANA (GM) - GANA Glazing Manual; 2009.
- C. GANA (TIPS) - Mirrors: Handle with Extreme Care (Tips for the Professional on the Care and Handling of Mirrors); 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Samples: Submit two samples, 12 x 12 inch in size, illustrating mirrors design, edging, and coloration.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in City's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual for glazing installation methods.
- B. Fabricate, store, transport, receive, install, and clean mirrors in accordance with recommendations of GANA (TIPS).

1.06 FIELD CONDITIONS

- A. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Mirrors:
 - 1. Binswanger Mirror/ACI Distribution: www.binswangerglass.com.
 - 2. Lenoir Mirror Co: www.lenoirmirror.com.

2.02 MATERIALS

- A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.

2.03 ACCESSORIES

- A. Mirror Attachment Accessories: Stainless steel clips.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces of mirror frames or recesses are clean, free of obstructions, and ready for installation of mirrors.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.

3.03 INSTALLATION

- A. Install mirrors in accordance with GANA (TIPS) and manufacturers recommendations.
- B. Set mirrors plumb and level, and free of optical distortion.
- C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.
- D. Frameless Mirrors: Set mirrors with clips, and anchor rigidly to wall construction.

3.04 CLEANING

- A. Remove labels after work is complete.
- B. Clean mirrors and adjacent surfaces.

End of Section

Section 08 9100

Louvers

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Louvers, frames, and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 09 9113 - Exterior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. AMCA 511 - Certified Ratings Program for Air Control Devices; 2010.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.
- D. Samples: Submit two samples 2 by 2 inches in size illustrating finish and color of exterior and interior surfaces.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide twenty year manufacturer warranty against distortion, metal degradation, and failure of connections.
 - 1. Finish: Include coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 LOUVERS

- A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
- B. Stationary Louvers: Horizontal blade, formed galvanized steel sheet construction, with intermediate mullions matching frame.
 - 1. Blades: Straight.

2. Frame: 4 inches deep, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
3. Steel Thickness, Galvanized: Frame 16 gage, 0.0598 inch minimum base metal; blades 16 gage, 0.0598 inch minimum base metal.
4. Steel Finish: Superior performing organic coatings, finished after fabrication.

2.03 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

2.04 ACCESSORIES

- A. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.
- B. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Install louvers level and plumb.
- C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- D. Secure louver frames in openings with concealed fasteners.
- E. Coordinate with installation of mechanical ductwork.

3.03 CLEANING

- A. Strip protective finish coverings.
- B. Clean surfaces and components.

End of Section

Section 09 2116
Gypsum Board Assemblies

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal stud wall framing.
- B. Metal channel ceiling framing.
- C. Cementitious backing board.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Textured finish system.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Building framing and sheathing.
- B. Section 07 2100 - Thermal Insulation: Acoustic insulation.
- C. Section 09 3000 - Tiling: Tile backing board.

1.03 REFERENCE STANDARDS

- A. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 2010 (Revised).
- B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2010).
- C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- D. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- E. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- F. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- G. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- H. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- I. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- J. ASTM C1325 - Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2014.
- K. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- L. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

- N. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- O. GA-214 - Recommended Levels of Gypsum Board Finish; Gypsum Association; 1996.
- P. GA-216 - Application and Finishing of Gypsum Board; 2013.
- Q. GA-600 - Fire Resistance Design Manual; 2015.
- R. UL (FRD) - Fire Resistance Directory; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on gypsum board, accessories, and joint finishing system.
- C. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.05 QUALITY ASSURANCE

- A. Perform in accordance with ASTM C 840.
- B. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 2. Dietrich Metal Framing: www.dietrichindustries.com.
 - 3. Phillips Manufacturing Company: www.phillipsmfg.com.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
 - 1. Exception: The minimum metal thickness and section properties requirements of ASTM C 645 are waived provided steel of 40 ksi minimum yield strength is used, the metal is continuously dimpled, the effective thickness is at least twice the base metal thickness, and maximum stud heights are determined by testing in accordance with ASTM E 72 using assemblies specified by ASTM C 754.
 - 2. Studs: "C" shaped with flat or formed webs with knurled faces.
 - 3. Runners: U shaped, sized to match studs.
 - 4. Ceiling Channels: C-shaped.
 - 5. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
 - 6. Resilient Furring Channels: 1/2 inch depth, for attachment to substrate through one leg only.
 - a. Products:
- C. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:

1. American Gypsum Company: www.americangypsum.com.
 2. Georgia-Pacific Gypsum: www.gpgypsum.com.
 3. National Gypsum Company: www.nationalgypsum.com.
 4. USG Corporation: www.usg.com.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold resistant board is required at areas exposed to moisture and at the Apparatus Bay ceilings and walls..
 - 1) Provide resilient furring channels at ceilings at 12" O.C. for attachment of mold-resistant board.
 3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
 5. Mold Resistant Paper Faced Products:
 - a. American Gypsum Company; M-Bloc.
- C. Impact Resistant Wallboard:
1. Application: High-traffic areas indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Type: Fire resistance rated Type X, UL or WH listed.
 4. Thickness: 5/8 inch.
 5. Edges: Tapered.
 6. Products:
- D. Backing Board For Wet Areas: One of the following products:
1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower surrounds and tile wall wainscots.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
 - a. Thickness: 1/2 inch.
 - b. Products:
 - 1) Custom Building Products: www.custombuildingproducts.com.
 - 2) USG Corporation: www.usg.com.
 - 3) Substitutions: See Section 01 6000 - Product Requirements.
- E. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings, unless otherwise indicated.
 2. Thickness: 1/2 inch.
 3. Edges: Tapered.

2.04 ACCESSORIES

- A. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
1. Types: As detailed or required for finished appearance.

- B. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
- C. Textured Finish Materials: Latex-based compound; plain.
- D. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- E. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.
- F. Screws: ASTM C 1002; self-piercing tapping type; cadmium-plated for exterior locations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
- C. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
 - 1. Orientation: Horizontal.
 - 2. Spacing: At 16 inches on center.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Corner Beads: Install at external corners, using longest practical lengths.
- B. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.05 JOINT TREATMENT

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
 - 2. Level 3: Walls to receive textured wall finish.
 - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 4. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- B. Finish gypsum board in scheduled areas in accordance with levels defined in ASTM C 840 and as scheduled below.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

1. Feather coats of joint compound so that camber is maximum 1/32 inch.

3.06 TEXTURE FINISH

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.08 FINISH LEVEL SCHEDULE

- A. Level 1: Above finished ceilings concealed from view.
- B. Level 2: Utility areas and areas behind cabinetry.
- C. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.
- D. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 09 2236.23

Metal Lath

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal lath for portland cement plaster.
- B. Metal lath for Cast Stone Masonry.

1.02 RELATED REQUIREMENTS

- A. Section 04 7200 - Cast Stone Masonry
- B. Section 06 1000 - Rough Carpentry: Sheathing on exterior walls.
- C. Section 07 2500 - Weather Barriers: Weather barrier under exterior plaster and stucco.

1.03 REFERENCE STANDARDS

- A. ASTM C847 - Standard Specification for Metal Lath; 2014a.
- B. ASTM C933 - Standard Specification for Welded Wire Lath; 2014.
- C. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- D. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- E. ASTM C1032 - Standard Specification for Woven Wire Plaster Base; 2014.
- F. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2015a.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on furring and lathing components, structural characteristics, material limitations, and finish.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with at least three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Lath:
 - 1. Cemco: www.cemcosteel.com.
 - 2. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 3. Structa Wire Corporation; Structa Mega Lath: www.structawire.com/sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FRAMING AND LATH ASSEMBLIES

- A. Provide completed assemblies with the following characteristics:
 - 1. Maximum Deflection of Vertical Assemblies: 1:360 under lateral point load of 100 lbs.
 - 2. Maximum Deflection of Horizontal Assemblies: 1:240 deflection under dead loads and wind uplift.

2.03 LATH

- A. Diamond Mesh Metal Lath: ASTM C847, galvanized; self-furring.
 - 1. Weight: To suit application and as specified in ASTM C841 or ASTM C1063 for framing spacing.
 - 2. Weight: 2.5 lb/sq yd.
- B. Ribbed Metal Lath: ASTM C847, galvanized; 3/8 inch thick.
 - 1. Weight: To suit application and as specified in ASTM C841 or ASTM C1063 for framing spacing.
 - 2. Weight: 3.4 lb/sq yd.
 - 3. Backed with treated paper.
 - 4. Location: At all horizontal surfaces
- C. Corner Mesh: Formed sheet steel, minimum 0.018 inch thick, perforated flanges shaped to permit complete embedding in plaster, minimum 2 inch size; same finish as lath.
- D. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, and maximum possible lengths.
 - 1. Material: Formed sheet steel with rust inhibitive primer, expanded metal flanges.
 - 2. Casing Beads: Square edges.
 - 3. Corner Beads: Radiused corners.
 - 4. Base Screeds: Beveled edges.
 - 5. Control Joints: Accordion profile with protective tape, 2 inch flanges.
- E. Refer to Section 04 7200 for metal lath requirements at cast stone masonry.

2.04 ACCESSORIES

- A. Anchorage: Tie wire, nails, and other metal supports, of type and size to suit application; to rigidly secure materials in place, galvanized.
- B. Fasteners: Self-piercing tapping screws; ASTM C1002 or ASTM C954.
- C. Tie Wire: Annealed galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that substrates are ready to receive work and conditions are suitable for application.
- C. For exterior plaster and stucco on stud walls, verify that water-resistive barrier has been installed over sheathing substrate completely and correctly.
- D. Do not begin until unacceptable conditions have been corrected.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION - GENERAL

3.03 LATH INSTALLATION

- A. Apply lath taut, with long dimension perpendicular to supports.
- B. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches from corner to form the angle reinforcement; fasten at perimeter edges only.
- C. Place corner bead at external wall corners; fasten at outer edges of lath only.

- D. Place base screeds at termination of plaster areas; secure rigidly in place.
- E. Place 4 inch wide strips of lath centered over junctions of dissimilar backing materials, and secure rigidly in place.
- F. Place lath vertically above each top corner and each side of door frames to 6 inches above ceiling line.
- G. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.
- H. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

3.04 TOLERANCES

- A. Maximum Variation from True Lines and Levels: 1/8 inch in 10 feet.
- B. Maximum Variation from True Position: 1/8 inch.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 09 2400
Cement Plastering

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cement plastering.

1.02 RELATED REQUIREMENTS

- A. Section 04 7200 - Cast Stone Masonry
- B. Section 07 2500 - Weather Barriers.
- C. Section 09 2236.23 - Metal Lath: Lath, furring, beads, screeds, and joint accessories for plaster base.

1.03 REFERENCE STANDARDS

- A. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
- B. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- C. ASTM C206 - Standard Specification for Finishing Hydrated Lime; 2014.
- D. ASTM C897 - Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters; 2015.
- E. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster; 2015b.
- F. ICC (IBC) - International Building Code; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide data on plaster materials and trim accessories.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.06 FIELD CONDITIONS

- A. Exterior Plaster Work: Do not apply plaster when substrate or ambient air temperature is 40 degrees F or lower, or when temperature is expected to drop below 40 degrees F within 48 hours of application.

PART 2 PRODUCTS

2.01 CEMENT PLASTER APPLICATIONS

- A. Lath Plaster Base: Metal lath.
 - 1. Plaster Type: Factory prepared plaster mix.
 - 2. First Coat: Apply to a nominal thickness of 3/8 inch.
 - 3. Second Coat: Apply to a nominal thickness of 3/8 inch.
 - 4. Leveling Coat: Apply to a nominal thickness of 1/32 to 1/16 inch.

2.02 JOBSITE MIXED CEMENT PLASTER

- A. Materials:
 - 1. Portland Cement: ASTM C150/C150M, Type I.
 - 2. Masonry Cement: ASTM C91/C91M, Type N.
 - 3. Lime: ASTM C206, Type S.

4. Sand: Clean, well graded, and complying with ASTM C897.
5. Water: Clean, fresh, potable, and free of mineral or organic matter that could adversely affect plaster.
- B. Plaster Mixes: Proportioned in accordance with ASTM C926; parts by volume.
 1. First Coat Over Lath:
 - a. Plaster Mix "CM": One part Portland cement, and one part Type N masonry cement.
 - b. Minimum 2-1/2 parts and maximum 4 parts sand, per total volume of cementitious materials.

2.03 ACCESSORIES

- A. Lath: As specified in Section 09 2236.23.
- B. Beads, Screeds, and Joint Accessories: As specified in Section 09 2236.23.
- C. Reinforcing Mesh: 4.5 oz/sq yd alkali-resistant mesh.
- D. Water Resistive Barrier: As specified in Section 07 2500.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are properly in place.
- C. Verify mechanical and electrical equipment and services located within areas to receive this work have been properly tested and approved.

3.02 Mixing

- A. Mix only as much plaster as can be used prior to initial set.
- B. Mix materials dry, to uniform color and consistency, before adding water.
- C. Protect mixtures from frost or freezing temperatures, contamination, and excessive evaporation.

3.03 APPLICATION

- A. Apply plaster in accordance with manufacturer's written instructions and comply with ASTM C926.
- B. Base Coats:
 1. Apply base coat(s) to fully embed lath and to specified thickness.
 2. Follow guidelines in ASTM C926 and manufacturer's written installation instructions for moist curing base coats and application of subsequent coats.
- C. Leveling Coat:
 1. Apply leveling coat to specified thickness.

3.04 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet.

3.05 REPAIR

- A. Patching: Remove loose, damaged or defective plaster and replace with plaster of same composition; finish to match surrounding area.

End of Section

Section 09 3000

Tiling

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for wall and base application.
- B. Tile for shower receptors.
- C. Cementitious backer board as tile substrate.
- D. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

- A. Section 03 3513 - High-Tolerance Concrete Floor Finishing
- B. Section 07 1300 - Sheet Waterproofing.
- C. Section 07 1400 - Fluid-Applied Waterproofing.
- D. Section 22 4000 - Plumbing Fixtures: Shower receptor.

1.03 REFERENCE STANDARDS

- A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2013.1.
 - 1. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
 - 2. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).
 - 3. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).
 - 4. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 2010 (Revised).
 - 5. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
 - 6. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2010 (Revised).
 - 7. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2010).
 - 8. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes For Thin-Set Ceramic Tile And Dimension Stone Installation; 2014.
- B. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-set Ceramic Tile and Dimension Stone Installation; 2014.
- C. ASTM C847 - Standard Specification for Metal Lath; 2014a.
- D. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Samples:
 - 1. Submit to the Architect two (2) samples of all selected colors of tile and all available colors of grout.
 - 2. Submit to the Architect two (2) 18"x 18' sample boards indicating all specified patterns, colors and trims of tile and grout.
- E. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- C. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

1.06 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
- B. Construct tile mock-up where indicated by Architect, incorporating all components specified for the location.
 - 1. Approved mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

1.09 EXTRA MATERIALS

- A. Provide 3 sq. ft of each size, color, and surface finish of tile specified.

PART 2 PRODUCTS

2.01 TILE

- A. Manufacturers: All products by the same manufacturer.
 - 1. Wausau Tile: www.wausautile.com
 - 2. American Olean Corporation: www.americanolean.com.
 - 3. Dal-Tile Corporation: www.daltile.com.
 - 4. Or pre-approved equal
- B. Unglazed Porcelain Tile: At Shower Pan and Walls
 - 1. Composition: Impervious Porcelain
 - 2. Size:
 - a. Wall Tile: 24" by 24"
 - b. Wall Accent: 12"x 24" and 4"x10"
 - c. Shower Pan: 12" x 24"

3. Finish: Unpolished
 4. Basis-of-Design Product: "Unglazed Mosaics and Options" by American Olean
 - a. Relative Price: Premier
 5. Color: To be Selected from Manufacturer's Standard Line
 6. Blend: Assume two color blend for wall and at 75/25 with an accent stripe
 7. Trim: Bullnose, Bullnose corner, Coved base
- C. Unglazed Porcelain Tile: At Wall Wainscot
1. Composition: Impervious Porcelain
 2. Thickness: 5/16"
 3. Size:
 - a. Wall Field: 24" by 24"
 - b. Wall Accent: 12" x 24" and 4"x10"
 4. Finish: Unpolished
 5. Basis-of-Design Product: "Alysse" by American Olean
 - a. Relative Price: Premier
 6. Color: To be Selected from Manufacturer's Standard Line
 7. Trim: 4"x12" Bullnose at top of wainscot

2.02 TRIM AND ACCESSORIES

- A. Non-Ceramic Trim: Satin brass anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
1. Applications:
 - a. Large Corner Caddy - 2 3/4" x 2 3/8" x 8 3/4"
 - 1) Quantity: 2 per shower
 - b. Tub Soap Dish - 6 5/8" x 4 3/4" x 3 1/2"
 - 1) Quantity: 1 per shower
 2. Manufacturers:
 - a. American Olean: www.americanolean.com
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 SETTING MATERIALS

- A. Manufacturers:
1. Custom Building Products; ____: www.custombuildingproducts.com.
 2. LATICRETE International, Inc; ____: www.laticrete.com/sle.
 3. Merkrete, by Parex USA, Inc; ____: www.merkrete.com/sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ADHESIVE MATERIALS

- A. Manufacturers:
1. Bonsal American, Inc: www.sakrete.com
 2. Bostik Inc: www.bostik-us.com.
 3. Mapei Corporation: www.mapei.com.
- B. Organic Adhesive: ANSI A136.1, thinset bond type.

2.05 MORTAR MATERIALS

- A. Manufacturers:
1. Bostik Inc: www.bostik-us.com.
 2. Custom Building Products: www.custombuildingproducts.com.

2.06 GROUTS

- A. Manufacturers:
 - 1. Bonsal American, Inc: www.sakrete.com
 - 2. Bostik Inc: www.bostik-us.com
 - 3. Custom Building Products: www.custombuildingproducts.com

2.07 THICK-BED MATERIALS

- A. Metal Lath: ASTM C 847, Flat diamond mesh, of weight to suit application, galvanized finish.
 - 1. Color: As selected.

2.08 ACCESSORY MATERIALS

- A. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
 - 1. Crack Resistance: No failure at 1/16 inch gap, minimum; comply with ANSI A118.12.
 - 2. Bonded Sheet Membrane Type:
 - a. Material: Polyethylene sheet membrane with non-woven fabric laminated to both sides, 20 to 30 mils thick, nominal.
- B. Membrane at Walls: 4 mil thick polyethylene film.
- C. Backer Board at Walls and Wainscots: Cementitious backer board type complying with ANSI A118.9; 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
- D. Backer Board at Showers: Thermal plastic faced extruded polystyrene foam backer board type complying with ANSI A118.10; 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- B. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Install thermal plastic faced extruded polystyrene foam backer tapered floor board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.
- D. Install thermal plastic faced extruded polystyrene foam backer board in accordance with ANSI A108 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.
- E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

- A. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

- B. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- C. Form internal angles square and external angles bullnosed.
- D. Install non-ceramic trim in accordance with manufacturer's instructions.
- E. Sound tile after setting. Replace hollow sounding units.
- F. Keep control and expansion joints free of mortar, grout, and adhesive.
- G. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- H. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- I. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - SHOWERS AND BATHTUB WALLS

- A. At tiled shower receptors install in accordance with TCNA (HB) Method B415, mortar bed floor, and W244, thin-set over cementitious backer unit walls.
- B. Grout with standard grout as specified above.

3.05 INSTALLATION - WALL TILE

- A. Over thermal plastic faced wxtruded polystyrene foam backer units install in accordance with TCNA (HB) Method W246.

3.06 CLEANING

- A. Clean tile and grout surfaces.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

3.08 SCHEDULE

- A. Restroom Porcelain Tile Floors:
 - 1. Tile:_____.
 - 2. Base: Coved, 6" high x 12" length.
- B. Restroom Porcelain Tile Wainscot:
 - 1. Wall Tile:_____.
 - a. Field Tile:_____.
 - b. Accent Tile:_____.
- C. Shower Porcelain Tile Floors:
 - 1. Tile:_____.
 - 2. Base: Coved, 6" high x 12" length.
- D. Shower Porcelain Wall Tile:
 - 1. Wall Field Tile:_____.
 - 2. Accent Tile:_____.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 09 5100
Acoustical Ceilings

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 RELATED REQUIREMENTS

- A. Section 07 2100 - Board and Batt Insulation: Acoustical insulation.

1.03 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.
- C. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Samples: Submit two samples 12 by 12 inch in size illustrating material and finish of acoustical units.
- D. Samples: Submit two samples each, 8 inches long, of suspension system main runner, cross runner, and perimeter molding.

1.05 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.07 PROJECT CONDITIONS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Install acoustical units after interior wet work is dry.

1.08 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional provisions.
- B. Provide 80 sq ft of each type of acoustical unit for City's use in maintenance of project.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustic Tiles/Panels:

1. Armstrong World Industries, Inc: www.armstrong.com.
 2. CertainTeed Corporation: www.certainteed.com.
 3. USG: www.usg.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Suspension Systems:
1. Same as for acoustical units.
 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. Acoustical Panels Type A:
1. Size: 24 by 24 inches.
 2. Light Reflectance: 87 percent, determined in accordance with ASTM E1264.
 3. NRC Range: 0.70 to 0.80, determined in accordance with ASTM E1264.
 4. Panel Edge: Square.
 5. Surface Pattern: Perforated.
 6. Surface Color: White.

2.03 SUSPENSION SYSTEM(S)

- A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- B. Exposed Steel Suspension System Type A: Formed steel, commercial quality cold rolled; heavy-duty.
1. Profile: Tee; 15/16 inch wide face.
 2. Construction: Double web.
 3. Finish: Painted, color as selected.
 4. Products:

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- C. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.
- B. Install suspension system in accordance with DSA IR 25-2
- C. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.
- J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Overlap and rivet corners.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.

3.04 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 09 6500
Resilient Flooring

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient base.
- B. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

- A. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store all materials off of the floor in an acclimatized, weather-tight space.
- B. Protect roll materials from damage by storing on end.

1.06 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.07 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional provisions.

1.08 WARRANTY

- A. Manufacturer's 10 year warranty on all products.
- B. Contractor to warranty installation for three (3) years.

PART 2 PRODUCTS

2.01 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
 - 1. Height: 6 inch typical, 4 inch below casework.
 - 2. Thickness: 0.125 inch.
 - 3. Finish: Satin.
 - 4. Length: Roll.
 - 5. Manufacturers:
 - a. BurkeMercer Flooring Products: www.burkemercer.com.
 - b. Roppe Corp: www.roppe.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCESSORIES

- A. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- B. Moldings, Transition and Edge Strips: Same material as flooring.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

3.02 PREPARATION

- A. Clean substrate.
- B. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 Installation - Resilient Base

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.
- E. Install straight and level to variation of plus or minus 1/8 inch over 10 feet.

3.04 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

End of Section

Section 09 6566
Resilient Athletic Flooring

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interlocking, loose-laid rubber tile.
- B. Resilient athletic floor tile.
- C. Accessories required for installation, maintenance and repair.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.

1.03 REFERENCE STANDARDS

- A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2006a (Reapproved 2013).
- B. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- D. CA (State of California) Section 01350: Standard Method for Testing and Evaluation of Volatile Organic Compound Emissions from Indoor Sources Using Environmental Chambers.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed data sheets for products specified, and printed installation guidelines.
- C. Shop Drawings: Fabrication and installation details, and layout, colors, and equipment locations.
- D. Selection Samples: Manufacturer's color charts for flooring materials specified, indicating full range of colors and textures available.
- E. Verification Samples: Actual flooring material specified, not less than 6 inch square, mounted on solid backing.
- F. Maintenance Guidelines: Provide manufacturer's printed maintenance guidelines for resilient athletic flooring.
- G. Warranty: Provide manufacturer's printed standard warranty for resilient athletic flooring.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer must have a minimum of 15 years of experience in the manufacturing of prefabricated resilient athletic flooring.
- B. Installer Qualifications: An experienced installer with experience in installations for the last 3 years and certified in writing by the flooring manufacturer to be qualified for installation of specified flooring system.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.

- B. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.07 FIELD CONDITIONS

- A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70-95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

PART 2 PRODUCTS

2.01 PREFORMED ATHLETIC FLOORING

- A. Manufacturers: All products by the same manufacturer.
 - 1. Mondo Sport & Flooring: www.mondoindoorsportusa.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Rubber Tile Flooring: Resilient rubber athletic flooring, calendered and vulcanized with a base of natural and synthetic rubbers, stabilizing agents formed into square tiles.
 - 1. Thickness: Minimum 3/8 inch.
 - 2. Size: Nominal 36 inch square.
 - 3. Tensile Strength: Minimum 600 psi, per ASTM D412.
 - 4. Surface Texture: Hammered.
 - 5. Color: As selected from manufacturer's standards.

2.02 ACCESSORIES

- A. Leveling Compound: As recommended by flooring manufacturer for substrate conditions.
- B. Flooring Adhesive: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Concrete: Use leveling compound as necessary to achieve substrate flatness of plus or minus 1/8 inch within 10 ft radius.
- B. Remove coatings that are incompatible with flooring adhesives, using methods recommended by flooring manufacturer.
- C. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Comply with manufacturer's recommendations.

C. Rubber Tile Flooring:

1. Lay out center lines in spaces to receive tile flooring, based on location of principal walls. Start tile installation from center, and adjust as necessary to avoid tiles less than one-half width at perimeter.
2. Lay tiles square with room axis, matching for color and pattern by selecting from cartons and mixing as recommended by manufacturer.

3.04 CLEANING

- A. Clean flooring using methods recommended by manufacturer.

3.05 PROTECTION

- A. Protect finished athletic flooring from construction traffic in accordance with manufacturer's written instructions to ensure that it is without damage upon Date of Substantial Completion.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 09 9000
Painting and Coating

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, varnishes, and other coatings.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
- D. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Floors, unless specifically so indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.
- E. See Schedule - Surfaces to be Finished, at end of Section.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Shop-primed items.
- B. Section 06 2000 - Finished Carpentry
- C. Section 07 7123 - Manufactured Gutters and Downspouts
- D. Section 09 2400 - Portland Cement Plaster

1.03 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- C. GreenSeal GS-11 - Paints and Coatings; 2013.

1.04 DEFINITIONS

- A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content.
- C. Samples: Submit three drawdown samples of selected colors for review.
- D. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- E. Certification: By manufacturer that all paints and coatings do not contain any of the prohibited chemicals specified; GreenSeal GS-11 certification is not required but if provided shall constitute acceptable certification.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum 5 years experience. Work to be performed only by workers thoroughly skilled and specially trained in the techniques of painting, and who are completely familiar with the published recommendations of the manufacturer of the paint material being used.
- C. Single-Source Responsibility - Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code requirements for products and finishes including
- B. Air Pollution Control District regulations and federal lead content laws.
- C. VOC Compliance regulations
- D. Conform to California Air Resources Board (CARB) Rules, especially 1113
- E. Woodworking Institute (W.I.).

1.08 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
 - 1. Mock-up: Before proceeding with paint application, finish one complete surface of each color scheme required, clearly indicating selected colors, finish texture, materials and work quality. If approved, sample area will serve as a minimum standard for work throughout.
 - 2. Locate where directed.
 - 3. If approved, mock-up may remain as part of the Work.
- B. DELIVERY, STORAGE, AND HANDLING
 - 1. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
 - 2. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
 - 3. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.
- C. FIELD CONDITIONS
 - 1. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- D. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
 - 1. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
 - 2. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
 - 3. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
 - 4. Provide lighting level of 80 ft candles measured mid-height at substrate surface.
- E. EXTRA MATERIALS
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

2. Supply 1 gallon of each color; store where directed.
3. Label each container with color in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
 1. Benjamin Moore & Co: www.benjaminmoore.com.
 2. Sherwin Williams: www.sherwin-williams.com
 3. Dunn Edwards Paints: www.dunnedwards.com.
- C. Stains:
 1. Olympic: www.ppg.com
 2. Watco: www.rust-oleum.com
- D. Copper "metal effects" paint coating and green patina aging solution coating shall be by Modern Masters, (818) 683-0201.
- E. Sealers:
 1. Thompson's Water Seal Advanced Clear Multi-Surface Waterproof.
- F. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 2. Supply each coating material in quantity required to complete entire project's work from a single production run.
 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a.
 - b. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Color Schedules
 1. The Architect will prepare a color schedule with samples for guidance in painting after color selection from samples submitted.
 2. The Architect may select, allocate, and vary colors on different surfaces throughout the work, subject to the following:

- a. Exterior Work: A maximum of four (4) different colors will be used, with variations for trim, doors, miscellaneous work and metal work.
3. Interior Work: A maximum of four (4) different pigmented colors will be used, with variations for trim and wall surfaces and wainscots.
4. Paints at Wet Areas
- E. In toilet rooms and contiguous areas, add an approved fungicide to paints.
 1. For oil based paints, use 1% phenylmercuric or 4% tetrachlorophenol.
 2. For water emulsion and glue size surfaces, use 4% sodium tetrachlorophenate.
 3. Compatibility
 - a. All paint materials and equipment shall be compatible in use: finish coats shall be compatible with prime coats; prime coats shall be compatible with the surface to be coated; all tools and equipment shall be compatible with the coating to be applied.
- F. Thinners, when used, shall be only those thinners recommended for that purpose by the manufacturer of the material to be thinned.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Perform ph and moisture content tests on substrates where indicated by manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Gypsum Wallboard: 12 percent.
 2. Plaster and Stucco: 12 percent.
 3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 5. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces which affect work of this section.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

- H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- J. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- K. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- L. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- M. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- N. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- O. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
- P. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.
- Q. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- R. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.
- S. Gutters and Downspouts: Coordinate with gutter and downspout fabricator to paint them with copper paint and patina coatings for Architects review prior to installation. Paint contractor to apply additional patina as directed by architect to achieve a natural look.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance.
- D. Sand wood and metal surfaces lightly between coats to achieve required finish.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

- F. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- H. Where previous paint coatings have been applied, test for adhesion of the substrate prior to application of new coatings. Remove any substrate that fails to adhere to the coatings below it. Sand surfaces to achieve uniform finish.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint shop-primed equipment, where indicated.
- B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. Finish equipment, piping, conduit, and exposed duct work in utility areas in colors according to the color coding scheme indicated.
- D. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 WORK QUALITY

- A. All materials shall be applied free from runs, sags, wrinkles, streaks, shiners, holidays, and brush marks.
- B. All materials shall be applied uniformly. If any reduction on the coating's viscosity is necessary, it shall be done in accordance with the manufacturer's label directions.
- C. Carry all finish coats to natural breaks and transitions.
- D. Allow each coat to dry before re-coating, adjusting manufacturer's MINIMUM time recommendations between coats to job conditions.
- E. Apply each coat to achieve the specified dry film thickness per coat. Achieving the total system recommended dry mil thickness with application rates in excess of those recommended and fewer coats than specified will not be accepted.
- F. Apply each coat of paint slightly darker (or lighter depending on the finish color) than the preceding coat unless otherwise approved.
- G. Enamels and undercoats are to be sanded smooth prior to topcoating.
- H. Tops, bottoms, and sides of doors and garage doors are to be finished with the same number of coats as the face.
- I. Where spray application is used, backrolling should immediately follow. Spraying alone without backrolling is unacceptable. Wet film gauges are to be used after backrolling to insure acceptable wet film thickness.
- J. A quality control log, recording weather and surface conditions must be completed each day prior to beginning painting. Paint batches are to be recorded as used showing which building each is applied to and when.

3.06 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.07 PROTECTION

- A. Protect finished coatings until completion of project.

- B. Touch-up damaged coatings after Substantial Completion.
- C. Tops, bottoms, and sides of all doors are to be finished with the same number of coats as the face.

3.08 SCHEDULE - SURFACES TO BE FINISHED

- A. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically noted.
 - 2. Fire rating labels, equipment serial number and capacity labels.
 - 3. Stainless steel items.
 - 4. Ceramic Tile
 - 5. Exposed Stone
 - 6. Casework clad with laminate
- B. Paint the surfaces described below under Schedule - Paint Systems.
 - 1. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
 - a. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
 - b. Paint shop-primed items occurring in finished areas.
 - c. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 - d. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
 - 2. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- C. SCHEDULE - PAINT SYSTEMS
 - 1. All exposed interior and exterior surfaces are to have a finished surface. Surfaces omitted from the following schedule but otherwise normally painted are assumed to be painted, request clarification from Architect for paint system to be used.
 - 2. Exterior:
 - a. Exterior metal, (aluminum, ferrous with or without galvanizing):
 - 1) First Coat: 223 Devran Recoatable Epoxy Primer
 - 2) Second Coat: 379UVA Devthane Aliphatic Urethane Gloss Enamel
 - 3) Third Coat: 379UVA Devthane Aliphatic Urethane Gloss Enamel
 - b. Exterior metal, (aluminum or galvanized on roof):
 - 1) First Coat: 4020PF Devflex DTM Flat Interior/ Exterior Waterborn Primer and Finish
 - 2) Second Coat: 378 Devthane Aliphatic Urethane Semi-Gloss Enamel
 - 3) Third Coat: 378 Devthane Aliphatic Urethane Semi-Gloss Enamel
 - c. Exterior Wood:
 - 1) First Coat: 2000 Prep and Prime House 100% Acrylic Primer Sealer
 - 2) Second Coat: 2406 Dulux Professional Ext. 100% Acrylic Semi-gloss Finish
 - 3) Third Coat: 2406 Dulux Professional Ext. 100% Acrylic Semi-gloss Finish
 - d. Cement Plaster:
 - 1) Integral 100% acrylic system - Refer to Specification Section 09 2400.
 - e. Concrete masonry sealer: (Located at all exposes masonry site walls.)
 - 3. Interior:
 - a. Interior semi-gloss enamel (SGE):

- 1) Ferrous metal:
 - (a) First Coat:4020PF Devflex Direct-to-Metal Primer and Flat Finish
 - (b) Second Coat:4216 High Performance Waterborne Acrylic SGE
 - (c) Third Coat:4216 High Performance Waterborne Acrylic SGE
 - 2) Gypsum drywall:
 - (a) First Coat:1000 Prep and Prime Hi hide Wall Water-Based Primer Sealer
 - (b) Second Coat:1416 Ultra Hide Latex Low Lustre Interior Wall and Trim Enamel
 - (c) Third Coat:1416 Ultra Hide Latex Low Lustre Interior Wall and Trim Enamel
 - 3) Gypsum drywall at 'wet' areas:
 - (a) First Coat:3210 Prep and Prime Gripper Multi-Purpose Water-Based Primer Sealer
 - (b) Second Coat:1416 Ultra Hide Latex Low Lustre Interior Wall and Trim Enamel
 - (c) Third Coat:1416 Ultra Hide Latex Low Lustre Interior Wall and Trim Enamel
 - 4) Gypsum drywall at all walls in Apparatus Bay: (Epoxy Coating)
 - (a) First Coat:High Hide Interior Primer Sealer 1000-1200 by Glidden Professional.
 - (b) Second Coat:Tru-Glaze-WB 4428 Waterborne Epoxy Coating by Devoe High Performance Coatings.
 - (c) Third Coat:Tru-Glaze-WB 4428 Waterborne Epoxy Coating by Devoe High Performance Coatings.
 - b. Interior egg shell enamel (ESE):
 - 1) Gypsum drywall:
 - (a) First Coat:1000 Prep and Prime Hi hide Wall Water-Based Primer Sealer
 - (b) Second Coat:1413 Dulux Professional Interior Latex Eggshell Finish
 - (c) Third Coat:1413 Dulux Professional Interior Latex Eggshell Finish
 - c. Interior wood trim:
 - 1) Manufacturer's standard stain for color selection by Architect.
4. SCHEDULE - COLORS
- a. Interior
 - 1) Ceiling: To Match: 30 Glacier White - LRV-1 by Kelly-Moore Paints
 - 2) Walls and Soffits: To Match: 41 Snip of Tannin - LRV 63 by Kelly-Moore Paints
 - 3) Accent: To Match 42 Wise Owl - LRV 51 by Kelly-Moore Paints
 - 4) Exposed Metal in Apparatus Bay and Miscellaneous Metals: To match adjacent wall or ceiling.
 - 5) Interior Metal Frames: To match accent color
 - 6) Interior Metal Doors: To Match Wall Color
 - b. Exterior
 - 1) Miscellaneous Trim and Surfaces: To Match Exterior Integral Cement Plaster Colors
 - 2) Flashing at roof to match roofing color.
 - 3) Gutters and Downspouts: "Metal Effects" copper paint with green patina
 - (a) Color: To be selected from 4 samples submitted (No patina, light patina, medium patina, heavy patina)

- 4) Overhead Sectional Door: Factory Finish per Specification Section 08 3613
- 5) Exterior Metal Doors and Frames: To match adjacent wall color.
- 6) Bollards: High Gloss Powder Coat Finish - Color to be selected by Architect from standard line.

End of Section

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Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 10 1101
Visual Display Boards

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Markerboards and Tackboards, Board and Edge Trim for Map by Owner

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Blocking and supports.
- B. Section 06 2000 - Finish Carpentry: Wood frame and chalkrails.
- C. Section 09 9123 - Interior Painting: Finishing of wood frame and chalkrail.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on markerboard, trim, and accessories.
- C. Samples: Submit two samples 2 by 2 inch in size illustrating materials and finish, color and texture of chalkboard, markerboard, tackboard, tackboard surfacing, and trim.
- D. Manufacturer's printed installation instructions.

1.05 QUALITY ASSURANCE

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Visual Display Boards:
 - 1. Claridge Products and Equipment, Inc: www.claridgeproducts.com.
 - 2. Polyvision Corporation (Nelson Adams): www.polyvision.com.

2.02 VISUAL DISPLAY BOARDS

- A. Markerboards: Porcelain enamel on steel, laminated to core.
 - 1. Steel Face Sheet Thickness: 24 gage, 0.0239 inch .
 - 2. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
 - 3. Backing: Aluminum foil, laminated to core.
 - 4. Size: As indicated on drawings.
- B. Map Frame and Backing: Map Provided by Owner
 - 1. Backing: Hardboard, 1/2 inch thick.
 - 2. Size: As indicated on drawings. (Verify with owner)

- 3. Frame: Extruded aluminum, with concealed fasteners.
- 4. Frame Profile: Manufacturer's standard
- 5. Frame Finish: Anodized, natural.
- C. Tackboards: Fine-grained, homogeneous natural cork.
 - 1. Cork Thickness: 1/8 inch.

2.03 MATERIALS

- A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.
- B. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.
- C. Foil Backing: Aluminum foil sheet, 0.005 inch thick.
- D. Adhesives: Type used by manufacturer.

2.04 ACCESSORIES

- A. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.
- B. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Secure units level and plumb.

3.03 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover with protective cover, taped to frame.
- C. Remove temporary protective cover at Date of Substantial Completion.

End of Section

Section 10 1124
Tackable Wall Systems

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Site fabricated, fabric-covered tackable wall system.
- B. Accessories as required for complete installation.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 2116 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

- A. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. ASTM E2573 - Standard Practice for Specimen Preparation and Mounting of Site-Fabricated Stretch Systems to Assess Surface Burning Characteristics; 2012.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Specimen warranty.
- C. Selection Samples: Fabric swatches representing manufacturer's full range of available colors, textures, and patterns.
- D. Verification Samples:
 - 1. For each fabric specified, minimum size 8 inches square, representing actual product in color, texture, and pattern.
 - 2. Actual samples of all track profiles to be employed, including transitions between dissimilar profiles.
 - 3. Tackable core backing material, minimum 12 inches square.
- E. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in City's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide components of tackable wall systems by single manufacturer, including recommended primers, adhesives, and sealants.
- B. Installer Qualifications: Firm specializing in site-fabricated wall systems, with not less than five years of documented experience in installing wall systems of the type specified, and approved by the manufacturer.
- C. Surface Burning Characteristics: Provide system with flame spread index of 25, maximum, and smoke developed index of 40, maximum, when tested in accordance with ASTM E84.
- D. Mock-Up: Provide a mock-up for evaluation of application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship and overall appearance are approved by Architect.
3. Refinish mock-up area as required to produce acceptable workmanship.
4. Approved mock-up may remain as part of the completed Work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect fabric, core, and track from excessive moisture in shipment, storage, and handling. Do not deliver materials to project until wet work such as concrete and plaster has been completed.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Do not begin installation until interior conditions have reached temperature and humidity that will be maintained during occupancy. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a 5-year period after Date of Substantial Completion.
- A. Provide replacement of damaged, soiled, or vandalized tackable wall panels for up to 3 years from Date of Substantial Completion.
 1. Replacement of up to 10 percent of the originally installed panels shall be at no additional cost to City.
 2. Replacement of damaged panels under this Article shall not include replacement of defective panels covered under warranty provisions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Tackable Wall Systems:
 1. Fabricmate Systems: www.fabricmate.com.
 2. Fabri-Trak Systems, Inc : www.fabritrak.com.
 3. Fabric Wall : www.actsusa.com.

2.02 TACKABLE WALL SYSTEM

- A. Tackable Wall System: Site-installed stretched fabric over tackable core and continuous perimeter and intermediate mounting extrusions applied directly to wall surface; designed to permit removal and replacement of fabric in individual panels without affecting adjacent panels.
 1. Surface Burning Characteristics: Flame Spread Index of 25, maximum; Smoke Developed Index of 450, maximum; when whole system is tested in accordance with ASTM E84 using mounting specified in ASTM E2573 for stretched systems.
 2. Prefabricated framed panels are not acceptable.
 3. Fabric must be installed over tackable substrate without adhesives, tapes, or fasteners.
- B. Verify that all adhesives and sealants employed in installation of tackable wall systems are low-emission types, with low VOC ratings.

2.03 MATERIALS

- A. Frame: Extruded polymer track system with serrated jaws of sufficient strength to hold fabric in place after repeated applications.
 - 1. Track Size: 3/8 inch protrusion from wall with minimum 1 inch base leg.
 - 2. Track Shape: Square at perimeter; square at intermediate abutting joints.
 - 3. Wall Thickness of Track: Minimum 0.062 inch.
 - 4. Profile: Beveled, 1/2 inch overall height. Beveled Freestanding at exposed edges of panels
 - 5. Intermediate Joints: Butt joints square.
 - 6. Color: As selected from manufacturer's standards.
- B. Core: Same thickness as track.
- C. Tackable Core: Fiberboard, 14-16 pcf density, flame retardant, 1/2 inch thickness.
- D. Fabric: Heavy-duty fire-retardant commercial fabric, as provided by manufacturer of tackable wall system; color, pattern, and texture as selected from manufacturer's standards.
- E. Fasteners: As recommended by manufacturer of tackable wall system for project conditions.
- F. Adhesives: Low VOC or water-based, approved by wall system manufacturer, and complying with requirements of Section 01 6116.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that all casework, markerboards, door and window jambs, finished ceiling, and other finished items abutting tackable wall systems have been installed.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. Install tackable wall systems at locations indicated, complying with manufacturer's instructions.

3.03 CLEANING

- A. Clean exposed surfaces of tackable wall system, complying with manufacturer's instructions for cleaning and repair of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 10 1400

Signage

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.
- B. Interior directional and informational signs.
- C. Interior Room Occupancy Signage at Community Room (Flat Sign)
- D. Building identification signs.
- E. Plaque.
- F. Traffic signs.
- G. Exterior Accessibility Signage
- H. Self Illuminating low level exit signs

1.02 RELATED REQUIREMENTS

- A. Section 22 0553 - Identification for Plumbing Piping and Equipment.
- B. Section 26 0553 - Identification for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When content of signs is indicated to be determined later, request such information from City through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - 2. Submit for approval by City through Architect prior to fabrication.
- D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- G. Maintenance Materials: Furnish the following for City's use in maintenance of project.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.07 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flat Signs:
 - 1. Best Sign Systems, Inc: www.bestsigns.com.
 - 2. Mohawk Sign Systems, Inc: www.mohawksign.com.
 - 3. Ark Ramos: www.arkramos.com
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Dimensional Letter Signs:
 - 1. Cosco Industries; Cast Aluminum: www.coscoarchitecturalsigns.com.
 - 2. Ark Ramos.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- C. Low Level Self Illuminating Exit Signs
 - 1. SignDirect: www.signdirect.com - Product: Tritium 10 year Self Luminous Exit Sign
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- D. Exterior Accessibility Signage
 - 1. Best Sign Systems: www.bestsigns.com
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- E. Plaques:
 - 1. Ark Ramos: www.arkramos.com
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
 - 1. Sign Type: Flat signs with engraved panel media as specified.
 - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 - 3. Character Height: 1 inch.
 - 4. Sign Height: 2 inches, unless otherwise indicated.

5. Office Doors: Identify with room numbers to be determined later, not the numbers shown on the drawings; in addition, provide "window" section for replaceable occupant name.
 6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers shown on the drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.
 7. Service Rooms: Identify with Room names as shown on the drawings, no numbers are to appear on signs.
 8. Rest Rooms: Identify non accessible restrooms with pictograms, the names "MEN" and "WOMEN", and braille. Identify accessible restroom(s) adjacent to lobby with pictoram per American with Disabilities Act.
- C. Exterior Accessibility Signage: To Comply with the American Disabilities Act and as shown on drawings, included but not limited to:
1. Van Accessible Parking Space Signage
 2. Accessible Building Entrance Signage at front door
 3. Parking Lot Entry "Tow Away" Signage - Obtain information from local jurisdiction.
- D. Building Identification Signs:
1. Use individual metal letters.
 2. Finish: As Selected by Architect from Manufacturer's full line.
 3. Style: As Selected by Architect from Manufacturer's full line.
 4. Mount: PM-1
 5. Size: as shown on Drawings.
 6. Mount on outside wall in location shown on drawings.
- E. Plaque:
1. Model: A-00
 2. Finish : As selected by Architect from manufacturer's full line
 3. Letter Style: No 530 Optima
 4. Border Style: No 516
 5. Texture: Matte
 6. Mount: No 2
 7. Size: To be determined by owner. (Assume 24"x30" for bid purposes.)
 8. Text: To be determined by owner. (Includes Text and Custom Graphics with Ark Ramos "Perfect Impressions" or equal.)
- F. Traffic Signs: Locate where indicated on the drawings.
- G. Low Level Self Illuminating Exit Signs - Locate on wall within 8" of floor at strike side of all doors that have powered exit signs.
1. Color: To be selected by Architect

2.03 SIGN TYPES

- A. Flat Signs: Signage media without frame.
1. Edges: Square.
 2. Corners: Square.
 3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
1. Character Font: Helvetica, Arial, or other sans serif font.
 2. Character Case: Upper case only.
 3. Background Color: To Be Selected by Architect.
 4. Character Color: Contrasting color. To Be Selected By Architect.

2.04 TACTILE SIGNAGE MEDIA

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
 - 1. Total Thickness: 1/16 inch.

2.05 PLAQUES

- A. Metal Plaques:

2.06 DIMENSIONAL LETTERS

- A. Metal Letters:
 - 1. Mounting: Tape adhesive.

2.07 ACCESSORIES

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Protect from damage until Substantial Completion; repair or replace damaged items.

End of Section

Section 10 2601
Wall and Corner Guards

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Corner guards.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Anchors for attachment of work of this section, concealed in wall.
- B. Section 06 1000 - Rough Carpentry: Blocking for wall and corner guard anchors.

1.03 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.
- C. Samples: Submit two sections of corner guard, 12 inch long, illustrating component design, configuration, color and finish.
- D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wall and Corner Guards:
 - 1. Construction Specialties, Inc: www.c-sgroup.com.

2.02 COMPONENTS

- A. Corner Guards - Surface Mounted: Extruded one-piece unit without splices, installed with screws.
 - 1. Material: Type 304 stainless steel, No. 4 finish.
 - 2. Size: 2 inches.
 - 3. Length: One piece.
- B. Mounting Brackets and Attachment Hardware: Appropriate to component and substrate.

2.03 FABRICATION

- A. Fabricate components with tight joints, corners and seams.
- B. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.

- B. Position corner guard 6 inches above finished floor (flush with top of concrete curb, where occurs) to 84 inches high.

3.03 TOLERANCES

- A. Maximum Variation From Required Height: 1/4 inch.
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

3.04 SCHEDULE

- A. Corner Guard at all outside wall corners at the following locations:
 - 1. Apparatus Bay
 - 2. Decon/Laundry Room
 - 3. Turnout Room
 - 4. Workshop

End of Section

Section 10 2813

Toilet, Bath, & Laundry Accessories

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Toilet Room and Lavatory Accessories.
- B. Utility Room Accessories.

1.02 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry

1.03 REFERENCES

- A. ASTM A 240/A 240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2005.
- B. ASTM A 554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2003.
- C. ASTM C 1036 - Standard Specification for Flat Glass; 2001.
- D. ASTM F 446 - Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area; 1985 (Reapproved 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's product data for products specified, indicating selected options and accessories.
- C. Shop Drawings:
 - 1. Plans: Locate each specified unit in project.
 - 2. Elevations: Indicate mounting height of each specified unit in project.
 - 3. Details: Indicate anchoring and fastening details, required locations and types of anchors and reinforcement, and materials required for correct installation of specified products not supplied by manufacturer of products of this section.
- D. Closeout Submittals: Warranty documents, issued and executed by manufacturer of products of this section, and countersigned by Contractor.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum five (5) years of documented experience producing products of the types specified in this section.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Factory-apply strippable protective vinyl coating to sight-exposed surfaces after finishing of products; ship products in manufacturer's standard protective packaging.
- B. Storage and Protection: Store products in manufacturer's protective packaging until installation.

1.07 SEQUENCING

- A. Supply locating and sizing templates, and other requirements, to fabricators and installers of products referenced in RELATED SECTIONS Article for building in products of this section.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer's standard warranty against defects in product workmanship and materials.

- C. Manufacturer's 10-year warranty against silver spoilage of mirrors.
- D. Manufacturer's 10 year warranty, 3 years for motor brushes, for hand dryers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Products Listed are manufactured by: Bobrick Washroom Equipment, Inc.
- B. Acceptable Manufacturers:
 - 1. Bobrick Washroom Equipment: Bobrick.com
 - 2. ASI-American Specialties, Inc; www.americanspecialties.com
- C. Substitutions: Section 01 6000 - Product Requirements.

2.02 FASTENINGS

- A. All toilet and bath accessories shall be complete with all required fastenings, and all fastenings shall harmonize with the item being fastened. All accessories requiring attachment shall be screw-mounted, set in solid backing or reinforced concrete unit masonry, unless otherwise noted.

2.03 TOILET ACCESSORIES

- A. Basic Construction Requirements:
 - 1. Doors: Fabricated from minimum 0.0313 inch stainless steel sheet, formed hems at sight-exposed edges; welded corners, finished to match sheet finish.
 - 2. Cabinets: Fabricated from minimum 0.0313 inch stainless steel sheet, formed hems at sight-exposed edges; all joints welded, sight-exposed welds finished to match sheet finish.
 - 3. Hinges: Stainless steel piano hinge, 3/16 inch diameter barrel, full length of cabinet; hinge leaves spot-welded to door and cabinet body.
 - 4. Locks: Tumbler locks, keyed alike other toilet accessory locks, with two keys for each lock.
 - 5. Stainless Steel Finish: No.4 satin unless otherwise specified.
- B. Paper Towel Dispenser/ Waste Receptacle: Classic series - recessed, Model B-369.
- C. Toilet Paper Holder: Double roll tissue dispenser with controlled delivery - surface mounted, Model B-274.
- D. Baby Changing Station : Model KB110-SSRE.
- E. Robe Hook : Model B-677.
- F. Shower Curtain Rod : Classic Series - Extra Heavy Duty - Model B-6047.
- G. Shower Curtain : Model 204-3, with Model 204-1 hooks.
- H. Mop Holder : Model B223x36.
- I. Towel Bar: Extra heavy duty, Model B-530 24

2.04 MIRRORS

- A. Mirror : Model B-165 2436.
 - 1. Finish: No.4 satin stainless steel.
- B. Channel Mirror Frames: Fabricated from 0.0375 inch stainless steel, formed to 1/2 by 1/2 by 1/2 inch channel; finished to match sheet finish; concealed mounting brackets with tamper-proof fasteners.

- C. Tempered Glass Mirror: 1/4 inch thick polished tempered glass, two coats silver, hermetically sealed with uniform electrolytically-deposited copper plating, backpainted with waterproof coating.

2.05 GRAB BARS

- A. Grab Bars - Basic Requirements: Fabricated to comply with ASTM F 446 and to withstand a 900 pound force, from ASTM A 554 stainless steel tubing, 18 gauge (1.2mm), Type 304, 18-8 alloy; formed 1-1/2 inch radius return to wall at each end; each end heliarc-welded to minimum 1/8" thick stainless steel circular flange; welds finished to match tube finish. Flange covers shall be 22 gauge and shall snap over mounting flanges to conceal mounting screws.
- B. Grab Bars: Series B-5806.
 - 1. Sizes and configurations: As indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions:
 - 1. Prepared openings are sized and located in accordance with shop drawings.
 - 2. Reinforcement and anchoring devices are correct type and are located in accordance with shop drawings.
- B. Installer's Examination:
 - 1. Installer of this section shall examine conditions under which construction activities of this section are to be performed, then submit written notification if such conditions are unacceptable.
 - 2. Beginning construction activities of this section indicates installer's acceptance of conditions.

3.02 INSTALLATION

- A. Install toilet accessories plumb and level in accordance with manufacturer's printed installation instructions.
- B. Locate toilet accessories at heights specified by Americans with Disabilities Act (ADA).

3.03 CLEANING

- A. Remove manufacturer's protective vinyl coating from sight-exposed surfaces 24 hours before final inspection.
- B. Clean surfaces in accordance with manufacturer's recommendations.

3.04 PROTECTION OF INSTALLED PRODUCTS

- A. Protect products from damage caused by subsequent construction activities.
- B. Field repair of damaged product finishes is prohibited; replace products having damaged finishes caused by subsequent construction activities.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 10 4400
Fire Protection Specialties

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.

1.02 RELATED REQUIREMENTS

- A. Section 06100 - Rough Carpentry

1.03 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
- B. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 PERFORMANCE REQUIREMENTS

- A. Conform to NFPA 10.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

1.06 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. Ansul, a Tyco Business; ____: www.ansul.com.
 - 2. Kidde, a unit of United Technologies Corp; ____: www.kidde.com.
 - 3. Nystrom, Inc; ____: www.nystrom.com/sle.
 - 4. Pyro-Chem, a Tyco Business; ____: www.pyrochem.com.
- B. Fire Extinguisher Cabinets and Accessories:
 - 1. Ansul, a Tyco Business; ____: www.ansul.com.
 - 2. Kidde, a unit of United Technologies Corp; ____: www.kidde.com.
 - 3. Nystrom, Inc; ____: www.nystrom.com/sle.
 - 4. Pyro-Chem, a Tyco Business; ____: www.pyrochem.com.
 - 5. Or pre-approved equal
 - 6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
- B. Dry Chemical Type Fire Extinguishers: Cast steel tank, with pressure gage.
 - 1. Class 2A10BC.

2. Metal valves and siphon tubes

2.03 FIRE EXTINGUISHER CABINETS

- A. Semi Recessed: Larsen # AL 2409-R7
 1. Door Style: Full Glass
 - a. Metal: Formed aluminum
 - b. Door Glazing: Float glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.
 - c. Lettering: Die cut, vertical, red
- B. Surface Mounted: Wall bracket Larsen, type 821

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings, with midpoint of door handle at 39" above finished floor.
- C. Install bracket mounted extinguishers such that the bottom edge of the extinguisher is at 26 1/2" above the finished floor.
- D. Place extinguishers in cabinets.

End of Section

Section 10 5100

Lockers

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall Mounted Metal Turnout Lockers
- B. Free Standing Metal Turnout Lockers

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking and nailers.
- B. Section 09 2116 - Gypsum Board Assemblies

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate locker plan layout, Color and Finish.
- C. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 Metal Turnout Lockers

- A. Quantity: As shown on the drawings.
- B. Size: Standard - 24" W x 20" D x 72" H
- C. Shelves: Two (2) shelves (constructed of high-strength ¼" wire)
- D. Hooks: Three (3) apparel hooks per locker.
- E. Adjustability: Wire shelves adjustable in 3" increments
- F. Frame: Heavy-duty 1-1/4" tubing
- G. Side & Back Grids: High-strength ¼" wire
- H. Nameplate: 2" H x 16" W custom printed name plate (1 per each locker)
- I. Mounting Brackets: 11 gauge steel
- J. Finish: Powder coat
- K. Color: Red
- L. Accessories: "Gearglove" glove and "Geardryer" turnout coat hanger for each unit.
- M. Top shelf: "Top Side Storage" continuous shelf above all lockers.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify mounting surface is in correct configuration and ready for mounting prior to installation.
- B. In the event of a discrepancy, Notify the Architect immediately.
- C. Do not proceed in areas of discrepancy until all issues have been fully resolved.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install lockers plumb and square.
- C. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 lb.
- D. Install accessories.

End of Section

Section 10 7500

Flagpoles

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum Flagpoles.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- B. NAAMM FP 1001 - Guide Specifications for Design Loads of Metal Flagpoles; 2007.

1.04 PERFORMANCE REQUIREMENTS

- A. Flagpole With Flag Flying: Resistant without permanent deformation to 90 miles/hr wind velocity; non-resonant, safety design factor of 2.5.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pole, accessories, and configurations.
- C. Shop Drawings: Indicate detailed dimensions, base details, anchor requirements, and imposed loads.
- D. Maintenance Data: Provide lubrication and periodic maintenance requirement and schedules.

1.06 QUALITY ASSURANCE

- A. Design flagpole foundation under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in California.
- B. Manufacturing Standards: Provide each flagpole as a complete unit produced by a single manufacturer, including fittings, accessories, bases, and anchorage devices.
- C. Pole Construction: Construct pole and ship to site in one piece.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- B. Protect flagpole and accessories from damage or moisture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flagpoles:
 - 1. American Flagpole: www.americanflagpole.com.
 - 2. Concord Industries, Inc: www.concordindustries.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FLAGPOLES

- A. Flagpoles: Designed in accordance with NAAMM FP 1001.
 - 1. Material: Aluminum.
 - 2. Design: Straight shaft.
 - 3. Mounting: Ground mounted type.

4. Nominal Height: 30 ft; measured from nominal ground elevation.
5. Mounting: Ground mounted type.
6. Design: Cone tapered.
7. Halyard: Interior type .

2.03 POLE MATERIALS

- A. Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

2.04 ACCESSORIES

- A. Finial Ball: Stainless steel, 6 inch diameter.
- B. Truck Assembly: Cast aluminum; revolving, stainless steel ball bearings, non-fouling.
- C. Cleats: 9 inch size, aluminum with galvanized steel fastenings, two per halyard.
- D. Cleat Box: Aluminum, with built-in hinge and hasp assembly, attached to pole with tamper proof screws inside box.
- E. Halyard: 5/16 inch diameter polypropylene, braided, white. Provide bronze snap shackles for two flags.

2.05 MOUNTING COMPONENTS

- A. Provide manufacturer's standard base system for the type of flagpole installation required.

2.06 FINISHING

- A. Metal Surfaces in Contact With Concrete: Asphaltic paint.
- B. Aluminum: Mill finish.
- C. Finial: Spun finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings.

3.02 PREPARATION

- A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

3.03 INSTALLATION

- A. Install flagpole, base assembly, and fittings in accordance with manufacturer's instructions.
- B. Electrically ground flagpole installation.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1 inch.

3.05 ADJUSTING

- A. Adjust operating devices so that halyard and flag function smoothly.

End of Section

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Job Name: Manteca Fire Department – Manteca Fire Station #5

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Section 11 3100
Residential Appliances

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Kitchen appliances.
- B. Laundry appliances.

1.02 RELATED REQUIREMENTS

- A. Section 22 1005 - Plumbing Piping: Plumbing connections for appliances.
- B. Section 26 2717 - Equipment Wiring: Electrical connections for appliances.

1.03 REFERENCE STANDARDS

- A. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.
- C. Shop Drawings: Include plans, elevations, sections, rough-in dimensions, attachments to other work. Include connections to utilities, clearance requirements for equipment access and maintenance.
- D. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in City's name and registered with manufacturer.
- E. Operation and Maintenance Data: For laundry equipment, include emergency, operation and maintenance manuals, including a schedule with Manufacturer's name and model number, and list of factory-authorized service agencies including addresses and telephone numbers.

1.05 QUALITY ASSURANCE

- A. Electric Appliances: Listed and labeled by UL (DIR) and complying with NEMA Standards (National Electrical Manufacturers Association).

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five (5) year manufacturer warranty on refrigeration system of refrigerators.
- C. Provide ten (10) year manufacturer warranty on magnetron tube of microwave ovens.
- D. Provide ten (10) year manufacturer warranty on tub and door liner of dishwashers.
- E. Provide three (3) year manufacturer warranty on washer extractor on any part of the equipment assembly and five (5) year manufacturer warranty on main frame, bearing, cylinder or cylinder shaft assembly from date of Substantial Completion.

PART 2 PRODUCTS

2.01 KITCHEN APPLIANCES

- A. Provide Equipment Eligible for Energy Star Rating: Energy Star Rated.
- B. Refrigerator Free-standing, side-by-side, and frost-free.
 - 1. General Electric, Monogram Built-in Stainless Steel Refrigerator
 - a. Model #ZIRS36NHLH - 21.97 CF.

- b. Size: 36" W x 84.5" H x 36" D
 - c. Open towards Freezer
 - 2. Provide all trim necessary for a complete installation of refrigerator and freezer combination.
- C. Freezer: Built In, Energy Star Rated
 - 1. General Electric, Monogram Built-in Stainless Steel Freezer,
 - a. Model #ZIFS36NHRH - 21.9 CF.
 - b. Size: 36" W x 84" H x 36" D
 - c. Open towards Refrigerator
- D. Range: Dual Fuel range / oven combination unit, free-standing, with sealed burners.
 - 1. Five Star True Dual Fuel, 48" wide, natural gas / electric, Model "The Five Star 48" Ideal Sous-Chef," six burners, Lodge Cast Iron griddle/grill, side by side ovens with TurboFlow Convection feature, stainless steel finish.
 - 2. Size: 48 inches wide by 24 inches deep by 36 inches high.
- E. Cooking Exhaust: Range hood.
 - 1. Vent A Hood - Model: Magic Lung Whisper Quiet, Model #PRH18-354, 54" wide x 27" deep (verify with drawings), with custom duct cover, extend duct cover to ceiling surface, and full width of hood, stainless steel finish.
 - 2. Blower Unit - Magic Lung, Model #B-200 Dual, 900 CFM blower unit. Refer to Section 7130 and 07300 for roof penetration waterproofing.
 - 3. Lights and Accessories: Warming light bar and fluorescent lights
- F. Microwave: Countertop.
 - 1. General Electric, Profile, Model #PEB 7226 SFSS, stainless steel.
 - a. Size: 14 7/8" H x 19 7/8" D x 24 1/8" W
 - b. Weight: 52 lbs.
 - 2. 27" Custom Stainless Steel Trim Kit for mounting in cabinetry - JX1527CSH.
- G. Waste Disposer, Waste King, Legend Series, Model 8000: stainless steel grinding components, corrosion proof glass filled polyester grinding chamber, overload protection, direct wired, dishwasher connection, drain elbow, drain connector, sound reduction features, and removable splash guard.
 - 1. Power: 1 HP.
 - 2. Capacity: Large.
 - 3. Height: 16-1/16 inch.
 - 4. Depth: 8-5/8 inch.
 - 5. Controls: Wall switch.
 - 6. Voltage: 115 volts, 60 Hz, 4 amps.
 - 7. Sink Flange Kit: Stainless steel.
- H. Dishwasher: Undercounter.
 - 1. Bosch, Benchmark Series, Model #SHX9PT75UC, stainless steel finish, stainless steel interior, hard food disposer and self-cleaning filter.
- I. Filtered Ice Machine
 - 1. Kitchen Aid - 18" convertible Ice Maker, Model #KUID508ESS, stainless steel finish with black details.
 - 2. Provided manufacturer's recommended in-line water filter.

2.02 LAUNDRY APPLIANCES

- A. Clothes Washer, Type stainless steel washtub, 0.5 HP motor: Top-loading stationary.
 - 1. Size: Large capacity.
 - 2. Controls: Mechanical Controls.
 - 3. Cycles: Include 4 cycle.
 - 4. Motor Speed: Two-speed.
 - 5. Features: Include optional second rinse, bleach dispenser, fabric softener dispenser, self-cleaning lint filter, sound insulation, and end of cycle signal.
 - 6. Finish: Painted steel, color as indicated.
 - 7. Manufacturers:
 - a. Speed Queen, Model AWN432SP113TW04.
- B. Clothes Dryer, Type stainless steel drum: Electric, stationary.
 - 1. Size: Large capacity.
 - 2. Controls: mechanical controls, with electronic moisture-sensing dry control.
 - 3. Temperature Selections: One.
 - 4. Cycles: Include normal, permanent press, knit/delicate, and air only.
 - 5. Features: Include reversible door, stationary rack, sound insulation, and end of cycle signal.
 - 6. Finish: Painted steel, color as indicated.
 - 7. Manufacturers:
 - a. Speed Queen, Model ADG3SRG113TW01.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Washer Extractor
 - 1. Unimac, Model No. UWN045T4V (3 Speed)
 - a. Size: 32-1/2" W x 55-1/2" H x 38-1/4" D
 - b. Weight: 750 lbs.
 - c. Provide all components necessary for Chemical Injection Supply System.
 - d. Wash Cylinder Volume: 7.21 cu. ft. minimum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify utility rough-ins are provided and correctly located.
- B. Do not begin installation until substrates have been properly prepared.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Anchor built-in equipment in place.
- C. Coordinate with specifications in Divisions 15 and 16 power and mechanical requirements and hookup locations prior to rough-in.
- D. Washer Extractor System Startup and Commissioning: Arrange for a local manufacturer's representative to inspect machines prior to startup and operation.

3.03 ADJUSTING

- A. Adjust equipment to provide efficient operation.

3.04 CLEANING

- A. Remove packing materials from equipment and properly discard.

B. Wash and clean equipment.

End of Section

Section 11 5213
Projection Screens

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Front projection screen assemblies.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking in walls and ceilings.
- B. Section 09 2116 - Gypsum Board Assemblies: Suspended gypsum board ceilings for recessed screens, and openings in gypsum board partitions for fixed and rear projection screens.
- C. Section 09 9123 - Interior Painting: Field painting.
- D. Section 26 2717 - Equipment Wiring: Electrical supply, conduit, and wiring for electric motor operated projection screens.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: For custom installations, indicate dimensions, verified field measurements, mounting details, and interface with adjacent construction.
- D. Samples: For screen fabrics, submit two samples 6 x 6 inch in size.
- E. Samples: For case and frame finishes, submit two samples 6 x 6 inch in size, illustrating color and texture of finish.
- F. Operation and Maintenance Data: Provide manufacturer's operation and maintenance instructions.
- G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in City's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver projection screens to project site in manufacturer's original unopened packaging, and inspect for damage and proper size before accepting delivery.
- B. Store in a protected, clean, dry area with temperature maintained above 50 degrees F, and stack in accordance with manufacturer's recommendations.
- C. Acclimate screens to building temperatures for 24 hours prior to installation, in accordance with manufacturer's recommendations.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide 3 year manufacturer warranty for projection screen assembly.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 FRONT PROJECTION SCREENS

- A. Manufacturers:
 - 1. Da-Lite Screen Company; _____, Model Advantage Electrol: www.da-lite.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Front Projection Screens: Factory assembled unless otherwise indicated.
- C. Matte Light Diffusing Fabric: Light diffusing screen fabric; washable, flame retardant and mildew resistant.
 - 1. Seams: No seams permitted.
- D. Electrically-Operated Screens:
 - 1. Roller: 2 inch aluminum, with locking device with locking device.
 - 2. Vertical Tensioning: Screen fabric weighted at bottom with steel bar with plastic end caps.
- E. Provide mounting hardware, brackets, supports, fasteners, and other mounting accessories required for a complete installation, in accordance with manufacturer's recommendations for specified substrates and mountings.

2.03 ELECTRICAL COMPONENTS

- A. Electrical Components: Listed and classified by UL as suitable for the purpose specified and indicated.
- B. Motors: Direct drive, 110/120 V, 60 Hz.
 - 1. Screen Motor: Mounted inside roller; three wire with ground; quick reverse type and lifetime lubricated; equipped with thermal overload cut-off, internal junction box, electric brake, and pre-set accessible limit switches.
 - a. Electrical Characteristics: 1.2 amps.
 - b. Motor mounted on sound absorber.
- C. Controls: Three (3) position control switch with plate.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate is finished and ready to accept screen installation.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that openings for recessed screens are correctly sized.
- D. Verify type and location of electrical connections.
- E. Do not install projection screens until climate control systems are in place and interior painting and other finishes are completed.

3.02 PREPARATION

- A. Coordinate screen installation with installation of projection systems.
- B. Coordinate installation with adjacent construction and fixtures, including ceilings, walls, lighting, fire suppression, and registers and grilles.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, using manufacturer's recommended hardware for relevant substrates.
- B. Do not field cut screens.
- C. Install screens in mountings as specified and as indicated on drawings.
- D. Install plumb and level.
- E. Install electrically operated screens ready for connection to power and control systems by others.
- F. Adjust projection screens and related hardware in accordance with manufacturer's instructions for proper placement and operation.
- G. Test electrical screens for proper working condition. Adjust as needed.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch up, repair, or replace damaged products before Date of Substantial Completion.

End of Section

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Job Number: 0353-01-CI15

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Section 12 2113
Horizontal Louver Blinds

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Horizontal slat louver blinds.
- B. Blackout Shades
- C. Operating hardware.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.
- B. Section 12 2116 - Vertical Louver Blinds.

1.03 REFERENCE STANDARDS

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the placement of concealed blocking to support blinds. See Section 06 1000.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating physical and dimensional characteristics.
- C. Samples: Submit two samples, 6 inch long illustrating slat materials and finish, cord type and color.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 PROJECT CONDITIONS

- A. Coordinate the work with window installation and placement of concealed blocking to support blinds.
- B. Take field measurements to determine sizes required.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 SHADES (Non-Blackout)

- A. Model: Custom Non-woven cellular shades (by Levelor as a standard of quality)
- B. Cell Size: 3/16"
- C. Operation: Corded
- D. Fabric: Non-woven fabric (Non-Blackout)
- E. Color: To be selected from manufacturer's standard colors.
- F. Accessory Hardware: Type recommended by blind manufacturer

2.03 BLACKOUT SHADES

- A. Model: Custom non-woven cellular shades (by Levelor as a standard of quality)

- B. Cell Size: 9/16"
- C. Operation: Corded
- D. Fabric: Blackout non-woven fabric
- E. Color: To be selected from manufacturer's standard colors
- F. Accessory Hardware: Type recommended by blind manufacturer

2.04 FABRICATION

- A. Fabricate blinds to fit within openings with uniform edge clearance of 1/4 inch.
- B. Fabricate blinds to cover window frames completely.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings are ready to receive the work.

3.02 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with flush countersunk fasteners.

3.03 TOLERANCES

- A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.
- B. Maximum Offset From Level: 1/8 inch.

3.04 ADJUSTING

- A. Adjust blinds for smooth operation.

3.05 CLEANING

- A. Clean blind surfaces just prior to occupancy.

3.06 SCHEDULE - See Floor plans for locations, see window schedule for sizes.

- A. Shades: Locate at All windows except Window Type _____ and those window types to receive Blackout Shades and Vertical Louver Blinds.
- B. Blackout Shades: Window Types _____.
- C. Refer to Specification Section 12 2116 for Vertical Louver Blinds

End of Section

Section 12 2116
Vertical Louver Blinds

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vertical louver blinds at Window Types _____.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.
- B. Section 12 2113 - Horizontal Louver Blinds.

1.03 REFERENCE STANDARDS

- A. WCMA A100.1 - Safety of Corded Window Covering Products; Current Edition, Including All Revisions.
- B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- C. Certification: Provide certification that product complies with WCMA A100.1.
- D. Shop Drawings: Indicate headrail location and schematic wire diagram of electronic controls and motors.
- E. Selection Samples: For vanes, color chips or material samples representing manufacturer's full range of available colors and patterns.
- F. Verification Samples: For vanes, minimum size 6 inches square, representing actual materials, color and perforations.
- G. Operation and Maintenance Data: Manufacturer's data on repair and replacement of vanes, chains, and other parts.
- H. Maintenance Materials: Furnish the following for City's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Extra Vanes: 20 of each type and size.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum 3 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. If blinds are delivered early and stored at the project, deliver in unopened containers; handle and store in such a manner to protect them from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Vertical Louver Blinds:
 - 1. Hunter Douglas: www.hunterdouglas.com.
 - 2. Levolor Contract: www.levolorcontract.com.
 - 3. Graber, division of Springs Window Fashions: www.graberblinds.com.
 - 4. The same manufacturer as for horizontal blinds, to obtain match.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 BLINDS AND BLIND COMPONENTS

- A. Vertical Louver Blinds: Horizontal travel, vertical vane louver units complete with tracks, pivot and traversing mechanisms, and accessories, as follows:
 - 1. Louvers: Fabric in-fill PVC louver blades of the specified size.
 - 2. Operation: Manual.
 - 3. Direction of Travel: As indicated on the drawings.
 - 4. Mounting: Outside (face of jambs).
 - 5. Cord and Chain Operation: Comply with WCMA A100.1.
- B. Tracks: Channel tracks as required for type of operation, extruded aluminum with clear anodized finish, with end caps.
 - 1. Provide a single tracks to span all window of the same type in a row, including wall space between.
 - 2. Vane Rotation: Chain driven direct rotation by activating tilt gear within end cap assembly in turn actuating tilt rod and worm-and-spur gears in carrier trucks.
 - 3. Operating Components: Internally mounted heavy-duty extruded aluminum tilt rod, vane carriers, and other components required for proper performance and designed for smooth, quiet, trouble free operation.
 - 4. Pivot Mechanism: Geared for synchronous 180 degrees rotation of vanes and type of operation indicated.
 - 5. Vane Carriers: Metal carriers with ball-bearing wheels or thermoplastic trucks, equipped with linkages or other devices to ensure positive spacing of vanes.
 - 6. Tilt Chain: Nickel plated brass beaded ball chain, minimum 1/8 inch diameter; locate at drawback side of units as indicated.
- C. Fabric Vanes: Integrally colored, extruded PVC vanes with fabric infill; flat, 3-1/2 inches (80mm) wide.
 - 1. Fabric: Manufacturer's standard flame resistant fabric.
 - 2. Flammability: Comply with NFPA 701.
 - 3. PVC Color: As selected by Architect from manufacturer's full range of colors.
 - 4. PVC Texture: Smooth.
 - 5. Fabric Color and Texture: Match fabric color specified for horizontal blinds, subject to approval of Architect.
- D. Brackets and Mounting Hardware: As recommended by manufacturer for the mounting configuration and span indicated; provide manufacturer's standard L- bracket with clip for outside mounting and clip only for inside mounting.
- E. Valances: To match vane design and color.
 - 1. Style: As selected by Architect from blind manufacturer's full selection.

2.03 FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Fabricate blinds to fit openings within specified tolerances.
 - 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom of vanes and finish floor.
 - 2. Horizontal Dimensions - Outside Mounting: Cover window frames, trim, and casings completely.
- C. Dimensional Tolerances: Fabricate blinds to within plus/minus 1/8 inch of intended dimensions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not start installation before openings are finished and all finishes have been completed; do not install until painting is completed.
- B. Field measure finished openings prior to ordering or fabrication.

3.02 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Coordinate the work with window installation and placement of concealed blocking to support blinds.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions using mounting style as indicated.
- B. Installation Tolerances:
 - 1. Maximum Offset From Level: 1/16 inch.
- C. Adjust blinds for smooth operation.
- D. Replace blinds that exceed specified dimensional tolerances at no extra cost to City.

3.04 CLEANING

- A. Clean installed work to like-new condition.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

End of Section

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Section 12 3600

Countertops

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for architectural cabinetwork.
- B. Wall-hung counters and vanity tops.
- C. Sinks molded into countertops.

1.02 RELATED REQUIREMENTS

- A. Section 06 4100 - Architectural Wood Casework.
- B. Section 22 4000 - Plumbing Fixtures: Sinks.

1.03 REFERENCE STANDARDS

- A. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- D. IAPMO Z124 - Plastic Plumbing Fixtures; 2012.
- E. AWI/AWMAC (QSI) - Quality Standard Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.
- F. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- H. WI (MAN) - Manual of Millwork; Woodwork Institute; 2003.
- I. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron-Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- J. ASTM A 123 - Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation, including joint details, joint locations, anchor and support details and edge and profile details; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, patterns, sealant and grout, where occurs.
- F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

- G. Installation Instructions: Manufacturer's installation instructions and recommendations.
- H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.
- I. Natural Stone Countertop Sealant Compatibility Test Report: Submit test report from sealant manufacturer, in accordance with Joint Sealers Section 07 9005 stating that sealants will not stain stone.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Skilled workers who custom-fabricate specified countertops similar to the work of this project. Must have ten (10) years minimum continuous operating experience fabricating and installing the specified countertop.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

PART 2 PRODUCTS

2.01 COUNTERTOPS

- A. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
 - 1. Laminate Sheet, Type ____: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
 - a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - b. NSF approved for food contact.
 - c. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
 - d. Finish: Matte or suede, gloss rating of 5 to 20.
 - e. Surface Color and Pattern: To be selected from manufacturer's full line.
 - 2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick; covered with matching laminate.
 - 3. Back and End Splashes: Same material, same construction.
- B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: 1/4 inch, minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - b. Sinks and Bowls: Integral castings; minimum 3/4 inch wall thickness; comply with IAPMO Z124.
 - c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - d. Color and Pattern: As selected by Architect from manufacturer's full line.
 - e. Manufacturers:
 - 1) Swanstone Corporation: www.swanstone.com
 - 3. Other Components Thickness: 1/2 inch, minimum.

4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge; use marine edge at sinks.
5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
6. Skirts: Locate Where it is open below and as indicated on drawings.
- C. Stainless Steel Countertops: ASTM A 666 Type 304 stainless steel sheet; 16 gage, 0.06 inch nominal sheet thickness.
 1. Finish: 4B satin brushed finish.
 2. Exposed Edge Shape: Marine edge with return; edge raised 3/16 inch above counter with 45 degree transition, minimum 1 inch flat rim; 1-1/2 inch high turndown, 1/2 inch return to face of case; reinforced with hardwood or steel.
 3. Back and End Splashes: Same material; welded 1/4 inch radius coved joint to countertop; square top edge with 1 inch wide top surface and minimum 1/2 inch turndown.
 4. Splash Dimensions: Backsplash to extend to bottom of upper cabinets, unless otherwise noted.
 5. Sinks: Same material, same thickness; integrally flush welded to counter; bottom sloped to outlet; radiused interior corners; drain outlet located in back corner.
 6. Associated Window Sills: Same material, same thickness.
 7. Wall Panels at Range: Provide a stainless steel wall panel to match the countertop to fully cover the wall surface behind the range from the floor to the bottom of the Vent Hood.
 8. Cabinet Panel at Range: Provide stainless steel panel to match the countertop mounted to cover the entire side of each cabinet end at either side of the range opening.
- D. Galvanized Steel Countertops: ASTM A 653 steel galvanized sheet; 14 gage, 0.0785 inch nominal sheet thickness.
 1. Splash Dimensions: 4 inch high by 1 inch thick, unless otherwise indicated.
 2. Back and End Splashes: Same material; welded 1/4 inch radius coved joint to countertop; square top edge with 1 inch wide top surface and minimum 1/2 inch turndown;
 3. Exposed Edge Shape: Straight turndown with return; 1-1/2 inch high face, 1/2 inch return to face of case ; reinforced with hardwood or steel.
 4. All fabrications, structural clips and other metal fabrication products shall be galvanized per ASTM A123 and ASTM A153.
 5. All bolts and fasteners shall be galvanized per ASTM A153

2.02 MATERIALS

- A. Medium Density Fiberboard for Supporting Substrate at all countertops: ANSI A208.2. To match substrate specified for Architectural Cabinetwork.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- C. Cove Molding for Top of Splashes: Rubber with semi-gloss finish and T-spline to fit between splash and wall; 1/2 inch by 1/2 inch.
- D. Cove Molding for Top of Splashes: Rubber with semi-gloss finish and T-spline to fit between splash and wall; 1/2 inch by 1/2 inch; color as selected.
- E. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 1. Join lengths of tops using best method recommended by manufacturer.

2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 2. Height: 4 inches, unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
- D. Stainless Steel: Fabricate tops up to 144 inches long in one piece including nosings and back and end splashes; accurately fitted mechanical field joints in lengths over that dimension are permitted.
 1. Weld joints; grind smooth and polish to match.
 2. Provide stainless steel hat channel stiffeners, welded or soldered to underside, as required.
 3. Provide wall clips for support of back/end splash turn downs.
 4. Sound Deadening: Apply water resistant, fire resistant sound deadening mastic to entire bottom surface.
- E. Galvanized Steel: Fabricate tops up to 144 inches long in one piece including nosings and back and end splashes; accurately fitted mechanical field joints in lengths over that dimension are permitted.
 1. Weld joints; grind smooth and polish to match.
 2. Provide galvanized steel hat channel stiffeners to underside as required.
 3. Provide wall clips for support of back/end splash turn downs.
 4. Sound Deadening: Apply water resistant, fire resistant sound deadening mastic to entire bottom surface.
 5. Repair paint: ZRC cold galvanizing compound or equal.
- F. Natural Stone: Comply with recommendation in MIA's "Dimension Stone-Design Manual."
 1. Selection:
 - a. Select stone for intended use to prevent fabricated units from containing cracks, seams and starts that could impair structural integrity of function.
 - b. Grade and mark stone for final locations to produce assembled countertop units with an overall uniform appearance.
 2. Joints: Fabricate countertops in largest sections practical for joining in field, with joints at locations shown on drawings and as follows:
 - a. 1/16 inch maximum width.
 3. Tolerances:
 - a. Variations from Plumb: for vertical lines and surfaces, do not exceed 1/16 inch in 48 inches.
 - b. Variation from Level: Do not exceed 1/8 inch in 96 inches, 1/4 inch 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 difference between edges of adjacent units, where edge line continues across joint.
 4. Substrate: Install countertops over substrate with full spread of water-cleanable epoxy adhesive.

5. Sealer: Apply stone sealer, following cleaning, to comply with stone producer's and sealer manufacturer's instructions.
- G. Cutouts and Holes:
 1. Under-Counter Fixtures: Make cutouts for under-counter fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 2. Counter-Mounted Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations.
 3. Fittings: Drill countertops in shop for plumbing fittings, such as counter-mounted soap dispensers and similar items.
- H. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
- C. Attach stainless steel countertops using stainless steel fasteners and clips.
- D. Seal joint between back/end splashes and vertical surfaces.
 1. Where indicated use rubber cove molding.
 2. Where applied cove molding is not indicated use specified sealant.

3.04 CLEANING

- A. Clean countertops surfaces thoroughly.

3.05 CLEANING AND PROTECTION

- A. Clean countertops surfaces thoroughly.
- B. Protect installed products until completion of project.
- C. Touch-up, repair or replace damaged products before Date of Substantial Completion.

End of Section

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Section 12 9313

Bicycle Racks

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Bicycle racks.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Mounting surface for bicycle racks.

1.03 REFERENCE STANDARDS

- A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate size, shape, and dimensions, including clearances from adjacent walls, doors, and obstructions.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Handle racks with sufficient care to prevent scratches and other damage to the finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 MATERIALS

- A. Bicycle Racks: Tubular steel pipe formed to allow at least one bicycle to lock simultaneously on each bend and each end, securing one wheel and part of the frame.
 - 1. Style: Bollard Cyclops -2172-P-C
 - 2. Capacity: 2 bicycles.
 - 3. Mounting: In-ground anchor.
 - 4. Finish: Powder coat, maintenance-free and weather-resistant.
 - 5. Color: As selected.
 - 6. Accessories: In-ground grout cover.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive bicycle racks.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Do not begin installation until unsatisfactory substrates have been properly repaired.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install bicycle racks level, plumb, square, and correctly located as indicated on the drawings.
- C. In-Ground Anchor Installation:
 - 1. Prepare holes in size according to manufacturer's instructions.
 - 2. Place anchoring bolts through the holes in the pipe.
 - 3. Lower rack into holes, ensuring the bottom of lower bends are at least 1-1/2 inch from the ground.
 - 4. Pour concrete and level rack.
 - 5. Support until dry.

3.03 CLEANING

- A. Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

End of Section

SECTION 22 0000

PLUMBING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Related Documents:

1. The other Contract Documents complement the requirements of this Section and apply to this Section
2. Division 1 - General Requirements, General Mechanical Section 23 0013 and apply to the Work of this Section.
3. Where requirements of this Section exceed those in other Contract Documents, Contractor shall comply with the requirements of this Section.

B. Codes and Regulations:

1. California Plumbing Code (CPC).
2. California Mechanical Code (CMC).
3. California Building Code (CBC).
4. California Green Building Standard Code.
5. National Fire Code (NFC).
6. National Fire Protection Association (NFPA).
7. Local Building Department.
8. Local Fire Marshal.
9. Office of the State Fire Marshall.
10. Division of the State Architect.
11. California Energy Commission.
12. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirements will govern when so directed by the Architect.

C. Scope of Work: (Plumbing Section Division 22)

1. Material and labor including rough-in for and connection to fixtures, appliances and equipment are:
 - a. **WASTE AND VENT**
 1. Drain waste and vent piping (DWV)
 2. Indirect waste piping
 3. Auto wash drainage and clarifiers.
 4. Trench drains.
 5. Area drains.

6. Floor drains.
7. Traps.
8. Vent flashings.
9. Interceptors and separators.
- b. WATER
 1. Potable water piping systems including above and below grade tanks, pressure reducing valves, relief valves, balancing valves, water hammer shock absorbers, air chambers.
 2. Isolation, Zone and Control Valves.
 3. Hot water systems including heaters and storage tanks.
 4. Water filters and strainers.
 5. Piping for water service.
 6. Backflow preventers.
 7. Disinfecting of water systems.
 8. Insulation of piping and equipment for heat, sound, and vibration.
- c. KITCHEN AND LAUNDRY
 1. Ranges (natural gas fired)
 2. Ovens (natural gas fired)
 3. Bar-B-Q (natural gas fired)
 4. Sinks and dishwashers.
 5. Ice makers
 6. Garbage disposers.
 7. Washing machines, clothes dryers.
 8. Clothes dryer vents.
 9. All other equipment with piping connections including kitchen unit combinations.
- d. ALL PLUMBING FIXTURES AND SUPPORTS
 1. Including, but not limited to:
 - (a) Sinks, lavatories, water closets, service sinks, etc., - all materials
 - (b) Shower pans, shower receptors, and shower stalls
 - (c) Supports (backing) for all plumbing fixtures and accessories
 - (d) Installation of sinks in or part of drainboards - all materials
- e. FUEL GAS PIPING
 1. Natural gas distribution, meters, regulators and connections to all gas fired equipment.

- f. FUEL OIL PIPING
 - 1. All piping, valves and appurtenances for complete systems as shown on the drawings and as specified herein.
- g. AIR PIPING
 - 1. Compressed air systems including compressor plant
 - 2. System controls
- h. PIPE IDENTIFICATION – Refer to Section 23 0013
- i. CONNECTIONS
 - 1. Utilities-Sanitary sewer, storm drain, water, gas
 - 2. Hot water tanks
 - 3. Temporary water, waste and air lines
 - 4. The joining of pipe by any mode or method including, but not limited to, acetylene and arc welding, brazing, lead burning, plastics welding, soldering, wiped joints, caulked joints expanded or rolled joints, etc., used in connection with any of the work listed herein.
- j. LAYOUT AND CUTTING
 - 1. Holes, chases, channels, the setting and erection of bolts, inserts, stands, brackets, stanchions, supports, sleeves, escutcheon plates, thimbles, hangers, conduits, and boxes.
- k. EXCAVATION, TRENCHING AND BACKFILL
 - 1. In connection with plumbing and piping work shown herein
- l. TEMPORARY PIPING in connection with:
 - 1. Building and construction work
 - 2. Excavating and underground construction
- m. PIPE HANGERS, SUPPORTS, ANCHORS, GUIDES, EXPANSION JOINTS
 - 1. Including:
 - (a) Supports for equipment to which pipe is connected, such as tank supports
 - (b) Isolators-dielectric and vibration
 - (c) Anchors and thrust blocks of concrete, metal, etc.
 - (d) Seismic bracing
 - (1) Anvil/Badger, Mason Industries, B-Line/TOLCO or approved equal.
 - (2) Seismic hanger system design shall comply with CBC 2013 requirements and ASE 7-05 and 7-10.
- n. SIGNS AND NOTICES
- o. SHEET LEAD, FIBERGLASS AND/OR PLASTIC LINING FOR:

1. Shower stalls
2. Tanks, vats, sinks and troughs
3. Roof flashing for pipe
- p. MECHANICAL EQUIPMENT-GAS FIRED
- q. ROOF FLASHINGS FOR PIPING PENETRATIONS
- r. TESTS
 1. Piping, for tightness
 2. Equipment for performance
 3. Operating instructions
 4. Final operation

1.02 ACCESSIBLE PLUMBING FIXTURES

- A. Accessible plumbing fixtures shall comply with all of the requirements of CBC CBC Section 11B-213, 11B-305, & 11B-308.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the Work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.
- C. Welder's Qualifications: Comply with ASME B31.8. The pipe welder shall have a copy of a certified ASME B31.8 qualification test report. Contractor shall also conduct a qualification test. Submit each welder's identification symbols, assigned number, or letter, used to identify work of the welder. Affix symbols immediately upon completion of welds. Welders making defective welds after passing a qualification test shall be given a requalification test and, upon failing to pass this test, shall not be permitted to work this contract.
- D. Comply with NSF 14, "Plastics Piping System Components and Related Materials," for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.
- E. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

1.04 SUBMITTALS

- A. Comply with pertinent provisions of Architectural Sections.
- B. Product Data: Within 35 calendar days after the Contractor has received the Notice to Proceed, submit 6 copies of the following to the Architect for approval prior to acquisition:
1. Materials list of items proposed to be provided under this Section.

2. Manufacturer's specifications, catalog cuts, and other data needed to prove compliance with the specified requirements. All pieces of equipment shall be clearly identified on corresponding manufacturer's literature being submitted.
3. Shop Drawings or other data as required to indicate method of installing and attaching equipment, except where such details are fully shown on the Drawings.
4. All submittals for the entire project shall be submitted at the same time. Submittals shall be provided in a tabulated three ring binder or PDF format. Incomplete or noncompliant submittals may be rejected.

1.05 DESIGN CHANGES CAUSED BY PRODUCT SUBSTITUTIONS

- A. Contractor shall pay costs of design and installation for changes resulting from substitution of alternate products.
- B. Acceptance of alternate products by Architect does not change this requirement.

1.06 PRODUCT HANDLING

- A. Comply with pertinent provisions of Architectural Sections.
- B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

PART 2 - PRODUCTS

2.01 WASTE, VENT, SEWER AND STORM DRAINAGE

- A. Above and Below Grade:
 1. Schedule 40 Solid wall PVC plastic DWV pipe with solvent-cemented drainage pattern fittings complying with ASTM D 1785 - Latest Issue.
 - a. SCH. 40 Cellular Core PVC plastic DWV pipe with solvent-cemented drainage pattern fittings complying with ASTM D 4396 may be used at Contractor's option for vent piping. -Latest Issue.
 2. Schedule 40 Solid wall ABS plastic DWV pipe with solvent-cemented fittings complying with ASTM D-2661 - Latest Issue.
 - a. SCH. 40 Cellular Core ABS plastic DWV pipe with solvent-cemented drainage pattern fittings complying with ASTM D 3965 may be used at Contractor's option for vent piping. -Latest Issue.
- B. Condensate (sized per CMC) and indirect waste drains
 1. Type M Copper Water Tube ASTM B88 with wrought Copper solder fittings, ANSI-B16.22
 2. PVC Schedule 40 Plastic Pipe and fittings, Solvent Cement Joints ASTM D 1785 or D2241. ASTM D2464, D2466 or D2467. For condensing furnaces and heating equipment only.

2.02 DOMESTIC WATER PIPING

- A. Below Grade (Water Service)
 1. 3" NPS and smaller, Schedule 40 PVC Plastic Pipe and fittings. ASTM D1785, D2466, with Solvent Cement Joints ASTM D2564.

2. 2" NPS and smaller, Type K Soft Annealed Temper Copper Tube ASTM B88 with Wrought Copper pressure fittings, ANSI B16.22. SIL-FOS - High temperature Brazing Metal Filler.
 3. 4" NPS and larger, PVC AWWA C900 Class 100 Plastic Pipe with Ductile-Iron fittings AWWA C110, C111 or Elastomeric Gasket Joints
- B. Above Grade (Distribution System)
1. Piping
 - a. For soldered, brazed and mechanical joints, 4" and smaller Copper Water Tube Type L Annealed Temper (Hard Drawn) ASTM B75 or ASTM B88.
 2. Fittings
 - a. Wrought Copper Pressure Solder Fittings, ASME B16.22 or ASME B16-25, 95-5 Tin-Antimony Filler Metal.
 - b. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
 - c. Copper Unions: MSS SP-123, cast-copper alloy, hexagonal-stock body, with ball-and-socket, met-to-metal seating surfaces, and solder-joint or threaded ends.
 - d. Press Fitting: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM. Press fittings shall have an inboard bead design.
 1. Copper Press Fittings: Viega/Rigid Tool Company, NIBCO, Elkhart/Apollo Xpress or approved equal.
 2. 2"NPS and smaller: Wrought copper fitting with EPDM-rubber O-ring seal in each end.
 3. 2-1/2" to 4"NPS: Cast-bronze or wrought copper fitting with EPDM-rubber O-ring seal in each end.
 - e. Grooved-Joint Copper-Tube Appurtenances:
 1. Basis of Design Product: Subject to compliance with requirements, provide a comparable product by one of the following manufacturers:
 - (a) Anvil International
 - (b) Shurjoint Piping Products
 - (c) Victaulic Company
 2. Copper Grooved-End Fittings: ASTM B75 copper tube of ASTM B 584 bronze castings.
 3. Grooved-End-Tube Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, EPDM-rubber gaskets suitable for hot and cold water, and bolts and nuts.
 - f. All underground water piping within the building boundaries shall be ASTM B88-93a Type "L" annealed (soft) copper tube made up without fittings below the floor level.

2.03 GAS PIPING

A. Below Ground

1. Schedule 40, Seamless, Black Steel Pipe, 2 1/2" and under ASTM A-120 with Malleable-Iron Threaded fittings ANSI-B16.3, Class 150. Pipe and fittings shall be coated and wrapped per IAPMO IS 13-91 or provide factory applied plastic coated pipe.
2. Schedule 40, Seamless Steel Pipe 3" and larger ASTM A-53 with Buttweld Steel fittings ASTM-A-234
3. Polyethylene (PE) Natural and Liquefied Petroleum Gas Yard Piping ASTM D2513 with Fusion Joints. Provide Steel Transition Risers and Detectable Warning Tape.

B. Above Ground

1. Schedule 40, Seamless Black Steel Pipe ASTM A 120 2 1/2" and smaller with Malleable Iron Threaded fittings ANSI B16.3 Class 150
2. Schedule 40, Seamless Steel Pipe 3" and larger. ASTM A53 with Buttweld Steel fittings ASTM A 234

2.04 FUEL OIL PIPING

A. Below Grade

1. Schedule 40, Seamless, Black Steel Pipe, 2 1/2" and under ASTM A-120 with Malleable-Iron Threaded fittings ANSI-B16.3, Class 150. Pipe and fittings shall be coated and wrapped per IAPMO IS 13-91 or provide factory applied plastic coated pipe.
2. Schedule 40, Seamless Steel Pipe 3" and larger ASTM A-53 with Buttweld Steel fittings ASTM-A-234

B. Above Grade

1. Schedule 40, Seamless Black Steel Pipe ASTM A 120 2 1/2" and smaller with Malleable Iron Threaded fittings ANSI B16.3 Class 150
2. Schedule 40, Seamless Steel Pipe 3" and larger. ASTM A53 with Buttweld Steel fittings ASTM A 234

2.05 COMPRESSED AIR PIPING

- A. Compressed air piping shall be ASTM-120-A53 black iron schedule 40 threaded steel pipe with ANSI B16 banded black malleable iron fittings.
- B. Piping from the receiver to the first shut-off valve shall be schedule 80 threaded steel pipe.
- C. Alternate 1: Type L Copper, hard drawn with wrought copper pressure fittings and 95-5 tin antimony filler metal.
- D. Alternate 2: Victaulic Schedule 5 carbon steel with "Pressfit" fittings. Pipe shall be externally zinc electroplated. Fittings shall have grade "E" O-Rings. System to be rated for 300 psi service.

2.06 FLUE VENT PIPE AND FITTINGS

- A. Install per manufacturer's recommendations.

- B. Flues or vents shall terminate above the roof with flashing and a listed vent cap installed in accordance with its listing and the manufacturer's instructions. Flues or vents shall terminate as required per current CMC.
- C. Vent cap shall be of the same manufacturer as the flue pipe.
- D. For condensing equipment: DuraVentPolyPro venting system: Inner pipe a minimum of 2.2 thick polypropylene pipe. Exterior pipe made of galvalume. ULC-S636 gas vent—BH. Class II venting system, installed per manufacturer's recommendations.

2.07 VALVES

- A. Acceptable Manufacturers: Milwaukee, Hammond, NIBCO, Watts, others as noted.

Type	Size Range	Part Number
Ball	2" and smaller (2 piece)	Milwaukee UPBA400 Hammond UP8301A NIBCO 585-80-LF
Ball	2½" and larger (3 piece)	Milwaukee UPBA300 Hammond UP8604 NIBCO 595Y-LF
Note: Stem extensions of non-thermal-conductive material and protective sleeve that meets UL 2043 approved for inside air plenum and allows operation of valve without breaking the vapor sleeve shall be used on insulated pipe. NIBCO NIB-Seal handle or acceptable equal.		
Check-Swing	2" and smaller	Milwaukee UP509 Hammond IB940 NIBCO 413Y
Check-Spring	2" and smaller	Milwaukee UP548T NIBCO 480Y-LF
Check-Swing	2½" and larger	Apollo 61YLF NIBCO F-918-B-LF
Check-Spring	2½" and larger	NIBCO F-938-33
Gas Cock	2" and smaller	Milwaukee BA475B Hammond 8901 NIBCO FP600

- B. All valves in copper piping shall be soldered in or have screwed threads. Threaded valves shall be installed with sweat to screwed adapters.
- C. All compressed air valves shall be ball valves especially made for compressed air service.
- D. All below grade ball valves shall have stainless steel handles.

2.08 HANGERS AND SUPPORTS

- A. In general, all pipe hangers and supports shall conform to the following except where special pipe hangers and supports are detailed on the Drawings. In all cases hanger and support details on the Drawings shall take precedent over the following:

Piping 6" Size and smaller:

<u>Items</u>	<u>TOLCO Figure</u>	<u>Anvil</u>
Pipe Hanger	1; 2; 200	260
Side Beam Clamp for Wood Joist	58	207
Beam Coupling for Steel Beams	65	92
Rod Coupling for Connection to "Hilti"	70	135

Inserts in Concrete Decks	107;109A;109AF	N/A
Trapeze Hangers	Tolstruct A12	AS200
Pipe Clamp	TOLCO Cush Clamp	AS004OD- AS098OD

B. Similar items by Anvil International, Erico-Caddy or TOLCO/B-Line will be acceptable.

C. Hanger Rods shall conform to the following table:

<u>Tube/Pipe Size</u>	<u>Rod Diameter</u>
1/2" to 4"	3/8"
5" to 8"	1/2"
10" to 12"	5/8"

D. Trapeze hangers may be used where parallel runs of pipe occur. All rods on trapeze hangers shall be 1/2" minimum size.

E. Hanger Support Spacing shall be as follows unless shown otherwise on the Drawings:

1. Horizontal:

- a. Copper: Every 6 feet for 1-1/2 inch and smaller, and 10 feet for 2 inch and larger.
- b. Steel, Gas: Every 6 feet for 1/2 inch, 8 feet for 3/4 inch and 1 inch, and 10 feet for 1-1/4 inch and larger.
- c. Schedule 40 PVC or ABS DWV: Every 4 feet for all sizes. Provide for expansions every 30 feet.

2. Vertical:

- a. Copper: Every floor not to exceed 10 feet.
- b. Steel, Gas: Same as horizontal spacing except 1-1/4" and larger at every floor.
- c. Schedule 40 PVC or ABS DWV: Base and every floor with mid-floor guides. Provide for expansion every 30 feet.

F. Refer to the plumbing code for materials not listed above.

G. At all points where insulated pipe contacts a hanger or support, the point of contact shall be protected by a metal insulation pipe shield #B3153 as manufactured by B-Line. Equivalent pipe protectors will be considered provided the substitute item meets the same standard of quality and performance as the specified item.

H. Seismic Restraint Devices

1. Available Manufacturers:

- a. Anvil/Badgr
- b. Mason Industries
- c. B-Line Tolco Division of Eaton

2. Seismic hanger system design shall meet the requirements of IBC, CBC and ASCE 7-05 and 7-10.

2.09 WALL AND FLOOR PENETRATIONS

- A. Fire walls and floors:
 - 1. Wall and floor penetrations shall be protected with a U.L. approved fire rated system. The system shall be per the Drawing Details, or other manufacturer's installation instructions.
 - 2. Fire stopping materials by Hilti, Metacaulk, or 3M are considered equal. The material shall be the same as called out for in the U.L. approved system.
- B. Poured concrete walls and floors.
 - 1. Pipes penetrating poured concrete walls and floors shall be protected by providing the following:
 - a. A Schedule 40 PVC sleeve one (1) size larger than the pipe or one quarter (1/4) inch of foam material wrapped around and secured to the pipe or packed and caulked with mineral wool.
 - b. Protection shall end flush with the wall or floor surface.
- C. All walls and floors:
 - 1. Piping passing through walls and floors exposed to view shall be provided with chrome plated split-ring escutcheon plates in finished areas. Brass or galvanized escutcheon plates may be used elsewhere.

2.10 FLASHING

- A. All flashing shall be 4 lb. sheet lead and all vents penetrating the roof shall be flashed and counter-flashed. Stoneman Co. roof flashing assembly with 10" skirt or equal may be used.
- B. The flashing for vents penetrating a metal roof shall have a corrosion resistant aluminum base compatible with the roofing system. A rubber type flashing by "Tech Specialties" shall be installed between the flashing and pipe.
- C. For single ply roofing, provide flashing per roofing manufacturer recommendations or installation instructions.

2.11 VALVE BOXES

- A. Brooks Products Inc., Christy Co., or equal with the word "Water" or "Gas" cast in cover as applicable.

2.12 CLEANOUTS

- A. Provide cleanouts per Drawings and details on Drawings. Cleanouts as manufactured by J. R. Smith, Mifab, Wade, or Zurn are approved equals.
- B. Cleanout tops to be installed with tamper-proof screws.

2.13 FLOOR DRAINS, FLOOR SINKS AND ROOF DRAINS

- A. Provide drains as specified on the Plumbing Schedule. Drains as manufactured by J.R. Smith, Mifab, Josam, and Zurn will be acceptable provided they are equal.
- B. Floor sinks by J.R. Smith, Mifab, Josam, and Zurn or Commercial Enameling are acceptable provided they are equal.

2.14 WATER HAMMER ARRESTORS

- A. Provide Wilkins Piston Model #1200, Sioux Chief #65X-X or equal, as sized on the Drawings or required by PDI. Install per manufacturer's instructions.

2.15 AUTOMATIC TRAP PRIMERS

- A. Provide Precision Plumbing Products, J.R. Smith, Mifab or Sloan as specified on the Drawings. Install per manufacturer's instructions.

2.16 PLUMBING FIXTURES

- A. Fixture locations, quantities, types, sizes and connections shall be as shown on both the Plumbing and Architectural Drawings. If a conflict in fixture location is noted between the Plumbing and Architectural Drawings, the Architectural Drawings shall take precedence.
- B. Fixtures shall be thoroughly protected against damage to the chrome plate or enamel, by chipping, scratching or other damage during the entire period of construction. Roof drains, floor sinks and drains, toilet and sink drains, plumbing vents, and all other similar fixtures shall be covered to prevent trash from entering the pipes until final installation of grates, domes, fixtures or other protective devices.
- C. Provide fixtures as specified in the Plumbing Schedule. American Standard, Crane, Elkay, Kohler, or Zurn are acceptable substitutes provided they are equal if approved by Engineer.
- D. Fixture carrier numbers listed are as specified on the Plumbing Schedule; however, carriers as manufactured by J.R. Smith, Mifab, or Zurn are acceptable provided they are equal.

2.17 CONNECTORS

- A. Provide Brass Craft "Speedway" or equal heavy pattern iron pipe size brass stops, rigid or flexible supplies and chrome plated brass "P" traps. Stops in "Public" areas to have screwdriver slots and those in "Private" areas to have all cross handles.
- B. Provide Brass Craft or equal flexible stainless steel braided water supplies to appliances. They may also be used to fixtures as an option to rigid supplies. Aquaflo is an acceptable substitute.
- C. Provide Brass Craft flexible or equal, stainless steel gas appliance connectors. Dormont is an acceptable substitute.

2.18 ACCESS BOXES

- A. See section 21 0013 for access panels.

2.19 PRESSURE GAGES AND THERMOMETERS

- A. Provide Marsh Quality gages or equal with 3-1/2" dial, gage cock, in type required. For pump suction, provide compound type.
- B. Provide Terice 7" BX or 3" Bimetal Dial series thermometers or equal, straight, angle, or oblique as required, equipped with separable sockets and well. Provide extension necks as required on insulated line.
- C. Arrange gages and thermometers for easy reading.

2.20 PRESSURE REGULATORS AND BACKFLOW PREVENTORS

- A. Provide the pressure regulator(s) and backflow preventer(s) as specified on the drawings and/or as required by the governmental authority having jurisdiction.
- B. Pressure regulators and/or backflow preventers by Febco, Hersey, Watts or Wilkins are considered equal when their pressure fall-off/loss is equal to or less than the specified regulators/preventer's loss for the given flow rate.
- C. Provide all potable water outlets with hose attachments with non-removable hose bibb backflow preventers per the C.P.C.

2.21 WATER HEATERS

- A. Provide water heaters as specified in Plumbing Schedule or approved equal of size, capacity, recovery, and KW/BTUH input. American, A.O. Smith and State are considered equal. Heater shall be A.G.A. or U.L. listed.
 - 1. Heater storage tank shall be provided with magnesium anodes, approved standard pressure/temperature relief valve and all standard factory trim.
 - 2. Gas heaters shall be provided with an A.G.A. approved 100% safety shut-off.
 - 3. Provide approved flexible copper supplies for the water heater water connections.
- B. Provide a Smitty Co., Benjamin Co. with 1" drain outlet or equal, water heater pan as specified in the Water Heater Schedule.

2.22 PRESSURE-TEMPERATURE RELIEF VALVE

- A. Pressure-temperature relief valve shall be Wilkins TP220, or TP3000 Series or equal.

2.23 EXPANSION TANK

- A. Expansion tank shall be Wilkins XT series as specified on the Drawings or approved equal in size and capacity. Amtrol and Watts expansion tanks are considered equal.

2.24 WATER HEATER SEISMIC RESTRAINTS

- A. Seismic restraints shall be Spacemaker restraint system Model E-50 or E-100 as applicable for the water heater specified. Spacemaker Model #TSE-25 or Seismik Model #SR-2 may be substituted when first approved by the Engineer.

2.25 PROTECTIVE INSULATION (ADA FIXTURES)

- A. Provide approved manufactured, molded antimicrobial vinyl protective pipe and fitting covering for exposed waste and drain assembly and for hot and cold water supplies and stops. Protective system shall consist of pre-formed pipe or tubing sleeve and pre-formed fitting patterns for trap and stops. Assembly shall have integral snap fasteners.
- B. Provide protective covering for off-set drain assembly and disposer at kitchen sinks.
- C. Foam pipe wrap, duct tape, baggy-type covers, tie-strap fasteners are not acceptable.
- D. Acceptable manufacturers:
 - 1. Truebro "Lav-Guard"
 - 2. Plumberex "Pro-Xtreme"

2.26 INSULATION

- A. All pipe insulation shall conform to Section 123 of the California Energy Efficiency Standards except to the extent that this Specification supersedes the minimum standards as established by the Code, in which case this Specification shall take precedent. Outside insulation shall be protected with a hard plastic or metal shell covering.
- B. Domestic cold water piping shall be insulated with a minimum 1" insulation in unheated areas of the building and where exposed outside of the building.
- C. Domestic hot water piping shall be insulated with Owens-Corning Fiberglass heavy density pipe insulation 25 ASJ/SSL-II (All Service Jacket/Double/ Self-Sealing Lap). Insulation shall be UL rated non-combustible pipe insulation with a k factor of 0.24-0.28 @ 100 degrees F. mean temperature, an embossed vapor barrier laminated and pressure sealing lap adhesive. All lap and butt strips shall have integral pressure-sensitive strips and shall be applied in strict accordance with manufacturer's instructions.
 - 1. Closed cell polyethylene foam by IMCOA or equal may be used at Contractor's option provided it meets the above requirements.
- D. Insulation thickness' shown below are based on insulation having a conductivity range of 0.24 to 0.28 per BTU/inch per hour per square foot per °F temperature of 100 degrees F.
 - 1. Temperature Range: Above 105°F

Pipe Size	Minimum Insulation Thickness
Runouts* up to 2"	0.5"
1" and less	1.0"
1.25" to 2"	1.5"
2.5" to 4"	1.5"
5" and larger	1.5"

*Runouts are defined as being less than 2" in diameter, less than 12 feet long, and connected to fixtures or individual terminal units.

- E. Insulation materials not meeting the specified conductivity range shall be submitted for approval and determination of the insulation thickness required.

2.27 CIRCULATION PUMP: (DOMESTIC)

- A. Provide pump(s) per schedule. Bell and Gossett, Grundfos, Laing or March are considered equal.

2.28 AIR COMPRESSOR

- A. Air Compressor unit shall be a factory-packaged assembly, including 3 phase, 208 volt motor controls, switches, wiring, accessories, and motor controllers, in a NEMA 250, Type 4 enclosure. Tank-mounted air compressors shall be manufactured to comply with UL listing requirements. Air compressors shall have manufacturer's name and address, together with trade name, and catalog number on a nameplate securely attached to the equipment. Each compressor shall start and stop automatically at upper and lower pressure limits of the system. Each compressor motor shall be provided with an across-the-line-type magnetic controller, complete with low-voltage release. An intake air filter and silencer shall be provided with each compressor. Aftercooler and moisture separator shall be installed between compressors and air receiver to remove moisture and oil condensates before the air enters the receiver. Aftercoolers shall be air type. The air shall pass through a sufficient number of tubes to affect cooling. Tubes shall be sized to give maximum heat

transfer. Cooling capacity of the aftercooler shall be sized for the total capacity of the compressors. Means shall be provided for draining condensed moisture from the receiver by an automatic float type trap. Capacities of air compressors and receivers shall be as indicated. Compressors shall be two-state, V-belt drive, capable of operating continuously against their designed discharge pressure, and shall operate and discharge pressure indicated. Compressors shall be tank mounted. The compressor main bearings shall be either roller or ball. The discharge passage of the high pressure air shall be piped to the air receiver with a copper pipe or tubing. A pressure gauge calibrated to 15- psi and equipped with a gauge cock and pulsation dampener shall be furnished for installation adjacent to pressure switches.

- B. **Air Receivers:** Receivers shall be designed for 200 psi working pressure. Receivers shall be factory air tested to 1-1/2 times the working pressure. Receivers shall be equipped with safety relief valves and accessories, including pressure gauges and automatic and manual drains. The outside of air receivers may be galvanized or supplied with commercial enamel finish. Receivers shall be designed and constructed in accordance with ASME BPV VIII Div 1 and shall have the design working pressures specified herein. A display of the ASME seal on the receiver or a certified test report from an approved independent testing laboratory indicating conformance to the ASME Code shall be provided.
- C. **Intake Air Supply Filter:** Dry type air filter shall be provided having a collection efficiency of 99 percent of particles larger than 10 microns. Filter body and media shall withstand a maximum 862 kPa (125 psi), 125 psi, capacity as indicated.
- D. **Pressure Regulators:** The air system shall be provided with the necessary regulator valves to maintain the desired pressure for the installed equipment. Regulators shall be designed for a maximum inlet pressure of 125 psi and a maximum temperature of 200 degrees F. Regulators shall be single-seated, pilot-operated with valve plug, bronze body and trim or equal, and threaded connections. The regulator valve shall include a pressure gauge and shall be provided with an adjustment screw for adjusting the pressure differential from 0 to 125 psi.

PART 3 - EXECUTION

3.01 GENERAL CONDITIONS

- A. Examine the areas and conditions under which Work of this Section will be performed. Conditions detrimental to timely and proper completion of the Work shall be brought to the attention of the Architect before the installation of materials. Do not proceed until unsatisfactory conditions are corrected. Incorrectly installed materials requiring changes will be at Contractor's expense.
- B. All plumbing fixtures, appliances, and appurtenances furnished with manufacturer's installation instructions shall be installed per those instructions.

3.02 PLUMBING SYSTEM LAYOUT

- A. Lay out the plumbing system in careful coordination with the Drawings. Determine proper elevations for all components of the system and use only the minimum number of bends to produce a satisfactorily functioning system.
- B. Follow the general layout shown on the Drawings in all cases except where other Work may interfere.

- C. Lay out pipes to fall within partitions, walls, or roof cavities, and to not require furring other than as shown on the Drawings.

3.03 PIPING INSTALLATION

- A. Pipe sizes as shown on drawings are Nominal Pipe Size (NPS) or Iron Pipe Size (IPS). Drawings and fixture schedule indicate pipe sizing per the CPC and Standard Engineering Practice. Pipe sizes shall be maintained to fixtures, appliances and equipment. Approved reducing fittings shall be installed at all points of connections.
- B. Install piping generally square with building, free of traps or air pockets, and true to line and grade. Keep all piping tight to the building structure, unless pipe slope is required. Do not install piping in any locations where, in the Architect's opinion, it will interfere with the use of the building or create a safety hazard. Where space is inadequate, notify the Architect in time to avoid unnecessary Work. Install all exposed piping as high as possible without interfering with other trades.
- C. Make changes in direction with manufactured fittings; use long radius elbows. Street elbows, bushings, close nipples and bending of pipe or tubing will not be allowed.
- D. Provide "P" traps at sanitary sewer drainage devices without integral traps.
- E. All natural gas piping under structures or concrete slabs will be installed in a protective vent sleeve. Sleeves under a building will be vented to outside the building per detail on Plans. Sleeves under concrete slabs will extend a minimum of 1 foot beyond the slab. All sleeves will be sloped 1/8" per foot up toward the vented end. The vent end of sleeves under slabs will terminate under a landscaped or asphalted area.
- F. Gas piping shall be tapped off the top or side of pipe and ends of mains shall be provided with dirt legs.
- G. Underground plastic pipe will horizontally transition to metal pipe 5 feet before the above ground riser. Install plastic pipe with a minimum of 36" of cover when located under areas of possible vehicle traffic. Approved metallic pipe must be used if the minimum depth is not met. A tracer wire, terminating at each end at an exposed location, will be installed with all underground plastic pipe. Gas piping will also have a continuous tape marked "Gas" laid 6" above it.
 - 1. Piping may terminate a maximum of one foot above ground when encased in a listed metallic transition riser.
- H. Use friction wrenches when installing brass, polished, or soft metal piping, and when installing piping exposed in finished areas. Replace piping showing wrench marks.
- I. Attach escutcheon plates to pipes with set screws or spring clamps with concealed hinges. Continue insulation through escutcheon plates.
- J. Compressed air piping shall be adequately supported in a manner that eliminates all sags and bowing of the line. All horizontal runs shall be straight and sloped at 1% to the indicated drain. All branch or individual drop lines shall be taken off the top of their supply line.
- K. General:
 - 1. Proceed as rapidly as the building construction will permit.
 - 2. Thoroughly clean items before installation. Cap pipe openings to exclude dirt until fixtures are installed and final connections have been made.

3. Cut pipe accurately, and work into place without springing or forcing, properly clearing windows, doors, and other openings. Excessive cutting or other weakening of the building will not be permitted.
4. Show no tool marks or threads on exposed plated, polished, or enameled connections from fixtures. Tape all finished surfaces to prevent damage during construction.
5. Provide sufficient swing joints, ball joints, expansion loops, and devices necessary for a flexible piping system, whether or not shown on the Drawings.
6. Support piping independently at pumps, coils, tanks, and similar locations, so that weight of pipe will not be supported by the equipment. Support the equipment independently from the pipe.
7. Pipe the drains from mechanical equipment, drip pans, relief valves, air vents and similar locations, to an open sight drain, floor drain, or other acceptable discharge point, and terminate with an air break or air gap per C.P.C.
8. Securely bolt all equipment, isolators, hangers, and similar items in place.

3.04 PIPE SUPPORT INSTALLATION

- A. Support pipes from structure with assemblies specified. Provide auxiliary members, anchors, guides, and sway braces necessary to maintain pipe alignment and prevent excessive movement or strain on piping system or components; allow for expansion and contraction of piping. Provide at least one hanger for each branch. Do not use powder driven fasteners, wire, perforated tape, nails, wood blocking, or other makeshift devices to support pipe.
- B. Attach supports to structure with bolts, screws or concrete anchors, per support manufacturer's requirements.

3.05 JOINTS AND CONNECTIONS

- A. Cut pipe shall be reamed to full inside diameter of pipe. Cut threads straight and true. Insure all filings have been removed from inside of the pipe. Apply liquid Teflon to male pipe threads and not inside fittings. Use graphite on cleanout plug threads.
- B. Joints in copper tube shall be made with 95-5 tin-antimony or lead-free solder, applied in strict accordance with the manufacturer's directions.
- C. Dissimilar metals shall be isolated with dielectric couplings, "EPCO" or approved equal. Provide access panels at all hidden couplings.
- D. All plastic pipe shall be joined in accordance with the manufacturer's recommendations for their pipe and IAPMO Installation Standard per the latest edition of the C.P.C.
- E. Press Connections: Copper press fittings shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.
- F. Pipe Protection: Provide protection against abrasion where copper tubing is in contact with other building members by wrapping with an approved tape, pipe insulation or otherwise suitable method of isolation.

- G. Penetration Protection: Provide allowance for thermal expansion and contraction of copper tubing passing through a wall, floor, ceiling or partition by wrapping with an approved tape or pipe insulation, or by installing through an appropriately sized sleeve. Penetrations of fire resistance rated assemblies shall maintain the rating of the assembly.

3.06 SANITARY SEWER, VENT AND INDIRECT WASTE SYSTEM INSTALLATION

- A. Install horizontal drainage piping at a minimum 2%, condensate 1%, slope unless otherwise noted. Where this is impractical notify the Architect before installing the pipes.
- B. Install vent piping to drain back into the sewer system.
- C. Provide cleanouts where shown on Drawings and where required by governmental agencies having jurisdiction.
 - 1. All cleanouts to grade shall be firmly secured by means of a concrete block 20" square by 5" thick, and shall be flush with finished grade, unless otherwise noted on the plans.
- D. Provide automatic trap primers as specified at floor sinks and drains as indicated on Drawings or where required by governmental agencies having jurisdiction. Provide access panels for all hidden mechanical trap primers.

3.07 FLUE VENT PIPE INSTALLATION

- A. All flues or vents shall terminate above the roof with flashing and a listed vent cap installed in accordance with its listing and the manufacturer's instructions. Vent cap shall be of the same manufacturer as the flue pipe. Flues or vents shall terminate per the latest Edition of the C.P.C.

3.08 VALVE INSTALLATION

- A. Provide valves in the water, air, and gas systems. Locate and arrange so as to give a complete regulation of apparatus, equipment, and fixtures.
- B. Provide valves in at least the following locations:
 - 1. In branches and/or headers of water piping serving a group of fixtures.
 - 2. On both sides of apparatus and equipment.
 - 3. For shutoff of risers and branch mains.
 - 4. For flushing and sterilizing the system.
 - 5. Where shown on the Drawings.
- C. Locate valves for easy accessibility and maintenance. Provide access panels for all hidden valves.
- D. Unions shall be installed downstream of all screwed valves.

3.09 WATER HAMMER ARRESTOR INSTALLATION

- A. Provide water hammer arrestor on hot and cold water lines.
 - 1. Install at all quick closing valves, solenoids, and supply headers at plumbing fixture groups.
 - 2. Locate and size as shown on Drawings, and where not shown, locate in accordance with Plumbing and Drainage Institute Standard WH-201.

3.10 BACKFLOW PREVENTION INSTALLATION

- A. Protect plumbing fixtures, faucets, hose connections, and other equipment having plumbing connection, against possible back-siphonage.
- B. Arrange for testing of backflow devices as required by the governmental agencies having jurisdiction.

3.11 PLUMBING FIXTURE INSTALLATION

- A. Connect plumbing services to fixtures as shown on Drawings and as specified.
- B. Install compression stops and flexible supplies per fixture manufacturer's recommendation or as high as possible on wall directly below fixtures.
- C. Install fixtures at right angles to, and tightly against, building surfaces, and in proper alignment. Fill gaps between fixtures and building surfaces with white grout. Mounting heights and locations shall be as shown on the Drawings, or, if not shown, as directed by the Architect.

3.12 INSULATION INSTALLATION

- A. Clean and dry surfaces prior to application of insulation or adhesives.
- B. Insulate piping, fittings, valves, and strainers. Leave unions exposed. Where insulation terminates, bevel ends of insulation and continue jacket over insulation and secure to pipe. Do not interrupt insulation at hangers, supports, clamps, or penetrations through structure. Fittings shall be finished with "Zeston" or approved equal fitting closures. If fitting closures not available, use 8 oz. canvas dipped in "Seal-Fas".
- C. Attach longitudinal jacket laps and butt strips with factory applied pressure sensitive adhesive. On concealed piping only, outward clinching coated staples at two inch spacing may be used. Cover elbows with one piece polyvinyl chloride covers. Secure with tack fasteners. Tape ends of covers with matching tape on exposed piping. Seal off all cut ends with canvas and Benjamin Foster 30-36.
- D. Install closed cell polyethylene foam per manufacturer's instructions.

3.13 TESTING AND ADJUSTING

- A. Provide personnel and equipment, and arrange for and pay the costs of, all required tests and inspections required by governmental agencies having jurisdiction. See Section 23 0013 for test requirements.
- B. Where tests show materials or workmanship to be deficient, replace or repair as necessary, and repeat the tests until the specified standards are achieved.
- C. Adjust the system to optimum standards of operation.

3.14 CLEANING (For potable water systems.)

- A. Disinfection: The copper hot and cold water distribution system shall be disinfected prior to being placed in service. The system shall be disinfected in accordance with AWWA C651 or the following requirements:
 - 1. The piping system shall be flushed with potable water until discolored water does not appear at any of the outlets.

2. The system shall be filled with a water chlorine solution containing at least 50 parts per million of chlorine. The system shall be valved off and allowed to stand for 24 hours. Or, the system shall be filled with a water chlorine solution containing at least 200 parts per million of chlorine. The system shall be valved off and allowed to stand for 3 hours.
3. Following the standing time, the system shall be flushed with water until the chlorine is purged from the system.

3.15 WARRANTY

- A. The contractor shall warranty all of the systems for proper operation installed by the contractor for not less than one calendar year from date of project completion. This completion date shall be set by the Architect or owner.

END OF SECTION 22 0000

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SECTION 23 0000

HEATING, VENTILATION, AND AIR CONDITIONING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Related Documents:
 - 1. The other Contract Documents complement the requirements of this Section and apply to this Section.
 - 2. Division 1 - General Requirements and Section 23 0013.
 - 3. Where requirements of the Section exceed those in other Contract Documents, Contractor shall comply with the requirements of this Section.
- B. Codes and Regulations:
 - 1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.
 - 2. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirements will govern when so directed by the Architect.
- C. Included: Work includes, but is not necessarily limited to, the following.
 - 1. The Work covered by this Specification shall include furnishing labor, material, equipment and services to construct, install and place in operation, the complete Heating, Ventilating and Air Conditioning Systems to the extent as indicated, and as shown on the Drawings and specified herein. The Work covered under this Section shall hereinafter be referred to as the Mechanical System.
 - 2. A system of temperature controls shall be furnished and installed complete as hereinafter described. Low voltage wiring and conduit, complete with electrical accessories and materials as required for the installation of the temperature control system shall be furnished and installed under this Section of the Contract, but shall conform to the Specification requirements as set forth under Division 26.
 - 3. Gas Fired Furnaces
 - 4. Fan Coil Units
 - 5. Cooling Coils
 - 6. Condensing Units
 - 7. Heat Pump Units
 - 8. Centrifugal Exhaust Fans and Roof Exhausters
 - 9. Supply, return, and exhaust duct systems complete with grilles, registers and diffusers.
 - 10. Filter and Filter Boxes
 - 11. Duct, Pipe and Equipment Insulation

12. Space Temperature Controls
 13. Refrigerant Piping
 14. Fire Dampers
 15. Vibration Isolators
- D. Work Not Included In This Section:
1. Blocking, framing and wood supports required for the purpose of accommodating the Mechanical System unless specifically called for under this Division. The contractor is responsible for the correct location of such items and shall bear the expenses covering their omission or improper location.
 2. Electrical connections to motors, electric starters, disconnect and over-current protective devices, unless specifically called for by this Section, or unless the equipment is furnished as an integral part of the Mechanical System Equipment, as hereinafter specified or noted on the Drawings.
 3. Line voltage electrical wiring and conduit, except where specifically called for on the Drawings or hereinafter in this Section.
 4. Painting, except when supplied as factory finish, or specifically called for in this Section or on Drawings.

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the Work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

1.03 SUBMITTALS

- A. If the heating and/or air conditioning units are substituted with a different brand than that specified on the Drawings the Title 24 Calculation may have to be re-run. This re-calculation will be billed hourly (6 hr minimum), payable to BMA, Inc., at the current rate defined in Exhibit B for Senior Energy Analyst.
- B. Comply with pertinent provisions of Architectural Section.
- C. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit 6 copies of the following to the Architect for approval prior to acquisition:
 1. Materials list of items proposed to be provided under this Section including, but not limited to heating, ventilating and air conditioning equipment and mountings, air distribution equipment, ductwork and fittings, flexible ductwork, flue vent pipe, duct specialties, flexible connections, insulation, lining and adhesive, duct joint sealer, temperature controls, piping and accessories.

2. Manufacturer's specifications, catalog cuts, and other data needed to prove compliance with the specified requirements. All pieces of equipment shall be clearly identified on corresponding manufacturer's literature being submitted.
3. Shop Drawings or other data as required to indicate method of installing and attaching equipment, except where such details are fully shown on the Drawings.
4. Submittals for entire Project shall be submitted at the same time or may be rejected until all are included in one submittal package.
5. Submittals shall be provided electronically in PDF format, bookmarked by design tags for equipment and specification sections for materials. Alternatively, hard copies will be accepted if 6 copies are provided, bookmarked as previously noted and bound together separately in three-hole folders or three ring binders.

1.04 DESIGN CHANGES CAUSED BY PRODUCT SUBSTITUTIONS

- A. Contractor shall pay costs of design and installation for changes resulting from substitution of alternate products.
- B. Acceptance of alternate products by Architect does not change this requirement.

1.05 PRODUCT HANDLING

- A. Comply with pertinent provisions of Architectural Sections.

PART 2 - PRODUCTS

2.01 HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

- A. Heating, Ventilating, and Air Conditioning Equipment: Equipment shall be as specified on the Drawings. All other equipment shall be pre-approved by the Mechanical Engineer.
- B. It shall be the responsibility of the Contractor to see that any substituted equipment performs similarly to that which is specified and fits in the same area as specified. Cost of any additional Work caused by the substitution of equipment shall be borne by the Contractor.

2.02 AIR DISTRIBUTION EQUIPMENT

- A. Grilles, registers and ceiling diffusers and other accessory equipment shown on the Drawings and "Grille, Register and Diffuser Schedule" shall be manufactured by Titus unless shown otherwise.
- B. Any substitutions of the above equipment which may be proposed by the Contractor shall be re-sized to suit his equipment by the proposed manufacturer and submitted in tabular form listing components proposed for each location in the System, identifying each as to location, design, air quantity passing through the devices, pressure drop, noise criteria data, velocities of air leaving the device and "K" flow factors for each item. Manufacturer's data sheets showing dimensions and recommended method of installation for each component must also be included.

2.03 CONTROL DAMPERS

- A. In all locations provide Greenheck model VCD-23, class 1 @ 4"wg as scheduled on plans. Damper frame shall be stainless steel, formed into a 5" X 1" structural hat channel. Blades shall be 16 gauge stainless steel strengthened by three longitudinal 1" deep Vee grooves running the entire length of each blade. Blade seals shall be Silicone. Jamb to be flexible stainless steel compression type. The linkage shall be concealed in the frame out of the air stream, stainless steel material. The Axle shall be stainless steel. Bearings to be stainless steel. Finish shall be Hi-Pro polyester power coated.

2.04 LOUVERS

- A. 4" deep louvers, Greenheck, Model ESJ-401, or approved equal. Deflection blades shall be spaced on 4" centers having 1/2" high vertical baffle and an additional lateral center rain hood. The edges of louver blades shall be folded or beaded to exclude driving rain. Louvers blades shall be oriented to minimize the entrainment of rainwater. Louver blades, heads, sills, jambs, braces and mullions shall be made of aluminum. Louvers shall be provided with flanges.
- B. Provide 1/2" aluminum bird screen on outside air intake louvers and 1/4" aluminum insect screen on combustion air louvers.

2.05 RECTANGULAR SHEET METAL DUCTWORK

- A. Rectangular supply, return, outside air and exhaust ducts, single leaf dampers and plenums shall be fabricated from prime grade galvanized steel sheets of lock form quality and shall be constructed in accordance with appropriate tables of the latest ASHRAE "Guide and Data Book" and SMACNA "HVAC Duct Construction Standards" handbook and Chapter 6 of the 2016 CMC.
- B. Transverse Duct Joints shall be made with The Ductmate System. When using The Ductmate System, construction of the duct such as gage, reinforcing, etc. shall be as indicated in the latest addition of the applicable SMACNA standards. With proper data, an equal may be submitted, providing the corners have a downset and corner clips to insure airtight integrity. Testing must be done by a nationally recognized testing laboratory. The standard Ductmate 35 System joint is the equivalent of a SMACNA "J" connection. The Ductmate 25 System joint is the equivalent of a SMACNA "F" connection. The installation of the Ductmate System shall be in accordance with the latest manufacturer's printed Assembly and Installation Instructions.
- C. Each duct or plenum shall be diagonally cross-broken for rigidity.
- D. Duct bends, fittings, transitions, etc. shall be fabricated in accordance with Fabrication Standards as shown on the Drawings or in accordance with latest SMACNA "HVAC Duct Construction Standards" where not shown on Drawings.
- E. Support ducts to joists or similar structural members. Except where indicated otherwise, ducts with a side of 24" or more shall be supported on Ductmate trapeze duct hangers consisting of 2" high x 1-1/2" wide x 18" gauge channel and 3/8" diameter hanger rods hung from support brackets bolted to structural members. See also Special Fabrications as shown on the Drawings. Duct supports shall be eight (8) feet maximum on center.

- F. At branch ducts, provide manually operated dampers of the type and arrangement shown on the Drawings, two gages heavier than the duct (if single leaf type) in which installed, and equipped with locking quadrants and closed end bearings.
- G. Sizes shown on Drawings are net inside dimensions. Enlarge duct to accommodate lining.

2.06 ROUND DUCTWORK AND FITTINGS

- A. 2-10" w.g. round duct through 61" in diameter shall be United Sheet Metal spiral lockseam unseal duct, or approved equal, manufactured from galvanized steel meeting the ASTM A-527-71 in the following gages:

Diameter	Metal Thickness
3-13"	26 ga.
14-23"	24 ga.
- B. Round duct shall be new and exclusively obtained for this project. Each piece shall be in 20' lengths. Ducts shall be cut to length required with joints only at fitting locations, except on duct runs longer than 20 feet.
- C. Spiral duct and fitting connections, 15" diameter and larger shall be Ductmate Spiral mate round duct connectors. The connector system shall consist of two mating round duct connector flanges roll-formed from hot dipped galvanized steel with an integral sealant and closure ring roll-formed from hot dipped galvanized steel.
- D. Fittings shall be United Sheet Metal galvanized fittings in the following gauges:

Diameter	Metal Thickness
3-13"	24 ga.
14-23"	22 ga.
- E. Spiral duct fittings must be manufactured as separated fittings and shall not be saddle taps, stubs or tap-in fittings tapped into spiral duct, nor may they be dove-tailed tap-ins into pipe or fittings.
- F. Reducers shall occur after a branch tap occurs on the main portion of the fitting. Divided-flow fittings shall be used unless shown otherwise on the Drawings.
- G. Joints on ducts and fittings shall be covered and sealed with 4" wide, 6 oz. canvas saturated with Arabol lagging adhesive, or Hardcast DT tape in conjunction with Hardcast FTA-20, non flammable, non-toxic adhesive, or GlenKote duct sealer or other approved mastic type sealer. Duct tape will not be allowed. Where exposed to weather, paint lagging strips with two coats of silver enamel paint.
- H. All ductwork shall be constructed in accordance with appropriate tables of the latest ASHRAE "Guide and Data Book" and SMACNA "HVAC Duct Construction Standards" handbook and Chapter 6 of the 2016 CMC. Duct gauges to be in accordance with 2.6.A and 2.6.D of this section.
- I. At branch ducts, provide manually operated dampers of the type and arrangement shown on the Drawings, two gages heavier than the duct (if single leaf type) in which installed and equipped with locking quadrants and closed end bearings.

2.07 FLEXIBLE DUCT

- A. (RESIDENTIAL ONLY) Flexible air duct shall be Hart & Cooley Model F218. Duct shall consist of an inner core having two layers of polyester film encapsulating a steel wire helix surrounded by a blanket of fiberglass insulation and sheathed in a metalized polyester vapor barrier reinforced with fiberglass scrim. All air ducts shall be UL listed under the UL-181 standard as a Class 1 Air Duct also conforming to NFPA standards 90A and 90B. This air duct shall have a certified thermal resistance rating of R-8 in accordance with ASTM C518 at 75°F and carry the ADC “Thermal Performance” seal.
- B. Flexible air duct shall be JP Lamborn Co., AMR-25. Flexible duct shall be factory made with a sound absorbing, spun-bonded, non-woven inner core. R-4.2 insulation to encompass core and a metalized polyester reinforced vapor barrier surrounding entire duct. Ends shall be secured to rigid duct per current SMACNA DCS with UL-181 FX tape. Length not to exceed 7 feet. Duct shall be Class 1, UL approved, and meet NFPA 90A, 90B and CMC minimum requirements.
- C. Use only the minimum length required to make the connection. In no case shall any section of flexible duct exceed 7 feet in length.
- D. Use two layers of UL listed 181 duct tape to connect flexible duct to the metal duct if flexible duct does not have S.M. collars.
- E. The number of bends shall not exceed a combined total of 90 degrees. 90 degree bends will not be allowed at diffuser connections.

2.08 FLUE VENT PIPE AND FITTINGS

- A. Type B double wall vent pipe with UL label shall be used for gas burning appliances, except gas wall furnaces and gas appliances with power burners. Install per manufacturer's recommendations.
- B. Boilers: FasNSeal by M&G DuraVent Inc. AL29-4C stainless steel, double wall, gasketed installed per boiler and flue manufactures recommendations.
- C. For gas fired wall furnaces Type BW double wall vent pipe shall be used and installed per latest C.M.C. and manufacturers recommendations.
- D. Flues or vents shall terminate above the roof with flashing and a listed vent cap installed in accordance with its listing and the manufacturer's instructions. Flues or vents shall terminate as required per current CMC.
- E. Vent cap shall be of the same manufacturer as the flue pipe.
- F. For condensing furnaces: M&G DuraVent PolyPro venting system: Inner pipe a minimum of 2.2mm thick polypropylene pipe. Exterior metal pipe made of galvalume. ULC-S636 gas vent –BH. Class II venting system, installed per manufacturer's recommendations.

2.09 DUCT SPECIALTIES

- A. Damper Regulators and Bearings: Duro-Dyne "Specline" SR-Series or approved equal, lever type with matching end bearing. Regulator set shall include rubber gasket between regulator and duct, spring washer between core and housing, wedge pin, dial indicator and handle. Matching end bearing shall be closed end with rubber gasket:

Model	Size
-------	------

- | | |
|-----|---------------|
| 148 | 10" and Under |
| 388 | 20" and Under |
| 128 | 21" and Above |
- B. Access Panels: Access panels shall be located at all points where adjustable mechanisms are installed internal to or on the surfaces of the ductwork. Where adjustable mechanisms are concealed by walls or ceilings, "Elmdor" or approved equal access doors shall be installed. Size shall be suitable for convenient servicing. Tile Walls: Doors and Frame: Stainless Steel. Other areas: recess type to receive ceiling or wall finish in order to provide "Blind Finish".
- C. Fire Dampers: Fire dampers shall be installed where shown on the Drawings and/or required, and shall be of a type approved by the U.L. Laboratories, Inc. and the State of California Fire Marshal. Dampers shall be installed per manufacturer's instructions. Provide access door in duct at each fire damper such that damper is easily accessible.
- D. Volume Dampers:
1. In rectangular ducts greater than 1.5 sq. ft., provide Pottorff Model CD42, or equal, factory fabricated opposed blade damper, 16 gauge blades, and brass bearings. Blade width shall not exceed six inches.
 2. In rectangular ducts 1.5 sq. ft. and less, provide single leaf dampers as described in Section 15600, 2.3 (a. and g.).
 3. In round ducts 15" in diameter and less, provide shop fabricated galvanized sheet metal plate dampers. Plate shall be 18 gauge or shall be two even gauges heavier than duct; minimum thickness 22 gauge. Provide stiffening beads at 1/3 points in dampers lighter than 18 gauge.
 4. In round ducts 16" and greater, provide Pottorff opposed blade damper Model CD22R or approved equal.
 5. In round ducts 4" – 24" in diameter, above "hard" ceilings, provide DuroZone Cable Operated Damper. Cable length to be between 3 and 15 FT long. Contractor to determine proper length to be use.
- E. Provide 20 gauge galvanized sheet metal escutcheon plates at duct penetrations of finished building surfaces. Install tight against surface and securely attached to duct. Continue insulation through openings.
- F. Duct Mounted Access Doors:
1. In rectangular duct provide, DuroDyne Model IAD, Ductmate "Sandwich", or equal, insulated, duct mounted access doors with Cam-Lock operated latches where shown on drawings or required for access to duct mounted equipment. Doorframe shall be 24-gauge with double wall door and 1/2" glass fiber insulation. Size doors to provide easy access to equipment.
 2. In round ducts, provide Ductmate - METU round duct access doors, fully insulated, with attached gasket and springs between inner and outer door. Access doors shall be as large as practical as duct size will allow.

2.10 FLEXIBLE CONNECTIONS

- A. Provide fireproof, insulated, non-porous, flexible connections between fans and ducts or casings and where ducts are of dissimilar metals. For round ducts, securely fasten flexible connections by zinc coated steel clinch-type drawbands. Flexible connections shall be DuroDyne "Insulfab" or "Insulflex" or approved equal.
- B. Provide a duct support next to each flex connector to prevent any strain on connection.

2.11 CONDENSATE DRAINS AND DRAIN PANS

- A. Air conditioning cooling coils shall have a condensate drain pipe, type "M" copper, to drain the condensate as shown on drawings.
- B. Condensing furnaces drains shall be PVC, slope a min of ¼ ft/inch from furnace connection to drain and installed per manufacture recommendations.
- C. Fan coils or DX cooling coils located in an attic or furred space shall have a secondary drain pan constructed of 20 gauge galvanized steel sheet metal. This pan shall have a drain line discharging to a conspicuous location. This pan and drain is in addition to the normal condensate drain line from the coil.

2.12 PIPE HANGERS AND SUPPORTS

- A. In general, pipe hangers and supports shall conform to the following except where special pipe hangers and supports are detailed on the Drawings. In cases hanger and support details on the Drawings shall take precedent over the following:

Pipe 6" Size and Smaller	
Items	Superstrut Number
Pipe Hanger	710
Side Beam Clamp for Wood Joist	540
Beam Coupling for Steel Beams	U563-U562
Rod Coupling for Connection to "Hilti"	H-119
Inserts in Concrete Decks	
Trapeze Hangers	A1200-A1202
Pipe Clamp	A716 or 701W/S-716

- B. Similar items by Unistrut, Securstrut, Michigan, or B-Line will be acceptable.
- C. Hanger Rods shall conform to the following table:

Tube/Pipe Size	Rod Diameter
½ to 4"	⅜"

- D. Hanger Support Spacing shall be as follows unless shown otherwise on the Drawings:

- 1. Horizontal:
 - a. Copper: Every 6 feet for 1-1/2 inch and smaller, and 10 feet for 2 inch and larger.
 - b. Steel, Gas: Every 6 feet for □ inch, 8 feet for 3/4 inch and 1 inch, and 10 feet for 1-1/4 inch and larger.
- 2. Vertical:
 - a. Copper: Every floor not to exceed 10 feet.

- b. Steel, Gas: Same as horizontal spacing except 1-1/4" and larger at every floor.

2.13 DUCT SMOKE DETECTORS:

- A. HVAC systems rated at 2000 CFM or greater shall be equipped with a duct smoke detector to automatically shut off the HVAC system if smoke is detected.
- B. The detectors shall be installed in the main supply duct downstream of any filters, before any branch ducts or terminal connections.
- C. The detector shall be System Sensor Innovairflex D4120 4-wire Photoelectric Smoke Detector. Provide with Factory NEMA 4 enclosure if mounted outside.

2.14 DAMPER ACTUATORS

Provide actuators as specified in the mechanical control drawings. If actuators are not specified in the mechanical control drawings or in the mechanical legend or detail drawings, then the following shall be used:

- A. Actuators shall be Belimo. Actuator shall be direct coupled over the shaft, spring return type.

2.15 ELECTRICAL EQUIPMENT

- A. Motor starters shall be provided complete with properly sized thermal overload protection and other appurtenances necessary for motor control specified. Mount starter adjacent to equipment. See electrical drawing. Maintain minimum of 3' clearance to front of device.
- B. Motor Starters: Shall be NEMA I or III as appropriate, general purpose, weather-resistant, with watertight enclosure where required.

2.16 INSULATION

- A. General: Insulation and lining material shall meet requirements of flame spread not to exceed 25 and smoke developed not to exceed 50 as tested by Procedure ASTM-E-84, NFPA 255 or U.L. 723 and shall conform to NFPA 90A and 90B.
- B. Heating and cooling duct and related heating and cooling equipment insulation shall conform to 2016 Building Energy Efficiency Standards, Administrative Regulations, Title 24, Part I, Section 120.4, except to the extent that this Specification supersedes the minimum standards as established by the Code, in which case this Specification shall take precedent.
- C. Unless noted otherwise, insulation shall be Fiberglass, or approved equal material. Application Work shall be performed in accordance with the best accepted practice of the trade and the manufacturer's recommendations. The performance of insulation Work shall be by experienced insulation applicators. Insulation shall be installed after the specified tests have been applied to the piping and duct systems, and the systems have been inspected and approved. Fiberglass trade names and/or numbers have been used to establish a standard of quality.
- D. External Duct Insulation – Outdoors, in a space between the roof and an insulated ceiling, in a space directly under a roof with fixed vents or openings to the outside or unconditioned spaces, in an unconditioned crawlspace; or other unconditional spaces: Shall be applied to concealed heating and cooling, supply and return duct except duct that is internally lined.

Insulation on duct shall be Manville Microlite FSK duct insulation, 3" thick, minimum installed R value of 8.0 or greater, FSK aluminum foil reinforced with fiberglass, scrim laminated to U.L. rated Kraft, or approved equal. Adhere to duct surfaces with Foster's 85-62 or approved equal, adhesive applied in strips of 6" wide on approximately 12" centers. Circumferential seams shall be butted together and sealed over joints with 3" wide pressure sensitive foil vapor barrier tape. Longitudinal edges shall be lapped 2" and secured with outward clinching staple 6" on center then sealed with pressure sensitive foil vapor barrier tape. Duct wrap shall be installed to allow maximum fullness at corners (avoid excessive compression) minimum thickness at corners shall be 1". Where ducts are over 24" in width, the duct wrap shall be additionally secured to the bottom of the rectangular ducts with mechanical fasteners spaced on 18" centers (Max.) to prevent sagging insulation.

- E. External Duct Insulation – All other locations not listed above: Shall be applied to concealed heating and cooling, supply and return duct except duct that is internally lined. Insulation on duct shall be Manville Microlite FSK duct insulation, 2" thick, type 100, minimum installed R value of 4.2 or greater, FSK aluminum foil reinforced with fiberglass, scrim laminated to U.L. rated Kraft, or approved equal. Adhere to duct surfaces with Foster's 85-62 or approved equal, adhesive applied in strips of 6" wide on approximately 12" centers. Circumferential seams shall be butted together and sealed over joints with 3" wide pressure sensitive foil vapor barrier tape. Longitudinal edges shall be lapped 2" and secured with outward clinching staple 6" on center then sealed with pressure sensitive foil vapor barrier tape. Duct wrap shall be installed to allow maximum fullness at corners (avoid excessive compression) minimum thickness at corners shall be 1". Where ducts are over 24" in width, the duct wrap shall be additionally secured to the bottom of the rectangular ducts with mechanical fasteners spaced on 18" centers (Max.) to prevent sagging insulation
- F. Internal Duct Insulation - Outdoors, in a space between the roof and an insulated ceiling, in a space directly under a roof with fixed vents or openings to the outside or unconditioned spaces, in an unconditioned crawlspace; or other unconditional spaces: Shall be applied to all heating and cooling supply and return duct and plenums on roof or where shown on Drawings. Manufacturer shall be Manville Microlite, or approved equal. Duct Liner shall be Linacoustic R, 2" thick, 1.5 pcf, with a "K" value of 2.2 in. for a total "R" installed value of 8.0 or greater. Insulation shall withstand velocities of up to 5000 FPM and temperatures up to 250 degrees F.
- G. Internal Duct Insulation – All other spaces not listed above: Shall be applied to all heating and cooling supply and return duct and plenums where shown on Drawings. Manufacturer shall be Manville Microlite, or approved equal. Duct Liner shall be Linacoustic R, 1 ½" thick, 1.5 pcf, with a "K" value of 2.2 in. for a total "R" installed value of 4.2 or greater. Insulation shall withstand velocities of up to 5000 FPM and temperatures up to 250 degrees F
- H. Portions of duct receiving Duct Liner shall be completed with transverse joints neatly butted with no gaps or interruptions. The duct liner shall be adhered to the sheet metal with 100% coverage of adhesive and exposed leading edges and transverse joints coated with adhesive. Adhesive shall be a water based product. In addition this shall be secured with mechanical fasteners which shall compress the liner sufficiently in place. The liner shall be cut to assure overlapped and compressed longitudinal corner joints. Application procedures

shall comply with the recommendations of the Sheet Metal and Air Conditioning Contractor's National Association's Duct Liner Application Standard, Second Edition.

- I. External Duct Insulation Exposed to Weather: Shall be applied to heating and cooling supply and return ducts and plenums exposed to weather if not noted to be internally insulated. Insulation shall be Knauf Type ASJ, or approved equal, rigid board fiberglass, 3.0 # per cubic foot minimum density, 2" min. thickness, 8.0 min. R value. The board shall be neatly cut and fitted to the surface with joints tightly butted together and against standing seams. The insulation shall be secured to the duct with adhesive and mechanical fasteners starting 3" from butt joints and 18" on center each direction. Vapor-barrier tape shall be then applied over joints, seams, breaks and any penetrations of the insulation vapor barrier jacket. A weather-barrier mastic compound reinforced with fabric or mesh shall be applied as a finish coat. Finish by painting with two (2) coats of aluminum paint.
- J. Ducts: Ducts shall be constructed, installed, sealed and insulated in accordance with the 2016 CMC. Insulation requirements are shown in 2016 California Energy Code T-24 Part 6 Section 120.4. The above paragraph(s) shall supersede if more stringent.

2.17 TEMPERATURE CONTROLS

- A. Temperature controls shall be furnished as indicated in schematic Drawing on Plans including room thermostats, relays and other necessary combustion, operating and safety controls.
- B. Wiring and Conduit
 - 1. Control wiring and conduit shall be the responsibility of this section and be installed as follows:
 - a. In equipment rooms/attics – Conductors shall be run in conduit. Final connection to equipment shall be flexible conduit.
 - b. Concealed in building construction (wall/inaccessible ceilings) - Conductors shall be run in conduit.
 - c. Roof mounted/exterior equipment yards – Conductors shall be in conduit. All flexible conduit shall be seal-tite with weatherproof connections. Equipment on grade and detached from the building a distance greater than 36" shall have underground control conduit routed to equipment.
 - d. Above accessible ceiling spaces – Control cable will be allowed to be installed without conduit in accessible areas above ceilings as follows:
 - 1. Cable is an approved type for the application.
 - 2. Cable is bundled/organized in management devices routed square with building lines (no diagonals) and kept clear of electrical devices (i.e., ballasts, transformers, etc.) that could cause interference.
 - 3. Conduit sleeves are provided between accessible ceiling spaces (i.e., across soffits, gypsum ceilings, etc.) as required to maintain future access to cable.

- e. Cable routed in accessible ceiling spaces shall comply with EIA/TIA standards for communications cabling. Communication bus wire shall be W183C-2058Y Connect Air, yellow shielded cable.
- C. Electric wiring, conduit and other electric devices required to complete the installation of the temperature control systems shall comply with requirements as set forth in the Electrical Section of this Specification.
- D. After completion of the installation, the Contractor shall adjust thermostats, motors and other equipment provided under this Contract. He shall place them in complete operating condition subject to approval of the Architect.
- E. The Control System herein specified shall be free from defects in workmanship and material under normal use and service. If, within twelve (12) months from date of acceptance by the Architect, any of the equipment herein described is proved to be defective in workmanship or material, it will be adjusted, repaired or replaced free of charge by the Contractor.
- F. The final connections and supervision of control wiring and interlock wiring shall be the responsibility of this Contractor.
- G. The Contractor shall submit to the Architect for approval, the required number of shop drawings of the entire control system before starting Work.
- H. Upon completion of the Work, the Contractor will provide diagrammatic layouts of the Automatic Control Systems specified herein. Layouts shall show control equipment and the function of each item shall be indicated.
- I. The temperature control system shall be installed by persons in the direct employment of the temperature controls manufacturer(s) exclusive contracting representative. The Mechanical Contractor shall not install the temperature controls unless pre-approved by the Mechanical Engineer.
- J. coating to allow connection of dissimilar metals. Fittings shall be certified to a working of 600 PSI.

2.18 REFRIGERANT PIPING

- A. Refrigerant piping shall be flushed clean with nitrogen and the ends capped prior to installation. Refrigerant piping shall be ASTM B280 ACR copper tube with wrought copper fittings. Use 45% minimum silver brazing alloy with melting point higher than 1100°F for making the joints.
- B. Insulate refrigerant suction line with 3/4" thick Owens-Corning Fiberglass or Armstrong Armaflex foamed plastic flexible tubing insulation applied with No. 500 adhesive. Use multiple layers and miter insulation to cover joints and all other items as required to prevent condensation. When piping is outside of building finish with 2 coats of Armstrong Armaflex finish, white in color.
- C. VRF and Heat pump systems: Insulate all refrigerant lines with 3/4" thick Owens-Corning Fiberglass or Armstrong Armaflex foamed plastic flexible tubing insulation applied with No. 500 adhesive. Use multiple layers and miter insulation to cover joints and all other items as required to prevent condensation. When piping is outside of building finish with 2 coats of Armstrong Armaflex finish, white in color.

2.19 REFRIGERANT PIPING ACCESSORIES

- A. Stop valves shall be Henry Type – rated for R410A, brass body, soldered, packless diaphragm.
- B. Solenoid valves shall be Sporlan Type – rated for R410A, soldered with brass body.
- C. Filter dryer shall be Sporlan "Catch-All" with soldered connections.
- D. Flexible joints for crossing building expansion joints shall be UL listed Tri-Flex Loop manufactured by Flex-Hose. Manufacturer to provide oxygen purge and cleaning of complete assembly prior to shipping.
- E. Flexible connectors rated for R410A shall be used at seismic joints. For linesets up to 5/8", flexible connectors shall be 36" Flex-Line Connectors manufactured by DiversiTech Corporation. Contractor to provide nitrogen purge and cleaning of complete assembly prior to installation.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

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

3.02 COORDINATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the Work of those trades for interface with the Work of this Section.

3.03 PREPARATION

- A. Holes in concrete:
 - 1. Provide sleeves, accurately dimensioned and shaped to permit passage of items of this Section.
 - 2. Deliver such sleeves, with accurate setting drawings and setting information, to the trades providing the surfaces through which such items must penetrate, and in a timely manner to assure inclusion in the Work.
- B. Flashing:
 - 1. Where items of this Section penetrate the roof, outer walls, or waterproofing of any kind, provide under this Section base flashing and counterflashing required at such penetration.
 - 2. Provide on each pipe passing through the roof a 4 pound seamless lead flashing and counterflashing assembly.

3.04 GENERAL INSTALLATION REQUIREMENTS

- A. Conceal piping, ductwork, and equipment in spaces provided unless specifically shown otherwise. If spaces are inadequate, notify Architect in time to avoid unnecessary Work. Do not cut or notch structural members without specific approval of the Architect.

- B. Follow manufacturer's instructions on items not specifically covered in drawings and specifications. Report discrepancies to Architect for clarification before starting Work.

3.05 EQUIPMENT INTERFACE

- A. Provide required shut off valves, unions, and final connections of piping to the Work of this Section.
- B. For electrically operated equipment, verify the electrical characteristics actually available for the Work of this Section and provide equipment meeting those characteristics.

3.06 PAINTING

- A. Paint inside of air outlets and connecting plenums with one coat of black paint, or provide all such items factory prepainted.
- B. For roof-mounted equipment, provide factory pre-finish on exposed surfaces.
- C. Touch-up scratches and abrasions to be invisible to the unaided eye from a distance of 5 feet.

3.07 INSTALLATION OF DUCTWORK

- A. Ductwork shall be delivered to the Project site with surfaces clean and free of loose dirt and rust. Special care shall be exercised by the Contractor to store the duct in a clean area to prevent the accumulation of dirt prior to installation. Fabricated or partially fabricated duct sections shall not be stored in open fields or on dirt areas surrounding the construction site. Paved areas may be used, if available, provided adequate protection is provided to prevent the accumulation of dirt on duct surfaces. If possible, the Contractor should arrange to deliver duct to the project site and store on the floor of the area in which it is to be installed.
- B. Before installation of ductwork, the Contractor shall inspect each section of duct and wipe internal surfaces clean. At the end of each Work period, or when ends of duct are left installed for future extension, the open ends shall be tightly closed off with a plastic sheet and taped securely to the open end of the duct.
- C. Construct and install sheet metal in accordance with latest SMACNA recommendations. Provide variations in duct size and additional duct fittings as required and approved by the Architect at no extra cost to the owner.
- D. The throat radius of bends shall be 1-1/2 times the width of the duct. Provide turning vanes in any mitered turn greater than 45 degrees.
- E. Transition slopes shall be no less than one to five where space permits.
- F. Abrupt offsets in the duct system greater than 30 degrees will not be allowed.

3.08 TEMPERATURE CONTROL INSTALLATION

- A. Install wiring and tubing parallel to walls and floors and securely clipped to structure or mechanical system components. Group parallel runs for neat appearance.
- B. Install room thermostats and other control devices at 48 inches above finished floor unless a lower mounting height is required for access by handicapped.

- C. Install outside air sensor in a location where it is not directly effected by radiation from the sun or any heat generating device or by a conditioned air stream or any other location that would produce a false reading.
- D. Upon completion of the installation calibrate all equipment and adjust controls for proper operation.

3.09 REFRIGERANT SYSTEM CHARGING PROCEDURE

- A. Pressurize the system with refrigerant and hold for 24 hours with no drop in pressure; test joints and equipment for evidence of leaks after satisfactory pressure test.
- B. Provide 1/2" angle type charging and purging valves adjacent to high and low side of the condensing unit to accomplish the procedure described hereinafter. Connect the vacuum pump to both the high and low side of the system. Do Work when ambient air temperature is above 60 degrees F during the evacuation process.
- C. Operate the vacuum pump until the system is evacuated to 2.5 mm Hg absolute. Break the system vacuum with nitrogen or refrigerant.
- D. After the system has been evacuated to 2.5 mm Hg absolute, close the vacuum pump suction valve and stop the pump.
- E. Charge system to required capacity with specified refrigerant.

3.10 CONTROL DEVICE IDENTIFICATION LABELS

- A. Thermostats and Exhaust fan switches shall have labels mounted on or just above the control device labled with the equipment being controlled. As an example, for a exhaust fan controlled by a switch the lable would read "EXHAUST FAN # 1" or if a thermostat the label would read "AC-1".
 - 1. Labels shall be 2" x 1" x 1/8" thick Formica/plastic engraving stock beveled on both sides and with two 3/16" diameter holes near the top uppermost tag corners.
 - 2. Labels shall be white with 3/8" high red engraved letters.
 - 3. Labels shall be attached to the equipment with adhesive.

3.11 WARRANTY

- A. The contractor shall warranty all of the systems for proper operation installed by the contractor for not less than one calendar year from date of project completion. This completion date shall be set by the Architect or owner.

3.12 SHOP DRAWINGS

- A. The Contractor shall prepare shop drawings covering duct systems, equipment and Mechanical Room piping systems. The drawings shall be prepared in 3/8" scale and shall be submitted to the Architect for approval prior to any fabrication. In preparing the shop drawings, the Contractor shall coordinate the location of duct, piping and equipment with the Work of other trades.

3.13 MECHANICAL SYSTEM START-UP RESPONSIBILITY

- A. Start up Mechanical Systems, and perform any such Work as may be required to adjust the systems to meet the requirements of the Contract Documents. Air distribution balancing shall be performed in accordance with Article "MECHANICAL SYSTEMS BALANCING".
- B. Install new clean specified filters in equipment containing filters immediately prior to owner occupancy. Contractor to bear all costs for this work.

3.14 MECHANICAL SYSTEMS BALANCING

- A. Testing and air balancing shall be performed by an independent balancing company certified by Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB). Testing and balancing shall be performed by a company other than the mechanical system installers/contractor. The name of the firm that the Contractor proposes to engage to perform this Work of balancing the system shall be submitted to the Engineer for approval prior to commencing the Work.
- B. Conduct tests in presence of Architect/Engineer.
- C. After Systems have been tested as outlined, air and water flow rates shall be balanced, and control devices adjusted. Balance and testing shall not begin until systems have been completed and are in full working order. Upon completion of the balancing operation and prior to final acceptance of the systems, the balancing firm shall submit a report, with six (6) copies, certifying to the proper performance of the system for approval by the Mechanical Engineer.
 - 1. The following information shall be included in the Air Side Report:
 - a. Fan speeds.
 - b. Motor current readings and voltage readings.
 - c. Air quantities in CFM at supply, return, exhaust terminals, and outside air intakes, both at design value and actual measured value. Test and adjust each terminal to within +10% of design requirements.
 - d. Air velocities in FPM at supply, return, and exhaust terminals at design value and actual measured value.
 - e. Positive static pressure, negative and total pressures and total air quantities for each fan system.
 - f. Equipment nameplate data.

END OF SECTION 15600

SECTION 23 00 13
GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Related Documents:
 - 1. The other Contract Documents complement the requirements of this Section.
 - 2. Division 1 - General Requirements applies to the Work of this Section.
 - 3. Where requirements of this Section exceed those in other Contract Documents, Contractor shall comply with the requirements of this Section.
- B. Codes and Regulations:
 - 1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.
- C. Included: Work includes, but is not limited to the following:
 - 1. Heating, Ventilating, Air Conditioning and System Balancing
 - 2. Plumbing
 - 3. Fire Protection
 - 4. Carpentry and metal Work required for Work of this Section and not specifically shown under another Section. Openings in concrete or masonry construction shall be either core drilled or saw cut unless indicated otherwise on Drawings.
 - 5. Excavation and Backfill
 - 6. Coordination Drawings
- D. Related Work:
 - 1. Painting (Division 09)
 - 2. Cutting and Patching (Division 30)
 - 3. Low voltage electrical control (Division 26)

1.02 DEFINITIONS

- A. Furnish: Purchase and deliver to job site in new condition.
- B. Install: Receive and store at job site until required; place secure and connect; furnish required appurtenances.
- C. Provide: Furnish and install as defined above.
- D. Section: Refers to a Section of these Specifications.
- E. Standards: The issue in effect as of the date of the contract documents.

1.03 PROJECT RECORD DRAWINGS

- A. Comply with pertinent provisions of Architectural Sections (Division 01).

1.04 SERVICE INTERRUPTIONS

- A. When Work of this Section requires temporary shutdown of existing systems for connections, the shutdown shall be made only during pre-arranged time agreeable to the Owner.

1.05 CORRELATION, INTERPRETATION AND INTENT OF CONTRACT DOCUMENTS

- A. The Mechanical Drawings are, in general, made to scale and the Contractor may obtain approximate distances and dimensions by scaling the Plans. It is distinctly understood, however, that it is done entirely at the Contractor's responsibility. Refer to Architect's Plans and Specifications for construction details, which will affect the Work and equipment. Examine the Architectural, Civil, Structural, Mechanical, Electrical, Landscape, Irrigation, Data, Fire Protection and Plumbing Plans and Specifications to ensure that this work does not conflict with the above trades. Plumbing, Mechanical and Electrical Plans are diagrammatic and, therefore, do not necessarily represent the exact installation. However, pipe sizing for utility services and ductwork are calculated per their respective codes and Standard Engineering Practice and shall be installed as sized from point of origin to terminal point. It shall remain the Contractor's responsibility to submit Shop Drawings if he/she has any questions about the final arrangement. Nothing on these Plans or Specifications shall be construed to permit work not conforming to all applicable codes and regulations.

PART 2 - PRODUCTS

2.01 ACCESS PANELS

- A. If not called for under other Sections, furnish Milcor, Elmdor, or Jay R. Smith access panels where shown on the Drawings or required for maintenance access to completed Work of this Section. Submit size, type, and location of proposed access panels not specifically shown, for review by Architect.
- B. Access panels shall be constructed of 16 gauge prime coated steel or stainless steel with screwdriver operated cam latch, concealed hinges, and fire rating equal to adjacent construction.
- C. Provide flush type doors with:
 - 1. Stainless steel finish for tiled surfaces.
 - 2. Prime coated finish for other surfaces.

2.02 FLASHING

- A. Provide watertight flashing at all openings through exterior walls and roof. Refer to Architectural Drawings.

2.03 BELT DRIVES

- A. All belts shall be "Vee" type, or approved equal. Sheaves shall be adjustable and shall be sized to drive fan at scheduled RPM when set at midpoint of adjustment range. All belt drive assemblies shall be rated at 150% of drive motor horsepower. OSHA approved belt guards shall be provided over all drive assemblies. The Contractor shall change any belts and drives as required to produce the specified CFM.

2.04 VIBRATION ISOLATION AND NOISE CONTROL

- A. All fans, heating and ventilating units, air conditioning units, blowers and similar equipment shall be securely mounted to and/or supported from the structure.
- B. Isolate all bare water piping from structural members or hangers with "Trisolators" or submitted and approved equal insulating sleeves. Install hangers on outside of insulated jacket on all insulated lines.

2.05 WEATHERPROOFING

- A. All equipment exposed to weather shall be protected by means of a suitable finish (i.e. paint). All fan cabinets, roof-mounted equipment, and ductwork shall be fabricated in such a manner to prevent leakage through seams and joints. Water rated, exterior hoods shall be provided over motors, belts, and other devices to insure against damage by water. At all locations where pipes and/or ducts penetrate exterior walls, or roofs, suitable rain tight flashing shall be provided.

2.06 PIPE WRAPPING

- A. All pipe, metal components, and joints buried in ground shall be primed and protected with 10-mil tape double wrapped or approved equal per IAPMO IS 13-2006. Before tape application, all bare pipe and fittings to be wrapped must be coated with pipe wrap primer. Stretch first layer of tape to conform to the surface while spirally half-lapping, apply a second layer, half-lapped and spiraled as the first layer with spirals perpendicular to first wrapping. In lieu of tape wrap, heat shrinkable 10-mil minimum thick polyethylene sleeve may be used.
- B. When applying tape, use only enough pull to cause the tape to properly conform to the irregular surfaces of the item. The proper amount of pull is reached when the tape surface is smooth without any wrinkles. Continue tape 4" above grade. End overlaps should point down. Tape shall be applied per manufacturer's installation instructions.

2.07 ELECTRIC MOTORS AND ELECTRICAL DEVICES

- A. All Electric motor current characteristics are as shown in equipment schedules on drawings and as specified hereinafter in this Specification. The Contractor shall refer to the Electrical Plans and shall confirm all motor voltage, amperage and phase characteristics before processing submittals or ordering equipment. If any equipment is installed different from the supplied electrical power, it is the contractor's responsibility to correct equipment to the required electrical characteristics.
- B. All electrical devices of a type normally listed by Underwriters Laboratories, Inc. shall bear U.L. label of approval.

2.08 PAINTING AND FINISHING

- A. Provide the coating specified below unless otherwise specifically called for under Painting, Division 09900. Exclude non-ferrous items, stainless steel, items to be insulated, and factory-finished items. Conform to requirements of the Painting Section where requirements are not specified in this Section.
- B. All materials used, except as otherwise specified in carrying out the provisions of the contract, are to be Fuller-O'Brien manufacturer or approved equal. Numbers given below are Fuller-O'Brien Company designation unless noted otherwise.

1. Primer coat for all exterior and interior materials: 1 Coat - Primer #66850
2. Finish coats as listed below:

Exterior concrete and concrete block	2 Coats – Semi-Gloss #664XX
Interior concrete and concrete block	2 Coats – Semi-Gloss #214XX
Exterior metal	2 Coats – Semi-Gloss #664XX
Interior metal	2 Coats – Semi-Gloss #214XX
Exterior galvanized metal	2 Coats – Semi-Gloss #664XX
Exterior stucco	2 Coats – Flat #668XX
Interior of Grilles, Diffusers, and Registers	1 Coat – Flat (black) #31202
3. Furnish equipment with factory or field-applied prime coat and finish coat of enamel. Restore damaged finishes to match original.

PART 3 - EXECUTION

3.01 GENERAL EQUIPMENT INSTALLATION REQUIREMENTS

- A. Install equipment to provide neat appearance, required manufacturer's access, and required space to allow replacement or maintenance. Provide bases, supports, anchor bolts, and other items required to install equipment. Installation shall be level and braced per CBC.
- B. Equipment shall operate quietly and without objectionable vibration. Excessive vibration, other than from specified equipment operating at optimum conditions, shall be the Contractor's responsibility and shall be eliminated as directed by Architect.

3.02 COORDINATION OF WORK

- A. Coordinate Work of this Section with Work of other Sections to avoid conflicts. If required, provide shop drawings and submit to Architect for approval.
- B. Insure that Work of other Sections is suitable to accommodate Work of this Section.

3.03 ADEQUACY OF FURRING

- A. Conceal piping and ductwork in spaces provided unless specifically shown otherwise. If spaces are inadequate, notify Architect prior to ordering materials and fabrication of components.

3.04 PROTECTION AND CLEANING

- A. Protect equipment from dirt, moisture, and mechanical damage during construction. Restore or replace damaged equipment to original condition.
- B. Keep interior of piping and ductwork free of foreign material during construction. Flush piping systems with test medium specified under Piping Tests before installing equipment and appurtenances or making final connections.

3.05 CLOSING-IN OF UNINSPECTED WORK

- A. Do not conceal or cover Work before tests and observations are completed. Uncover Work prematurely closed in and repair resulting damage to all Work, if requested by Architect, Engineer, or Project Inspector.

3.06 DAMAGE

- A. Repair or replace items damaged by leaks or overflow from Work provided under this Section and for any damage to any part of the project site, for a period of 1 year after notice of completion date. This is in addition to and not a limitation of other rights the Owner may have against the contractor under the Contract Documents.

3.07 PAINTING AND FINISHING

- A. The contractor shall examine carefully all surfaces to be finished under the contract; and before beginning any of his work shall see that the work of other trades has been left or installed in a workmanlike condition to receive paint, or a particular finish.
- B. The contractor shall take the necessary steps to protect his work and the work of other contractors during the time his work is in process and the contractor shall be responsible for any and all damage to the work or property of other contractors caused by his employees or by himself.
- C. Provide protective covers or drop cloths to protect floors, fixtures, and equipment. Exercise care to prevent paint being spattered on to surfaces which is not to be painted. Surfaces, from which such paint cannot be satisfactorily removed, shall be painted or repainted, as required to produce a finish satisfactory to the Architect.
- D. Cracks, holes, or imperfections in concrete or plaster are to be filled with patching plaster and smoothed off to match adjoining surfaces.
- E. All surfaces shall be in a proper condition to receive finish. Clean surfaces as necessary to receive paint. Remove all grease from metal surfaces before painting.
- F. Each coat of paint shall be applied at proper consistency and brushed evenly, free of brush marks, sags, runs, and with no evidence of poor workmanship. Color between coats of paint shall differ; (Color variations between coats should be enough to impair hiding.) Care shall be exercised to avoid lapping of paint on glass or hardware. Paint to be sharply cut to lines. Finished paint surfaces to be free from defects or blemishes.
- G. Exposed piping, ducts, and mechanical equipment (except for factory finished items) shall be painted. Exposed piping, except for identification banding, shall be painted to match surfaces adjacent. Each coat to be inspected when dry and subsequent coat not to be applied until approval received.
- H. Paint all surfaces visible through grille, diffuser and register faces, flat black.
- I. The contractor shall store all painting materials and equipment outside of the building. The receiving and moving of all paint materials and mixing shall be done outside of the building. Any other arrangements shall be made only with Architects approval.
- J. All necessary precautions shall be taken to prevent fire. Rags, waste, etc., soiled with paint or cleaning material, shall be removed from the premises at the end of each day's work.

3.08 MECHANICAL SYSTEM TESTING

- A. Furnish all test pumps, gauges, and equipment. Test all safety controls and devices.
- B. For air tests, install a calibrated test pressure gauge in the piping system to observe any loss in pressure. Calibrate the test pressure gauge with a dead weight tester within 15 days before use and certify by initial and date on a sticker applied to the dial face. Maintain the required test pressure for the time indicated. Brush joints with a soapy water solution to check for leaks if the required pressure cannot be maintained.
- C. After any test, repair all leaks found as directed and re-test as necessary until the system is proven tight.
- D. Before applying test pressure to any piping systems the Contractor shall be responsible for isolating all equipment e.g. control valves, regulators, relief devices, tanks and any other line accessories, which would otherwise be damaged by the test pressure.
 - 1. Soil, Waste, Vent, Roof, and Condensate Drainage:
 - a. Entire System: Tightly close all openings except the highest one. Fill to overflowing with water.
 - b. Sections of System: Tightly close all openings except the highest opening of the section under test. Fill section with water to test each section with a minimum 10-foot head of water except for the uppermost 10 feet of the system.
 - c. Allow to stand for (4) hours or longer, as required to complete the inspection.
 - 2. Domestic Water: Fill with water and test at 150 psig. Retain for (4) hours.
 - 3. Gas Piping: Air test to pressure equal to one and one-half times the design pressure, but in no case less than 50 psig. Retain for four hours.
 - 4. Refrigerant: Pressurize the system with nitrogen to 150 psig and hold for 24 hours with no drop in pressure; test joints and equipment for evidence of leaks after satisfactory pressure test.
- E. After all Systems have been tested as outlined, all flow rates shall be balanced, and all control devices adjusted. See Section 23 0000.
- F. The equipment and installations shall be operated by the Contractor and he shall demonstrate that all Systems are performing according to the requirements of the Plans and Specifications and to the satisfaction of the Architect, Engineer and Owner.
- G. Acceptance Testing Requirements: For applicable mechanical acceptance tests see the T-24 plan sheets. All forms, regulation and requirements are available online at www.energy.ca.gov/title24.

3.09 CUTTING AND PATCHING

- A. The Contractor shall do all cutting and patching which may be required for the installation of the Work under this Division of the Specifications. Patching shall be of the same quality, materials and finish as, and shall match accurately, all surrounding construction. No cutting of the Structure shall be permitted without the approval of the Architect.

- B. Wherever concrete or paved surfaces are cut to provide for the installation under this Section, the Contractor shall restore the surfaces to their original condition. Subgrade materials, concrete, and paving materials, along with the placement of same, shall be in accordance with the respective Sections of this Specification as they apply to the installation of such material.

3.10 EXCAVATION AND BACKFILL: (Buried pipes within the building walls and to 5 feet from the building.)

- A. Dig trenches straight and true to line and grade; bottom shall be left smoothed of rock points. Pipe shall be supported for the entire length on undisturbed, original earth. The minimum trench width shall be 16" and all pipe shall be 2 feet below the finished grade, minimum, wherever conditions permit. Sewer pipes to be below grade as necessary to meet the slope and invert on the Drawing. Whenever substantial variations of pipe bury is indicated by field conditions, the proposed changes in depth of bury shall be submitted, in writing, to the Architect for approval.
- B. All piping shall be laid on a bed of clean dry sand not less than 6" thick. The space between the pipe and the sides of the trench shall be backfilled with clean dry sand to a point 6" above the crown of the pipe. Both sides of the pipe shall be filled at the same time.
- C. The remainder of the trench shall be backfilled with native soil in lifts no greater than 12" and shall be mechanically compacted by tamping so to maintain a minimum relative dry density of 95%, determined by California Impact Test Method No. 216.
- D. All backfilling shall be brought flush with finished subgrade.
- E. Excess material shall be removed from the site. Trenches shall be backfilled immediately after approval.

3.11 EXCAVATION AND BACKFILL: (Buried pipes beyond 5 feet from the building walls.)

- A. The Contractor shall excavate for the installation of underground plumbing piping, and shall perform all Work to accomplish required excavation. Should it be required to cut asphalt pavement, such pavement shall be sawed or cut, to a depth necessary to bring about a straight-line break parallel to sides of the trench, so as not to disturb the adjoining pavement. All Work during its progress and after its completion shall conform truly to lines and grades given by the Architect.
- B. The width of the trench shall not be less than twelve (12") inches, no more than twenty-four (24") inches greater than the outside diameter of the barrel of the pipe to be laid therein. Where sheeting is required, this width shall be increased by the thickness of the sheeting.
- C. Should the trench be excavated to a greater depth than that given by the Architect, the Contractor shall bring such excavation to the required grade with such material as the Architect may designate, notwithstanding that it may be necessary to bring such material from other localities or to purchase suitable material; and the trench shall be tamped, as directed by the Architect. The required work shall be at the Contractor's expense, with no additional time.
- D. The material excavated shall be deposited along the side of the trench in such a manner as to create the least inconvenience possible.
- E. Special care shall be taken to have all fire hydrants and gate valves on water mains kept accessible at all times. The Contractor shall not obstruct the gutter or any street or

driveway, but shall use all proper means to provide for the free passage of surface water along the gutters into storm water inlets. He shall provide channels where necessary, suitable to the Architect.

- F. Wherever required, the side of the trench shall be sheeted and braced in strict accordance with the rules, orders, and regulations of the Division of Industrial Safety of the State of California. If water or quicksand is encountered, it may be necessary to sheet the trench solid with the type of sheeting suitable to the Architect.
- G. The Contractor shall cooperate with the Architect and maintain access to all areas required by the Architect. The Contractor shall be liable for all damages suffered by the Architect resulting from the contractor's negligence or lack of cooperation.
- H. Excess earth from the trenches, after compacting, shall be removed and disposed of by the Contractor unless otherwise directed by the Architect.
- I. Where groundwater or soft, yielding or otherwise unsuitable material is encountered in the bottom of the trench, which in the opinion of the Architect is an unsuitable foundation for the pipe, such material shall be excavated from the full width of the trench to a depth satisfactory to the Architect. Said depth shall be a minimum of six (6") inches. The resulting space shall be backfilled with imported bedding properly compacted to give adequate pipe support.
- J. All piping shall be laid on a bed of clean dry sand not less than 6" thick. The space between the pipe and the sides of the trench shall be backfilled with clean dry sand to a point 6" above the crown of the pipe and both sides of the pipe shall be filled at the same time.
- K. The remainder of the trench shall be backfilled with native soil in lifts no greater than 12" and shall be mechanically compacted by tamping so as to maintain a minimum relative dry density of 95% as determined by California Impact Test Method No. 216.
- L. Any asphalt pavement cut for the purpose of installing underground piping shall be replaced and shall conform in kind and quality to the type of pavement removed, but, in no case less than 12" of base rock be placed beneath the pavement. Where plant mix or asphalt concrete surfacing exists, pavement shall not be less than 3" in thickness unless otherwise authorized by the Architect.

3.12 INSTALLATION OF PIPING, DUCTWORK AND EQUIPMENT

- A. The installation of piping, ductwork, and equipment shall be made in such a manner to clear beams and obstructions. Do not cut into or reduce the size of plates or any load carrying members without approval of the Architect. Check Drawings and Work of others to prevent interference. Deviations of the Work determined by the Architect shall be installed by the Contractor without additional cost.
- B. Install piping and ductwork promptly, cap or plug open ends of pipe. No piping shall be permanently covered by construction before inspection and approval. Piping and ductwork shall be installed in accordance with best practice and recommendations of the manufacturer.
- C. Conceal piping and ductwork unless indicated otherwise. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions. Remove defective material from site. Install piping generally level, free of traps and unnecessary bends to conform with building requirements, and provide space for other work. Piping to be free of unusual noises. Avoid

any possible galvanic action by isolating dissimilar metals with suitable Dielectric Insulating Fittings.

- D. Unless called for otherwise, hereinafter in this Specification or by specific detail on the Drawings, all water pipes in contact with structure and/or hangers shall be suitably isolated. In the case of uninsulated pipe, "Trisolators" or equal shall be used.
- E. Protect enameled or polished equipment from damage, tool marks, etc.

3.13 STERILIZATION OF PIPES

- A. After preliminary purging of the Systems, the entire domestic potable water system pertaining to Work under this Contract shall be chlorinated in accordance with American Water Works Association, State of California Health and Safety Code procedure for disinfecting water mains. A thorough flushing operation shall be run upon completion of sterilization. Contractor shall then arrange with local health authority for test on mains and water systems and provide three (3) copies of test results to the Architect.

3.14 EQUIPMENT IDENTIFICATION TAGS

- A. Major pieces of equipment shall include, but are not limited to: water heaters, air conditioners, unit heaters, supply and exhaust fans, and shall be tagged.
 - 1. Tags shall be 2" x 2" x 1/8" thick Formica/plastic engraving stock beveled on both sides and with two 3/16" diameter holes near the top uppermost tag corners.
 - 2. Tags shall be white with 3/8" high red engraved letters.
 - 3. Tags shall be attached to the equipment with bolts, screws or chains as per valves.
 - 4. Tags shall have the following information:
 - a. Equipment number and nomenclature corresponding to the information on the mechanical contract drawings.
 - b. Examples:

WATER HEATER	EXHAUST FAN	AIR CONDITIONER
#1	#2	#3

3.15 IDENTIFICATION OF PIPING SYSTEMS

- A. Building Systems:
 - 1. Piping systems installed anywhere within the scope of the Work shall be identified as to contents using a color banding and marking system as outlined and in compliance with Federal OSHA requirements.
 - 2. This Work includes furnishing and application of all snap-around and/or self-sticking pipe markers. Formica valve tags, chains, wires, and related materials proper for the completion of the Work.
 - 3. Pipe markers shall be permanently shaped vinylite plastic snap-around pipe markers as manufactured by Seton Nameplate Corporation, Wilmington Plastic Company, or approved equal.

4. A maximum of four basic background colors shall be used and they shall conform to the American Standards Association Standard A13.1, "Scheme For Identification of Piping Systems" The names of materials (pipe contents) shall be superimposed on these ANSI background colors. Work legends shall conform to ANSI A13.1 to avoid confusion and mistakes. Basic background colors and content classification are:

Yellow	Dangerous Materials
Red	Fire Protection
Bright Blue	Protective Materials
Green	Safe Materials

5. Pipe marking and installation shall be as follows:
- Apply "Plastic Pipe Marker" at each valve to show proper identification of pipe contents.
 - Use an "Arrow Marker" with each "Pipe Content Marker". The Arrow shall always point away from the "Pipe Marker" and in the direction of the flow.
 - If flow can be in both directions, use a double-header "Arrow Marker".
 - Apply "Pipe Marker" and "Arrow Marker" at every point of pipe entry and exit where the line goes through the wall, floor or roof.
 - Apply "Pipe Marker" and "Arrow Marker" on each riser and "T" joint.
 - Apply "Pipe Marker" and "Arrow Marker" every 50 feet on long continuous lines.
 - Identifying long continuous lines with "Pipe Marker and "Arrow Marker at every bay or aisle within the building. All branch runs from mains on the roof shall be identified with "Pipe Marker" and "Arrow Marker" at the point of takeoff.
 - Apply "Markers" on the two lower quarters of the pipe where view is unobstructed. In this position "Markers" are read at a glance from ground floor level and dust will not obscure the "Marker". Roof-mounted piping "Markers" shall be so located that they can be read from a standing position on the roof.
 - All identification markers located out of doors and exposed to the sun and the elements shall receive one coat of clear lacquer after application to the pipe, to seal edges and to act as a protective coating.
 - Each "Arrow Marker" must have the same ANSI background color as its companion "Pipe Marker". Arrow must point away from "Pipe Marker" and indicate direction of flow.
 - "Pipe Markers" shall be guaranteed to stay on pipe systems for a period of not less than five years.

6. Following is a list of, but not necessarily limited to, the more commonly used piping systems that require identification "Pipe Markers" and "Arrow Markers".

Abbreviations on Drawings	Wording to Put on Pipe Marker	ANSI Color Background
CW	Domestic Cold Water	Green
DHWS	Domestic Hot Water Supply	Yellow
DHWR	Domestic Hot Water Return	Yellow
S	Gravity Sewer or Drain	Green
V	Vent	Green
G	Natural Gas	Yellow
A	Compressed Air	Blue
FM	Fire Protection Water	Red
CD	Condensate Drain Return	Yellow
RL	Refrigerant Liquid	Yellow
RS	Refrigerant Suction	Yellow
All lettering shall be black on the yellow background and white on all other background.		

3.16 SEISMIC BRACING

- A. It shall be required that pipes, ducts and conduits be supported and braced per the most current edition of SMACNA "Seismic Restraints Manual Guidelines for Mechanical Systems".
- B. When the SMACNA "Seismic Restraint Manual Guidelines for Mechanical Systems" does not specifically address the size of duct or pipe to be braced, the following shall apply:
1. All ducts shall be braced and guyed to prevent lateral or horizontal swing to the satisfaction of the Architect, Engineer, and State Inspector.
 2. All pipes shall be braced and guyed to prevent lateral or horizontal swing to the satisfaction of the Architect, Engineer, and State Inspector. Absolutely, no "Plumber's Tape" shall be used anywhere on this project.
- C. The SMACNA Manual can be obtained through SMACNA (VA) at (703) 803-2989. Contractor shall obtain manual prior to the start of any work.

3.17 OPERATION AND INSTRUCTION

- A. The Contractor shall furnish competent Technicians to supervise start-up operations of equipment specified by the Architect or Engineer and to instruct Owner's operators. The Contractor shall furnish six complete sets of operating instructions and service manuals to the Architect.

- B. Instruction period shall be started after instruction books and service manuals have been submitted to and approved by the Architect and shall be at hours (regular and non-regular) arranged by the Architect.
- C. Service manuals shall include oiling, cleaning, and servicing data, compiled in clearly and easily understood form and in a durable binder. Data shall show all serial numbers of every piece of equipment and complete list of replacement parts.

3.18 WARRANTY

- A. The contractor shall warranty all of the systems for proper operation installed by the contractor for not less than one calendar year from date of project completion. This completion date shall be set by the Architect or Owner.

END OF SECTION 23 00 13

SECTION 26 0500
COMMON WORK RESULTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
1. Materials and equipment shall be furnished and installed in support of electrical work described in these plans and specifications including but not limited to, raceways, boxes, enclosures, feeders, branch circuiting, supports, terminal cabinets, sleeves, gutters, panels, transformers, switchgear, lighting fixtures, controls, relays, contactors, in order to complete and make fully functional the systems described.
 2. Complete fire alarm and annunciation system as shown and/or required by the (local jurisdiction having authority, California State Fire Marshal) including monitoring equipment and wiring for central station connection. Provide fire alarm system design and submit for approval by the AHJ.
 3. Lighting systems, both interior and exterior as shown on the plans and as specified herein, including controls, occupancy sensors, lumen sensors, photocell controls, lamps, dimmers, racks, dimming ballasts, supports, fasteners, straps, and miscellaneous mounting hardware and support structures for such equipment.
 4. Electrical, Telephone and CATV Utility company site work as required by the serving companies. All utility company conduits, raceways, trenching, backfilling, utility vaults, equipment pads and substructures shall meet both the respective utility companies requirements as well as those of the authority having jurisdiction, whichever is more restrictive. In no case shall work be completed and covered without the written approval of the serving utility companies both on and off site.
 5. Duct banks and raceways for all power and communications systems as shown and/or required. Duct banks shall include all trenching, racking, conduit, concrete, backfill, boxes, pads, substructures required for a fully developed and useable pathway for cables, conductors, as shown on site, etc.
 6. HVAC and plumbing electrical: Conduit, conductors and terminations for all line voltage power, line voltage controls and fusible and/or non-fusible safety disconnect switches for HVAC equipment, including but not limited to air conditioners, furnaces, fans, heat pumps, cooling towers, system pumps, condensing units. Provide protective equipment unless otherwise noted, etc. including protective devices.
 7. Plumbing Electrical: Conduit, conductors and terminations for plumbing equipment with power requirements including necessary fusible and/or non-fusible safety disconnect devices. Provide motor starters where required unless provided by mechanical specification.
 8. Power and Lighting Distribution: Furnish and install power and lighting distribution systems including but not limited to panels, feeders, transformers, branch circuits,

devices, fixtures, disconnect switches, contactors, controls, etc. for a complete working system.

9. Data systems infrastructure including all boxes, raceways, cable tray, wire basket tray, dedicated branch circuits, sleeves and penetrations, etc. as described and as shown in plans, risers, specifications, EIA/TIA standards and/or required for a complete and operating system.
10. Lighting acceptance testing, documentation and completion of required forms as specified in Section 26 5670, LIGHTING ACCEPTANCE TESTING.
11. Furnish optional standby power distribution system in accordance with all applicable codes and standards. This project shall include the (standby option/prime) generator, automatic transfer equipment and emergency distribution system. This shall include the furnishing of a system that is approved by the local Air Pollution Control District (APCD) and the furnishing of all required data to the Owner or Owner Representative for obtaining the necessary permits.
12. Allocation of time to adequately train the Owner on the use and operation of all systems installed within the facility or on the property. Minimum two week advance notice shall be coordinated with the Owner and his representatives. Training shall be as outlined in individual system specifications identified to follow.

B. Related Sections Under Other Divisions:

1. Mechanical Wiring: Control circuit wiring, energy management controls and interlocks for mechanical equipment shall be installed by Mechanical Contractor.
2. Painting of electrical equipment where exposed and required by the Architect to be painted as described elsewhere in the specification.
3. Irrigation System: Provide all line voltage (50 volts or above) connections to irrigation system equipment, time clocks and or powered satellite controls. Coordinate locations of this work with the Landscape Contractor.
4. Pole Bases: Contractor shall be responsible to furnish light standard concrete pole bases, rebar, bolt templates and anchor bolt kits for a complete installation. Concrete, rebar, excavation shall be by Contractor in accordance with all parts of this specification.
5. HVAC Control Raceway: Raceways, boxes, and control wiring for thermostats, temperature sensors and control components specified within the mechanical specifications, shall be furnished and installed as required by Division 25 and installed in accordance with the minimum wiring methods allowed for branch circuit wiring in Division 26 (the DDC systems/EMS systems and components are installed in accordance with Division 25).
6. Smoke Fire Dampers: Coordination with Mechanical plans for exact locations and points of connection for power and fire alarm system connections (power and fire alarm connection shall be by Electrical Contractor).
7. Duct mounted smoke detectors: Coordination with Mechanical plans for exact locations and points of connection for power and fire alarm system connections (power and fire alarm connection shall be by Electrical Contractor).
8. Security System: Shall be installed by Owner's vendor. Contractor shall provide conduits, boxes, stubs to accessible ceilings, dedicated circuit(s) for alarm panel, access control system (key pads, electric locks), etc. as shown and/or required by the Owner's vendor.

1.03 SYSTEM DESCRIPTION

- A. The electrical plans indicate the general layout and arrangement; the architectural drawings and field conditions shall determine exact locations. Field verify all conditions and modify as required to satisfy design requirements as well as code minimums. Maintain all required working clearances as described in CEC Article 110 as well as other applicable articles.
- B. Discrepancies shall be brought immediately to the attention of the Architect for clarification. The Architect shall approve any changes. Prior to rough-in, refer to architectural plans that shall take precedence over electrical plans with respect to locations.
- C. Verify all power and communications utility company requirements prior to commencement of utility work. Make proper adjustments to the construction to satisfy the serving utility requirements if they differ from the construction documents. It shall be the Contractor's responsibility to contact each utility company for obtaining finalized utility design drawings and/or approval, and for scheduling inspection of utility infrastructure installations.
- D. Charges imposed by the electric and communications utility companies shall be paid by Owner directly to utility companies.

1.04 SUBMITTALS AND SHOP DRAWINGS

- A. Before construction, submit in accordance with the General Conditions of this Specification: A complete list of all materials proposed to be furnished and installed under this section.
- B. Manufacturers' specifications, catalog cuts and shop drawings as required to demonstrate compliance with the specifications. Identify specific intended use for each component where submittal may be ambiguous. Submit entire bound submittal at one time; partial submittals will not be accepted. At a minimum, submittals will be required for the following:
 - 1. Utility service/site work equipment including ducts, conduits, fittings, concrete manholes, concrete and fiberglass pull, manhole, boxes, vaults, trench racks, accessories, etc.
 - 2. Distribution equipment including main switchboards, distribution switchgear, transformers, distribution panels and breakers, motor controls, distribution and branch circuit panels, grounding, transient voltage surge suppressors, etc.
 - 3. Electrical equipment including disconnects, fuses, raceways, straps and racks, fittings, conductors, boxes, gutters, devices, plates, etc.
 - 4. Lighting equipment including fixtures, ballasts, lamps, mounting accessories, color charts (where required), etc.
 - 5. Lighting control equipment including low voltage switching system, dimmer switchbank / accessories, occupancy sensing equipment, time clocks, contactors, photocells, lumen sensors, etc.
 - 6. Constructability review letter/comments for lighting acceptance testing as required by Section 26 5670, LIGHTING ACCEPTANCE TESTING.
 - 7. Complete system component submittals and shop drawings for:
 - a. Fire Alarm System
 - b. Generator and Transfer Switches.
 - c. Communication Systems including but not limited to; cable, fiber, terminations, cable management, cable tray, patch panels, equipment racks, specified active

- electronics (where called for), cabinets, jacks, plates, cable labeling, testing procedure.
8. Conduit including all fittings, etc.
 9. Wiring and cable, terminations, etc.
 10. Fire rating penetration materials, details, etc.
- C. The intent of these specifications is to establish a standard of quality for materials and equipment. Therefore, some items are identified by manufacturer or trade name designation. Substitutions shall be subject to the Architect's approval. Samples of the proposed and substitute materials may be required for inspection prior to approval. Costs, if any, for evaluation of substitutions shall be the Contractor's responsibility. The decision of the Architect shall be final. Where the substitution will affect other trades, coordinate all changes with those trades concerned and pay any additional costs incurred by them as a result of this substitution. Approval of substitutions shall not relieve the Contractor from providing an operational system in accordance with all applicable codes and ordinances.
- D. SUPPORTING DEVICES
1. Provide all details of suspension and support for ceiling hung equipment.
 2. Where walls, floor, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for ducts, conduit and pipe must be included and approved before the submittals must include spacing, static loads and seismic loads at all attachment and support points.
 3. Provide seismic details of seismic restraints and anchors; including number, size and locations for each piece of equipment.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Storage of equipment for the job is the responsibility of the Electrical Contractor and shall be scheduled for delivery to the site, as the equipment is required. Damage to the equipment delivered to the site or in transport to the job shall be the responsibility of the Electrical Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials shall be new and bear the label of or be listed by a nationally recognized testing laboratory. The quality and suitability of all materials shall conform to the standards and practices of this trade.
- B. Supplied materials shall be of a current manufactured product line. Discontinued products are not acceptable. Where products are identified on the contract documents by part number, supply the current product model or series which meets the specification and intended use of the specified component.

2.02 SUPPORTING DEVICES

- A. Hangers: Kindorf B-905-2A Channel, H-119-D washer, C105 strap, 3/8" rod with ceiling flange.
- B. Concrete Inserts: Kindorf D-255, cast in concrete for support fasteners for loads up to 800 lbs.
- C. Pipe Straps: Two-hole galvanized or malleable iron.
- D. Luminaire Chain: Campbell Chain 75031, 90-lb. test with steel hooks.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Professionalism and appearance of installations shall be in accordance with accepted practices of this trade. Installation methods shall conform to manufacturers' specifications and recommendations. The Contractor shall man the job with qualified journeymen and helpers in this trade for the duration of the job. It is the Contractor's responsibility to communicate with and keep the job superintendent apprised of changes or clarifications, etc.
- B. Employment of any person on any job in the capacity of an electrician is not permitted unless such person has qualified for and holds a valid Journeyman Electrician Pocket Card or General Journeyman Electrician Certificate issued by the State of California Division of Apprenticeship Standards except, Contractor may employ electrical helpers or apprentices on any job of electrical construction, new or existing, when the work of such helpers or apprentices is performed under the direct and constant personal supervision of a journeyman electrician holding a valid Pocket Card accepted by the State of California Division of Apprenticeship Standards.
 - 1. Each Pocket Card carrying journeyman electrician will be permitted to be responsible for the quality of workmanship for a maximum of one helper or apprentice during any same time period, provided the nature of work is such that good supervision can be maintained and the quality of workmanship is the best, as expected by Owner and implied by the latest edition of the National Electrical Code.
 - 2. Before each journeyman electrician commences work, deliver to Owner at the project site, a photocopy of the journeyman's valid Pocket Card.
- C. Materials shall be installed in accordance with the manufacturers' specification and recommendations. They must conform to the approval AHJ adopted codes and standards, but not less than the 2013 CEC and all applicable codes and standards, including but not necessarily limited to California Code of Regulations Title 24, NFPA, National Electrical Manufacturers Association, ANSI, CBC, and any other adopted ordinances of applicable agencies having jurisdiction. Refer to general conditions of specifications.
- D. Electrical Contractor shall lay work out in advance in order to avoid unnecessary cutting, chasing, and drilling of floors, walls, ceilings and other surfaces. Work of this nature shall be carefully done so as not to damage work already performed by other trades. Any damage which results must be properly repaired at no extra cost to the Owner. Such alterations shall not

depreciate the integrity of the structure. Approval for cuts or penetrations in structural members shall be by the Architect.

E. Supporting Devices:

1. Verify mounting height of all luminaires or items prior to installation when heights are not detailed.
2. Install vertical support members for equipment and luminaires, straight and parallel to building walls. Provide independent supports to structural member for electrical luminaires, materials, or equipment installed in or on ceiling, walls or in void spaces or over furred or suspended ceilings.
3. Do not use other trade's fastening devices as supporting means for electrical equipment, materials or luminaires. Do not use supports or fastening devices to support other than one particular item.
4. Support conduits within 18" of outlets, boxes, panels, cabinets and deflections. Maximum distance between supports not to exceed 8' spacing.
5. Securely suspend all junction boxes, pull boxes or other conduit terminating housings located above suspended ceiling from the floor above or roof structure to prevent sagging and swaying.
6. Provide seismic bracing per UBC requirements for this building location.
7. Supporting Devices: Safety factor of 4 required for every fastening device or support for electrical equipment installed. Support to withstand four times weight of equipment it supports. Bracing to comply with seismic design category "SDC" per Structural Engineer.

F. Coordinate work with other trades as required to eliminate any delays during construction. Coordinate changes with other prime contractors to avoid construction conflicts.

G. Engineer's Field Observation: Site visits during construction for field observations and reports will be conducted by electrical engineer when directed by the Architect. A list of items that need to be addressed will be submitted to the Architect for forwarding to the Contractor. A written response to all items shall be submitted for Owner's review once complete. When Electrical Engineering representative performs a field observation, the Electrical Contractor shall be present and available to remove equipment covers as needed.

H. Drawings of Record: Provide a full and accurate set of field record drawings marked up in a neat and understandable manner submitted to the Owner Representative, Construction Manager, or Architect upon completion of the work and prior to issuance of a certificate of completion. The drawings shall dimension all electrical facilities including but not limited to underground conduit, vaults, boxes as well as conduit routing scaled to within 12" of actual field conditions and shall be kept up to date on a daily basis reflecting changes or deviations. Electrical facilities shall be accurately drawn on the plan to scale. Refer to the general conditions of these specifications for additional requirements. Record drawings shall be required to identify both horizontal and vertical dimensions to visible and fixed points such as concrete, asphalt, buildings, sidewalks, etc.

I. Identification: Provide engraved laminated plastic nameplates for all switchboards, panelboards, fire alarm terminal cabinets, telephone and cable television backboards, main devices, control panels, time clocks, contactors and safety disconnect switches accurately identifying each device. Labels shall be attached to the equipment by means of screws or rivets. Self-adhering

labels will not be acceptable. Refer to Section 26 0553, IDENTIFICATION OF ELECTRICAL SYSTEMS.

- J. Safety: The Electrical Contractor is responsible to maintain equipment in a safe and responsible manner. Keep dead front equipment in place while equipment is energized. Conduct construction operations in a safe manner for employees as well as other work persons or anyone visiting the job site. Provide barriers, trench plates, flags, tape, etc. The Contractor shall hold all parties harmless of negligent safety practices that may cause injury to others on or near the job site.
- K. Guarantees: Equipment and labor shall be guaranteed and warranted free of defects, unless otherwise stated to be more restrictive, for a period of one year from the date of final acceptance by the Owner. A written warranty shall be presented to the Architect at the time of completion prior to final acceptance. Equipment deemed to be damaged, broken or failed should be repaired or replaced at no additional cost to the Owner. Materials or system requiring longer than a one-year warranty as described herein shall be separately warranted in separate letters of guarantee stating the duration of warranty.
- L. Operating and Installation Manuals: Provide two copies each of manuals, operating and installation instructions for equipment indicated in submittal packages. Instruct the Owner's representative as to the operation and location of equipment necessary to allow them to operate the facility upon final acceptance. This instruction period shall be prearranged with the Owner's representative prior to occupancy of the facility and the weeks prior to training scheduled.
- M. Lighting Acceptance Testing: Provide two copies of lighting acceptance testing results and equipment operating manuals as specified in Section 26 5670, LIGHTING ACCEPTANCE TESTING. Instruct the Owner on operation of control systems.

END OF SECTION

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**SECTION 26 0519
LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Wires and cables.
 - 2. Connectors.
 - 3. Lugs and pads.
 - 4. MC cable (not allowed).

1.03 SYSTEM DESCRIPTION

- A. Provide wires, cables, connectors, lugs, strain reliefs, racking insulators for a complete and operational electrical system.

1.04 SUBMITTALS

- A. Provide product data for the following equipment:
 - 1. Wires.
 - 2. Cables.
 - 3. Connectors.
 - 4. Lugs.
 - 5. Splice Kits.
 - 6. Strain Relief Fittings.
 - 7. Cable Racking and Insulators.
- B. Provide the insulation cable testing report in the project closeout documentation, refer to Closeout Requirements in the General Conditions portion of this specification.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of the CEC, latest adopted version with amendments by local Authority Having Jurisdiction (AHJ).
- B. Furnish products listed by UL or other testing firm acceptable to AHJ.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Wires and Cables: General Cable, Okonite, Southwire, or approved equal.
- B. Connectors: Burndy, IlSCO, Thomas & Betts, or approved equal.
- C. Wire connectors shall be minimum 75 degree centigrade rated and properly sized for the number of conductors being connected, terminated, spliced etc. All above grade connectors shall be solderless lug or plastic wire nut type, screw on, pressure cable type (wire nut or spring nut type), 600 volt, 105 degree C, with skirt to cover all portions of stripped wires. Connector shall be U.L. rated for number and size of conductors being joined together as a splice.
- D. Splices:
 - 1. Branch Circuit Splices: Ideal, Scotch-Lock, 3M, or approved.
 - 2. Feeder Splices: Compression barrel splice with two layers Scotch 23 and four layers of Scotch 33+ as vapor barrier plus 3M cold Shrink.
 - 3. Screw Terminal Lugs.
 - 4. Kearney Split Bolt.

2.02 WIRES AND CABLES FOR LINE VOLTAGE SYSTEM AND CONTROLS. WIRE AND CABLE SHALL BE:

- A. Copper, 600 volt rated throughout. Conductors 14AWG to 10AWG, solid or stranded. Conductors 8AWG and larger, stranded.
- B. Phase color to be consistent at all feeder terminations; A-B-C, top to bottom, left to right, front to back. Phasing tape shall be permitted on sizes #6 and larger.
- C. Color Code Conductors as Follows:

PHASE	208 VOLT
A	Black
B.	Red
C.	Blue
Neutral	White
Ground	Green
- D. All conductors shall be copper unless otherwise noted. Minimum size for individual conductors shall be #12 AWG unless otherwise noted. Sizes #8 AWG and larger shall be stranded conductor. Individual conductors shall be insulated with type, XHHW, THW, THHN/THWN 600-volt insulation unless otherwise noted. Control, signal, communication conductors shall be as dictated by the vendor of that equipment or as specified here-in. Proper insulation type shall be used for the proper environmental application (i.e., waterproof, wet location, plenum, temperature rated). If a condition exists where the application is uncertain, contact the Engineer for direction. Contractor is responsible to follow specific cabling requirements described in other sections of this specification relative to various communications and controls systems as

well as the respective riser diagrams shown on plans. If a discrepancy occurs, communicate such discrepancy to the Architect and Engineer immediately for resolution.

- E. Insulation types THWN, THHN or XHHW. Minimum insulation rating of 90C for branch circuits.
- F. Refer to signal and communications specification sections for cable requirements.

2.03 CONNECTORS

- A. Copper Pads: Drilled and tapped for multiple conductor terminals.
- B. Lugs: Indent/compression type for use with stranded branch circuit or control conductors.
- C. Solid Conductor Branch Circuits: Spring connectors, wire nuts, for conductors 18 through 8AWG.

2.04 LUGS AND PADS

- A. Ampacity: Cross-sectional area of pad for multiple conductor terminations to match ampere rating of panelboard bus or equipment line terminals.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation: Conductors shall not be installed until after conduit systems are permanently in place. Use an approved non hardening type wire pulling lubricant if lubricant is to be used. Maintain all conduits and wire pulls free from foreign material. If due to field conditions, more than a total of 360 degrees of bend are required; a pull box shall be furnished and installed for ease of installation. Said pull boxes must be sized and rated for the appropriate application and must remain easily accessible upon completion of the project (approval of the location shall be obtained from the Architect prior to installation). Show these pullboxes on the field record drawings. Conductors installed in underground raceways on site shall be duct sealed and taped where they exit the raceway to prevent the entrance of foreign material and moisture after the conductors are installed. Proper drainage shall be provided for underground pull and splice boxes.
- B. Insulation: Use proper insulation types where temperature and environment are a factor.
- C. Splices at or below grade level shall be made with wet location rated and approved mechanical connectors and shall be encapsulated in epoxy or plastic molded poured kits. The connections must be assured to be watertight. Splices at or below grade shall always be avoided and minimized. Prior approval is required for feeder splices below grade. Submit proposed materials and exhibit showing location of intended splices for Engineer's review and approval prior to commencing with the work.

- D. Labeling: All conductors in panels, switchboards, terminal cabinets, vaults, pull boxes, and junction boxes shall be labeled with tape number markers indicating circuit number and identifying system. All labeling shall be permanent. In manholes and vaults, provide embossed brass tags identifying system serviced and function. See Section 26 0553 IDENTIFICATION OF ELECTRICAL SYSTEMS.
- E. All conductors, wiring, cable where installed below floor, slab or underground shall be considered wet locations, and shall be rated accordingly. Non waterproof cabling is not allowed in any below grade or wet application.
- F. Cables routed together in cable tray shall be stacked, organized and tie wrapped together in a neat and workman like manner. Random cable routing is not acceptable.
- G. Cable and conductors routed through pull boxes and vaults shall be properly supported on porcelain or equal insulators mounted on steel rack inserts. Bend radius of cable or conductor shall not be less than six times the overall cable diameter.
- H. Wires and Cables:
 - 1. Conductor Installation:
 - a. Install conductors in raceways having adequate, code size cross-sectional area for wires indicated.
 - b. Install conductors with care to avoid damage to insulation.
 - c. Do not apply greater tension on conductors than recommended by manufacturer during installation.
 - d. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation.
 - 2. Conductor Size and Quantity:
 - a. Install no conductors smaller than 12AWG unless otherwise shown.
 - b. Provide all required conductors for a fully operable system.
 - 3. Provide dedicated neutrals (one neutral conductor for each phase conductor) in the following single phase circuits:
 - a. Dimmer controlled circuits.
 - b. 120v branch circuits.
 - c. Ground fault and arc fault protected circuits where a GFI and arc fault breakers are used in panelboards.
 - d. Other electronic equipment which produces a high level of harmonic distortion including but not limited to computers, printers, plotters, copy machines, fax machines, where indicated.
 - 4. Conductors in Cabinets:
 - a. Cable and train all wires in panels and cabinets for power and control neatly and uniformly. Use plastic ties in panels and cabinets.
 - b. Tie and bundle feeder conductors in wireways of panelboards.
 - c. Hold conductors away from sharp metal edges.
 - d. Connectors: Retighten mechanical type lugs and connectors for conductors to equipment prior to Notice of Completion.

3.02 FIELD QUALITY CONTROL

- A. Tests:

1. Test conductor insulation on feeders of 400 amp and greater for conformity with 1000 volt megohmmeter. Use Insulated Cable Engineers Association testing procedures. Minimum insulation resistance acceptable is 1 megohm for systems 600 volts and below.
2. Test Report: Prepare a typed tabular report indicating the testing instrument, the feeder tested, amperage rating of the feeder, insulation type, voltage, the approximate length of the feeder, conduit type, and the measured resistance of the megohmmeter test. Submit report with operating and maintenance manual.

END OF SECTION

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SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Grounding and bonding requirements of electrical installations for personnel safety and to provide a low impedance path for possible ground fault currents as described in CEC Article 250.
 - 2. “Grounding electrode system” refers to all electrodes required by CEC, as well as including made, supplementary, lightning protection system and telecommunications system grounding electrodes.
 - 3. The terms “connect” and “bond” are used interchangeably in this specification and have the same meaning.
- B. Related Work:
 - 1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
 - 2. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.

PART 2 - PRODUCTS

2.01 GROUNDING AND BONDING CONDUCTORS

- A. Equipment grounding conductors shall be UL 83 insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid or stranded copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be permitted to be identified per CEC.
- B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes No. 10 AWG and smaller shall be ASTM B1 solid bare copper wire.
- C. Conductor sizes shall not be less than what is shown on the drawings and not less than required by the CEC, whichever is greater.

2.02 GROUND RODS

- A. Copperclad steel, 5/8" diameter by 8' long, conforming to UL 467 unless otherwise noted on drawings and details.
- B. Quantity of rods shall be as required to obtain the specified ground resistance or additional rods shall be driven to obtain specified resistance or less.

2.03 SPLICES AND TERMINATION COMPONENTS

- A. Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

PART 3 - EXECUTION

3.01 GENERAL

- A. Ground in accordance with the CEC, as shown on drawings, and as hereinafter specified.
- B. System Grounding:
 - 1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
 - 2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
- C. Equipment Grounding: Metallic structures (including ductwork and building steel), enclosures, fire sprinklers, plumbing piping, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be bonded and grounded.

3.02 INACCESSIBLE GROUNDING CONNECTIONS

- A. Make grounding connections which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

3.03 SECONDARY EQUIPMENT AND CIRCUITS

- A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.
- B. Metallic Piping, Building Steel, and Supplemental Electrode(s):
 - 1. Provide a grounding electrode conductor sized per CEC between the service equipment ground bus and all metallic water and gas pipe systems, building steel, and supplemental or made electrodes. Jumper insulating joints in the metallic piping. All connections to electrodes shall be made with fittings that conform to UL 467.
 - 2. Provide a supplemental ground electrode and bond to the grounding electrode system.

- C. Service Disconnect: Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.
- D. Switchboard:
 - 1. Connect the various feeder equipment grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
 - 2. For service entrance equipment, connect the grounding electrode conductor to the ground bus.
 - 3. Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and grounding conductor to the equipment ground bus.
- E. Conduit Systems:
 - 1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor sized per CEC.
 - 2. Non-metallic conduit systems shall contain an equipment grounding conductor, except that non-metallic feeder conduits which carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment need not contain an equipment grounding conductor.
 - 3. Metal conduit containing only a grounding conductor, and which is provided for mechanical protection of the conductor, shall be bonded to that conductor at the entrance and exit from the conduit.
- F. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, power and lighting branch circuits.
- G. Boxes, Cabinets, Enclosures, and Panelboards:
 - 1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes.
 - 2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
 - 3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.
- H. Motors and Starters: Provide lugs in motor terminal box and starter housing or motor control center compartment to terminate equipment grounding conductors.
- I. Receptacles shall not be grounded through their mounting screws. Ground with a jumper from the receptacle green ground terminal to the device box ground screw and the branch circuit equipment grounding conductor.
- J. Ground lighting fixtures to the equipment grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.
- K. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.
- L. Panelboard Bonding: The equipment grounding terminal buses of the normal and emergency branch circuit panelboards shall be bonded together with an insulated continuous copper

conductor not less than No. 8 AWG where panels are in same room together or within 25' of each other. These conductors shall be installed in rigid metal conduit.

3.04 CONDUCTIVE PIPING

- A. Bond all conductive piping systems, interior and exterior, to the building to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

3.05 TELECOMMUNICATIONS SYSTEM

- A. Bond telecommunications system grounding equipment to the electrical grounding electrode system. Refer to Section 27 13 00, INTERCOMMUNICATIONS SYSTEMS.

3.06 GROUND RESISTANCE

- A. Grounding system resistance to ground shall not exceed 25 ohms. Make necessary modifications or additions to the grounding electrode system for compliance without additional cost to the Owner. Final tests shall assure that this requirement is met and test results shall be submitted to the Owner with final close out documents.
- B. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE Standard 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.
- C. Services at Pacific Gas and Electric Company interface point shall comply with their ground resistance requirements.
- D. Below-grade connections shall be visually inspected by the IOR prior to backfilling. The Contractor shall notify the IOR 24 hours before the connections are ready for inspection.
- E. Furnish a copy of tests to Owner at completion of project.

3.07 GROUND ROD INSTALLATION

- A. Drive each rod vertically in the earth, not less than 7 1/2' in depth.
- B. Where permanently concealed ground connections are required, make the connections by the exothermic process to form solid metal joints. Make accessible ground connections with mechanical pressure type ground connectors.
- C. Where rock prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified resistance.

END OF SECTION

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SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.
- B. Related Sections include the following:
 - 1. Section 26 0548 "Vibration and Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.03 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.04 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.05 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Equipment supports.

1.06 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.07 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.08 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 4. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Hilti Inc. or equal.
 2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 5. Toggle Bolts: All-steel springhead type.
 6. Hanger Rods: Threaded steel.

2.02 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 05 50 00 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.02 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
 - 6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 05 5000 "Metal Fabrications" for site-fabricated metal supports.

- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.04 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 03 3000 "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base.
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.05 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

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SECTION 26 0533
RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Conduit and fittings.
 - 2. Outlet boxes.
 - 3. Weatherproof outlet boxes.
 - 4. Junction and pull boxes.
 - 5. Cabinets, termination cabinets.
 - 6. Concrete boxes and vaults.
- B. Related Work:
 - 1. Installation of all wire, cable, conductor, boxes/gutters, pull ropes, fiber optic cable raceway, conduit, innerduct, cable sleeve and duct as described on the plans and/or as specified here-in. This scope shall include pathways to be installed underground on site and offsite, underslab, above grade, both concealed and exposed, overhead concealed and exposed as appropriately applied. Raceways/boxes shall be installed in accordance with their intended and allowed uses and as specified here-in whichever is more restrictive. Size and capacity of all raceway/boxes shall be as specified here-in or as depicted on the drawings, but shall not be less than that required by code. Larger raceway sizes may be specified than code would permit. The specifications shall govern.
 - 2. Listed products for termination, coupling, extending, benching supports of raceways shall be used.
 - 3. Raceways/boxes described by this section shall include, but not be limited to, power for site utilities and lighting, site and building communications, controls, fire alarm, security, access control, sound systems, data system, energy management systems, power distribution, lighting, lighting controls, video, CATV, voice communications, intercom, nurse call, HVAC and other building low voltage/communications systems controls as may be required. Raceways, boxes and duct paths required for utility companies shall be installed per plans unless utility company requirements are more restrictive at which time those requirements shall take precedence.
 - 4. Protection of and cleanliness of pathways and raceways must be assured during the construction process in order to eliminate the possibility of debris entering the conduit, duct, pathway resulting in decreased wire capacity and potential damage to installed conductors and cables.
 - 5. Pathways are shown in a diagrammatic way and are generally accurate as to routing, however, it is the Contractor's responsibility as a means and methods process to coordinate with all other trades that require space within a building. The Contractor shall

- obtain approval for installation of raceways routing through structural footings, retaining walls, columns, beams, perkins, grade beams, etc.
6. It is the Contractor's responsibility to insure that all raceway and boxes systems penetrate fire assemblies and sound rated assemblies in an approved manner using the appropriate and listed products for the purpose.
 7. Trenching and backfilling for all underground conduit systems installed by the Electrical Contractor shall be the responsibility of the Contractor. Conduits shall have minimum cover requirement of 36" below finish grade with the exception of site lighting conduits which may be 24" below finish grade minimum. More stringent depth requirements may be imposed by the local agency and utility company and shall be adhered to, and / or this specification or as detailed on the plans. Joint trenching may be utilized where practicable and where permitted by this specification. Concrete, native material and sand shall be used as backfill material and shall be compacted in accordance with and coordinated with the grading and site preparation requirements. Conduits shall rest in a minimum of 4" bed of sand prior to backfill and compaction. Locations of existing underground (UG) utility systems shall be determined by calling Underground Service Alert (USA) at least 48 hours prior to any excavation. Also refer to Section 26 0546.13, ELECTRIC UTILITY SYSTEMS.
 8. Minimum conduit size shall be 1/2" except if plan shows or code requires larger size. Exception: Use minimum 3/4" for underslab and below grade applications outside of building exterior walls.
 9. All electrical, control, communications systems shall be installed in metallic conduit system. This shall include but not be limited to all systems described in Section B.3 above, except for voice and data systems which shall be installed as described on these plans and as specified here-in but shall not be less than the recommendations of EIA/TIA standards.
 10. All line voltage wiring within the building shall be installed in metallic conduit.
 11. All conduit, concrete pads, underground concrete or fiberglass substructures shall be furnished and installed with the approved materials and type for the application. Provide proper traffic control during construction as well as barriers and protection of all excavations and trenching.
 12. Empty or future conduits shall be properly plugged with plastic caps or inserts with a 3/8" polyethylene pull rope. Plastic or "duct" tape will not be acceptable.
 13. Exterior installations: After conductors are installed, seal conduit ends to prevent entrance of foreign material using pliable duct seal, caps or waterproof expanding foam.
 14. All low voltage systems including intercom, fire alarm, public address, etc. shall be in dedicated conduit systems. Voice / Data cabling shall be routed as specified in Section 27 1300, INTERCOMMUNICATIONS SYSTEMS and as recommended by EIA/TIA standards. It shall be the contractor's responsibility to provide raceway down walls to outlet boxes and to provide sleeves across inaccessible ceiling spaces.
 15. Underground conduits entering building shall have the open end of conduit within building above the elevation of the conduit outside the building such that water cannot enter building through conduit. If such a condition exists, a pull box outside of building footprint shall be installed in conduit route before conduit enters building whereby top of pull box is below finish floor of building and moisture may exit box before entering building.
 16. No single conduit run of any type shall exceed 300 degrees of radius bend from termination box to termination box.

17. Separate Raceway System: Provide a separate dedicated raceway system for each system installed, do not combine different systems into a raceway or cable tray system, unless otherwise noted or allowed.
18. Spare, Future Conduits: Conduits labeled conduit only, spare, or for future use, shall be provided with a pullrope, capped at each end, labeled as spare with destination marked, and turned over to the Owner in an unused state. Contractor shall not utilize these conduits for the installation of cabling or conductors as part of this scope of work. Contractor to verify and install at no additional cost to the Owner, additional conduits as required for the installation of the systems being installed.
19. Outlet System: Provide electrical boxes and fittings as required for a complete installation. Including but not limited to outlet boxes, junction boxes, pull boxes, bushings, locknuts, covers and all other necessary components.
20. Code Compliance: Comply with CEC as applicable to construction and installation of electrical boxes and fittings and size boxes according to CEC 312, 314 and 366 except as noted otherwise.
21. Outlets to be flush mounted: Maintain integrity of insulation and vapor barrier. Unless otherwise noted, flush mount all outlet boxes.
22. Provide putty pads of proper type around outlet boxes and/or as detailed on plan to meet sound transmission restrictions and fire ratings of walls.

1.03 SUBMITTALS

- A. Provide Shop Drawings and Product Data for the Following Equipment:
 1. Conduit and fittings.
 2. Outlet boxes.
 3. Weatherproof outlet boxes.
 4. Junction and pull boxes.
 5. Cabinets, termination cabinets.
 6. Concrete boxes and vaults.
 7. Fiberglass or composite boxes and vaults.
 8. Putty pads.
 9. Raceways

1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.
- B. Furnish products listed by UL or other independent and nationally recognized testing firm.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Heavy wall Rigid Non-Metallic Conduit, shall be PVC schedule 40 manufactured in accordance with NEMA Standard TC-2, UL-651 and WC 1094A specifications.

- B. Extra heavy wall non-metallic conduit, shall be PVC schedule 80 manufactured in accordance with NEMA Standard TC-2, UL-651 and WC 1094A specifications.
- C. Galvanized Rigid Steel (GRS) conduit shall be hot dipped galvanized, zinc coated and shall comply with Underwriters Laboratories UL-6, ANSI Specification C-80.1 and Federal Specification WW-C-581E.
- D. Electrical Metallic Tubing (EMT) shall be zinc coated, with a protective coating applied to the inside surface and shall comply with Underwriter Laboratories UL-797 ANSI Specification C-80.3 and Federal Specification WW-C-563A.
- E. Flexible Metal Conduit (FMC) shall be continuous wound reduced wall galvanized steel produced to UL standards.
- F. Liquid tight flexible metal conduit shall have a thermoplastic cover over a galvanized steel core containing an integral copper ground in sizes to 1 1/4" and shall be in compliance with UL standards and CEC Article 350.
- G. Manufacturers:
 - 1. Outlet Boxes: Bowers, Raco, Steel City or equal.
 - 2. Weatherproof Outlet Boxes: Bell, Red Dot, [Carlon] or equal.
 - 3. Junction and Pull Boxes: Circle AW, Hoffman, Wireguard or equal.
 - 4. Box Extension Adapter: Bell, Red Dot, [Carlon] or equal.
 - 5. Conduit Fittings: O-Z Gedney, Thomas & Betts, or equal.
 - 6. Vaults: Christy, Brooks, Utility Vault or equal.
 - 7. Putty pads: 3M, Hilti, or equal.
 - 8. Heavy wall rigid non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
 - 9. Extra heavy wall non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
 - 10. Galvanized Rigid Steel (GRS) conduit shall be hot dipped galvanized, zinc coated and shall comply with Underwriters Laboratories UL-6, ANSI Specification C-80.1 and Federal Specification WW-C-581E.
 - 11. Electrical Metallic Tubing (EMT) shall be zinc coated, with a protective coating applied to the inside surface and shall comply with Underwriter Laboratories UL-797 ANSI Specification C-80.3 and Federal Specification WW-C-563A.
 - 12. Flexible Metal Conduit (FMC), Alflex, American Flexible Conduit or equal.
 - 13. Liquid tight flexible metal conduit, Anacanda (type UA), Electri-flex Liguatite or equal.
 - 14. Surface mount raceway, Wiremold, Three Compartment Series 5500 or equal
 - 15. Wire basket tray, B-line, GS Metals, Cablofil or equal.
 - 16. Cable runway tray, B-line, CPI, Homaco or equal.
 - 17. Masonry Boxes, outlets in concrete, Raco Series 690 or equal.
 - 18. Exterior In-Grade Boxes for Non-Utility Company, Precast concrete or polymer concrete, Utility Vault and Christy.

2.02 OUTLET BOXES

- A. NEMA 1 gutter, junction and pull boxes shall be fabricated from code gage steel finished in grey enamel with screw cover fronts and concentric knockouts in all sides.

- B. NEMA 3R gutter, junction and pull boxes shall be fabricated from code gage galvanized steel with screw cover fronts and concentric knockouts in the bottom only. Any penetrations to the side, top or back shall be weatherproofed in an approved manner such as “MYERS” gasketed type hub or equal.
- C. Steel outlet boxes and plaster rings shall be galvanized rigid assemblies, either one piece pressed or factory welded construction containing the size and number of knockouts required. Steel outlet boxes shall be manufactured, sized and installed in accordance with CEC Article 314. Device Outlet: Installation of one or two devices at common location, minimum 4” square, minimum 2 1/8” deep. Single or 2 gang flush device plaster ring. Raco Series 681 and 686 or equal.
- D. Luminaire Outlet: minimum 4” square with correct plaster ring depth, minimum 2 1/8” deep with 3/8” luminaire stud if required. Provide proper depth plaster ring on bracket outlets and on ceiling outlets.
- E. Multiple Devices: Three or more devices at common location. Install 1 piece gang boxes with 1 piece device plastering. Install one device per gang unless otherwise allowed.
- F. Construction: Provide galvanized steel interior outlet wiring boxes, of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices. Boxes shall be properly secured to the structure such that they are flush with the finish surface. Boxes shall be made structurally secure by means of the proper fastening devices.
- G. Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, plaster rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

2.03 WEATHERPROOF OUTLET BOXES

- A. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner. Weatherproof boxes in wet locations as described in CEC 406.8 (B) shall be provided with a “while-in-use” cover; red dot ‘CK’ Series of aluminum die-cast construction, NEMA 3R, with lacquer finish.

2.04 JUNCTION AND PULL BOXES

- A. Construction: Provide galvanized sheet steel junction and pull boxes, with screw-on covers; of the type shape and size, to suit each respective location and installation; with welded seams and equipped with steel nuts, bolts, screws and washers.
- B. Location:
 - 1. Install junction boxes above accessible ceilings for drops into walls for receptacle outlets from overhead.

2. Install junction boxes and pull boxes as required to facilitate the installation of conductors and limiting the accumulated angular sum of bends between boxes, cabinets and appliances to 360 degrees.
3. Locations: Junction boxes shall be located only where necessary and only in equipment rooms, closets, and accessible attic and underfloor spaces. A horizontal distance of 24" shall separate outlet boxes on opposite sides of occupancy separation walls, fire-rated walls or partitions.
4. Labeling: Junction box covers shall be marked with indelible ink indicated the circuit numbers passing through the box.

2.05 BOX EXTENSION ADAPTER

- A. Construction: Diecast aluminum.
- B. Location: Install over flush wall outlet boxes to permit flexible raceway extension from flush outlet to fixed or movable equipment.

2.06 CONDUIT FITTINGS

- A. Requirements: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and plastic conduit bushings of the type and size to suit each respective use and installation.
- B. Steel boxes may allow for field knock-out modifications, but shall in all other ways conform to code requirements.

2.07 EXTERIOR IN-GRADE BOXES FOR NON-UTILITY COMPANY USE SHALL BE:

- A. Precast concrete or polymer concrete type with full bottoms and draining into gravel drywell. . Open bottom splice/pull boxes 24" x 36" and smaller shall be open bottom, with minimum 12" of gravel below for drainage.
- B. Flushmount in hardscape and 1" above grade in softscape.
- C. Provided with correct traffic type lid, i.e., full vehicular, intermediate incidental vehicular or pedestrian-rated as applicable stamped with "ELECTRIC", "LIGHTING", "COMMUNICATIONS", etc. cover identification as shown on the drawings or as applicable. All boxes or vaults located in streets, driveways, sidewalks wider than 8', and turf areas where mowing takes place shall be traffic rated.
- D. Provided with brass hold-down bolts in cover.
- E. Provided with necessary box extensions to gain proper depth.
- F. Seal all conduit in underground boxes with duct seal after conductors have been installed.

2.08 IN-GRADE UTILITY COMPANY BOXES AND VAULTS

- A. In-grade boxes and pads for utility company, shall be as specified by the respective utility company with all of the company's requirements and construction methods met.

2.09 PUTTY PADS

- A. Intumescent moldable firestop putty designed to protect electrical outlet boxes.
- B. Designed to install around outside of outlet boxes.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Conduit systems listed below are for use in installations where they are permitted to be used by CEC and/or other occupancy restrictions. The below installation methods do not intend to suggest that these materials be installed in conflict with any applicable code. Special attention to applications shall be made in building types such as Educational, Health Care, wet location, hazardous locations, assembly occupancy and multi-story, but not limited to these. Requirements which are more restrictive than the CEC may be called for by the drawings and / or these specifications. These requirements must be adhered to. The Electrical Contractor shall be responsible to use the proper conduit system for the application. Exposed conduit is not allowed below ceilings or above slab of floor, without the permission and approval of the Architect. All conduits shall be concealed except in electrical and telecommunication rooms or where shown to be surface mounted. Exposed conduit (where allowed) shall be run square and plumb with building lines in an approved manner. Support roofmount conduits, where allowed, Cooper B-Line DB10 (or equal) or as specified in roofing specification, by the Architect. Strap conduits to blocks with proper sized conduit straps. Spacing of support shall be a minimum as provided for in the CEC. All exposed conduit mounted below 8' above finished grade shall be strapped at a minimum of 5' spacing.
- B. Non-Metallic Rigid Conduit shall be used in concrete slabs, below concrete slabs on grade, or underground outside of a building slab or foundation. Maintain minimum depth requirements and cover with appropriate fill material. Minimum 4" of bedding and cover of backfill material 1/4" size grain and smaller maximum. Conduit shall be heavy wall Schedule 40 or 80, rigid PVC only. Rigid utility P&C duct shall not be used in any application. Properly sized grounding conductors shall be installed per CEC article 250, in all non-metallic conduit branch circuit and feeder runs. PVC conduit shall be formed or field bent only with the use of properly approved bending tools such as to not decrease the internal bore of the conduit. All conduits shall be cut square and reamed of burrs. Approved and compatible glue shall be used on all PVC fittings to attain watertight joints. All non-metallic conduit runs over 150' in length and over 1 1/4" trade size conduit shall utilize galvanized rigid steel elbows.
- C. Galvanized Rigid Steel (GRS) conduit shall be used where exposed less than 8'-0" above finished grade to 18" below finished grade and where subject to physical damage. Conduits shall be cut square and reamed to remove burrs and sharp edges. Strap conduit below 8' above

grade at 5' intervals. All threaded ends entering a junction box of any type shall require one locknut on the inside and one on the outside of the enclosure and be provided with a plastic bushing or grounding bushing where necessary for proper grounding. Where exposed to moisture, a watertight hub or other approved method shall be required. All conduits shall be stubbed up straight and uniform into junction boxes, panels, cabinets, etc., and shall be (GRS) properly supported and strapped. All GRS conduit located below grade, shall be tape wrapped.

- D. Electrical Metallic Tubing (EMT) shall be used as allowed by code and as permitted by this specification. It shall not be in contact with soil or the concrete slab on the ground floor of any structure. Connectors and couplings shall be steel set screw type where installed in indoor dry locations not subject to moisture. Where the potential for moisture is present, compression type weathertight fittings are required. One hole conduit straps are permitted from 1/2" to 1" and two hole conduit straps are required for size 1 1/4" and larger. EMT shall not be allowed in areas subject to severe physical damage. Install copper ground wire sized per CEC 250-122 in all EMT conduits.
- E. Flexible conduit may be used where concealed in building construction or above dropped ceilings, but shall meet the following criteria: No individual circuit path from distribution panel to last device shall exceed a cumulative length of 6' of flexible conduit from start to end. Flexible conduit shall not exceed a total directional change of 270 bending degrees in any one run between conduit terminations. Squeeze type or Jake type steel flex fittings of a grounding type are required. Flexible conduit must be supported in accordance with CEC. Where exposed to the weather, moisture, or spray down flexible conduit shall be of the liquidtight type. Fittings shall be manufactured for use with liquidtight flexible conduit. All motor connections shall be made with liquidtight flex. Flexible conduit may not be used where exposed except for last 2' of equipment connection and unless otherwise noted or approved. A copper ground wire sized per CEC 250-122 shall be installed in all flexible conduit runs. Flexible conduit may not be used exposed. Weatherproof liquid tight conduit shall not be used at roof level for equipment connections with lengths exceeding 24" nor shall it be used to circumvent a rigid conduit system in a horizontal direction. Connect recessed lighting fixtures to conduit runs with a maximum of 6' of flexible metal conduit extending from junction box to fixture. "Master" "Slave" fixtures are permitted to use manufactured flexible cable of longer dimension up to 12' between "Master" and "Slave" only and only as a U.L. listed system component.
- F. Underground conduits and transition to above grade/slab shall be as follows:
 - 1. PVC elbows allowed if top of elbow is minimum 18" BFG or below top of slab, otherwise GRS elbows are required.
 - 2. GRS elbows are required if conduit run is 150' or greater.
 - 3. All risers must be GRS from elbow below grade to equipment (device, outlet, panel, cabinet, etc.) above grade.
 - 4. GRS elbows/risers to be 10 MIL taped wrapped (1/2" lapped) to 3" above finish grade or top of slab.
- G. Conduit Supports: Conduit runs may be supported by one-hole and two-hole straps or supports as manufactured by Unistrut, Minerallac, Caddy or equals. Supports may be fastened by means of anchors, shields, beam clamps, toggle bolts, or other approved methods appropriate for the application and size of conduit. Pipe nailers (J-hooks) may only be used for 1" conduit and smaller and only in wood frame construction. Conduit support methods are subject to review by the engineer and authority having jurisdiction for adequacy. Installations deemed inadequate shall be corrected by the contractor at no cost to the Owner.

- H. Bends and offsets shall be made with approved tools for the type of conduit being utilized. Bends shall be made without kinking or destroying the smooth bore of the conduit. Parallel conduits shall be run straight and true with bends uniform and symmetrical. Minimum radii shall be per CEC 344-24.
- I. Conduit Stub-outs below grade shall be capped with plastic cap, and identified by placing a pull box marked with correctly identified utility such as “Elec”, “Tel”, etc. Dimension for exact location on field record drawings. Provide lids for proper field application (i.e. traffic, incidental, pedestrian).
- J. Conduit Seals: Where below grade conduits enter structure through slab or retaining wall of building or basement, seal the inside of each conduit as follows:
 - 1. Provide damming material around conductors 3” into conduit.
 - 2. Fill 3” of conduit with 3M #2123 sealing compound.
 - 3. Wrap conductors where they exit the conduit with 3M #2229 "Scotch Seal" mastic tape. Lap tape to approximate diameter of the raceway and wrap outside of conduit opening with (minimum) one turn.
 - 4. Use conduit sealing bushings type CSB (O-Z/Gedney) or equal.
 - 5. Empty conduits shall be sealed with standard non-hardening duct seal compound and then capped to prevent entrance of moisture and gases and to meet fire resistance requirements.
 - 6. Provide cable drip loop minimum 12” high.
- K. Marker tape: Place plastic yellow marker tape at 12” below finish grade along and above buried conduits. Label tape "CAUTION: ELECTRICAL LINES BELOW" or similar wording.
- L. Electrical and communications systems raceways routed underground shall not occupy the same trench as plumbing utilities such as sewer, water, storm drain, gas or other wet or dry gaseous utility system. A minimum of 12” of undisturbed earth is required. Where utilities must cross in closer proximity to each other due to physical constraints, 6” minimum crossing distances are allowed, however 18” on all sides of a utility crossing must be concrete encased.
- M. Duct bank defined here-in shall be four or more conduits in a common trench, conduit spacers and saddles shall be required in all trenches where more than two conduits over 2” in diameter travel in the same trench. Proper spacing between systems as outlined above shall be required and spacers shall be located each 5’ (maximum) along trench route from point to point.
- N. Conduits, routed below footings, slabs, grade beams, columns, and other structural elements shall be installed in strict compliance with structural details and criteria shown on structural plans. Clearances below structural elements and sleeves through structural elements must be carefully planned to avoid conflict and must be approved by the structural engineer if conflict arises.
- O. All conduit or raceways passing through fire rated walls, floors, or ceilings shall be installed with a listed penetration method which protects the opening to the same rating as the assembly and is non hardening.
- P. Expansion Joints

1. Conduits 3" and larger, that are secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
 2. Provide conduits smaller than 3" with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 5" vertical drop midway between the end. All conduit shall have a copper green grounding bonding conductor installed.
- Q. Seismic Joints
1. At seismic joints, provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes or approved fittings, on both sides of the joint. Connect conduits to junction boxes with sufficient slack flexible conduit such that these slack conduits are 1 1/2 times the distance between conduit ends. Flexible conduit shall have a copper green ground bonding jumper installed.
- R. Location: Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.
- S. Anchoring: Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.
- T. Special Application: Provide weatherproof outlets for locations exposed to weather or moisture.
- U. Knockout Closures: Provide knockout closures to cap unused knockout holes where blanks have been removed.
- V. Mount outlet boxes, unless otherwise required by ADA, or noted on drawings, the following distances above the finished floor:
1. Receptacles, Telephone, TV & Data outlets. (measured to bottom of outlet box): +15".
 2. Outlet above counter (measured to top of outlet box): +46".
 3. Control (light) Switches. (measured to top of outlet box): +48".
 4. Fire Alarm Manual Pull Stations, T-stats. (measured to top of outlet box): +48".
 5. Fire Alarm Visuals: the lower of +80" to bottom of lens, or 6" below ceiling.
 6. Other Outlets: As indicated in other sections of specifications or as detailed on drawings.
- W. Coordinate all electrical device locations with the architectural floor plan and interior and exterior elevations to prevent mounting devices within elements that they may conflict such as cabinetry, mirrors, planters, etc.
- X. Size outlet and junction boxes to minimum wire fill space requirements. Upsize box as required to allow ease of wire installation and device installation.
- Y. Outlet and junction boxes in fire rated walls shall be gauged and spaced so as not to exceed the maximum penetration allowed by the assembly without compromising the fire rating. If a conflict arises relative to a specific condition, the contractor shall follow the requirements of the fire authority and ask for guidance from the design team. At no time should a larger box be installed prior to resolution of conflict.

END OF SECTION

SECTION 26 0534
CABINETS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Cabinets where shown on the contract drawings and specified herein.
- B. Related Work:
 - 1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
 - 2. Section 26 0553, IDENTIFICATION OF ELECTRICAL SYSTEMS.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Type: Cabinets shall be flush or surface mounted type as indicated on the contract drawing, as per Code and U.L. Standard 50.
- B. Cabinet Construction: Sizes as indicated, constructed of code gauge sheet steel with hinged lockable doors, common keyed with panelboards. Equip cabinets with 3/4" fire retardant treated plywood backboards and/or barriers as applicable, terminal blocks for connection; index card holders and cards mounted behind heavy plastic on inside of cabinet doors.
- C. Finish: Cabinets shall be chemically cleaned and the fronts shall be finished in same way as panelboards and switchboards.
- D. Controls: As indicated on the contract drawings.
- E. Identification: Provide on exterior of cabinet doors engraved plastic nameplate identifying the cabinet as designated on the Contract Drawing. Lettering shall be white on black finish and shall be minimum 3/16" high. Affix nameplates to cabinet doors with a minimum of two escutcheon pins or screws.

PART 3 - EXECUTION

3.01 GENERAL

- A. Required: To be located where indicated on the Contract Drawing and installed as per manufacturer's instruction. Securely fasten to structural members or Unistrut support in vertical and plumb position and at heights indicated.
- B. Nameplates: Conform to provisions noted in 2.1E above or as designated on the plans.

END OF SECTION

SECTION 26 0546.13
ELECTRIC UTILITY SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Manholes, handholes and ducts to form a complete underground raceway system.
 - 2. “Duct” and “conduit”, and “raceway” are used interchangeably in this specification and have the same meaning. Refer to Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS for approved raceway and materials as well as execution.
 - 3. Scope of Work: Furnishing, installation and connection of manholes, handholes and ducts to form a complete underground raceway system for distribution of electrical and signal systems and utility service entrance facilities. This specification shall also provide guidance for construction of the utility company underground and substructure requirements. Contact serving company directly and obtain current detailed requirements of installation and adhere by same. Provide trenching, conduit, backfill, boxes and equipment pads as applicable. Nothing here in shall be construed to be in conflict with the requirements of the utility company, which shall take precedence over any possible conflicting requirement.
- B. Related Work:
 - 1. SITEWORK.
 - 2. FLATWORK.
 - 3. LANDSCAPING.
 - 4. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
 - 5. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings and boxes for raceway systems.
 - 6. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

1.03 SUBMITTALS

- A. Submit in accordance with Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include manholes, handholes, duct materials, and hardware. Proposed deviations from details on the drawings shall be clearly marked on the submittals.

3. If necessary to locate manholes or handholes at locations other than shown on the drawings, show the proposed locations accurately on scaled site drawings.
4. Precast manholes and handholes: Submit detail drawings and design calculations for approval prior to installation.

1.04 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. Underwriters Laboratories, Inc. (UL):
 1. UL 467 Grounding and Bonding Equipment
 2. UL 651 Schedule 40 and 80 Rigid PVC Conduit
 3. UL 6 Electrical Rigid Metal Conduit-Steel
- C. National Fire Protection Association (NFPA):
 1. 70 California Electrical Code (CEC)
- D. National Electrical Manufacturers Association (NEMA):
 1. RN 1 Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
 2. TC 2 Electrical Polyvinyl Chloride (PVC) Tubing And Conduit
 3. TC 3 PVC Fittings For Use With Rigid PVC Conduit And Tubing
- E. American Concrete Institute (ACI):
 1. 318 Building Code Requirements For Structural Concrete
- F. American Society for Testing and Materials (ASTM):
 1. C478 Standard Specification for Precast Reinforced Concrete Manhole Sections
 2. C478M Standard Specification for Precast Reinforced Concrete Manhole Sections (Metric).
 3. F512-95 Standard Specification for Smooth-Wall Polyvinyl Chloride (PVC) Conduit and Fittings for Underground Installation
- G. Utility company Handout Package and Construction Requirements for Underground and Substructure Installation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete: ACI 318, 3000 psi minimum 28 day compressive strength.
- B. Reinforcing Steel: Number 4 minimum.
- C. Manhole Hardware:
 1. Frames and covers (traffic type).

2. Sump frames and gratings.
3. Pulling Irons: 7/8" diameter hot dipped galvanized steel bar with exposed triangular shaped opening.
4. Cable supports:
 - a. Cable stanchions, hot rolled, heavy duty, hot dipped galvanized "T" section steel 2 1/4" by 1/4" in size and punched with 14 holes on 1 1/2" centers for attaching cable arms.
 - b. Cable arms, 3/16" gage, hot rolled, hot dipped galvanized sheet steel pressed to channel shape. Arms shall be approximately 2 1/2" wide and 14" long.
 - c. Insulators for cable supports, high glazed, wet process porcelain.
 - d. Spares: Equip each cable stanchion with two spare cable arms and six spare insulators for future use.
 - e. Miscellaneous hardware, hot dipped galvanized steel.
- D. Handhole Hardware:
 1. Frames and covers configuration as shown on the drawings.
 2. Pulling irons, 7/8" diameter galvanized steel bar with exposed triangular shaped opening.
- E. Cable supports are not required.
- F. Ground Rod Sleeve: Provide a 3" PVC sleeve in manhole floors so that a driven ground rod may be installed.
- G. Manholes and Handholes shall be precast units and be constructed as described below. Units shall comply with ASTM C478, C478M.
 1. Size: Plan area and clear height shall be not less than that shown on the drawings.
 2. Accessories, hardware, and facilities shall be the same as required for poured in place type.
 3. Assume ground water level 3' below ground surface unless a higher water table is shown in the boring logs and adjust design accordingly.
- H. Ducts:
 1. Size shall be as shown on drawings.
 2. Ducts (concrete encased):
 - a. Plastic Conduit:
 - 1) NEMA TC6 & 8 and TC9 plastic utilities conduit UL 651 and 651A Schedule 40 PVC.
 - 2) Duct shall be suitable for use with 90 degree C rated conductors.
 3. Ducts (direct burial):
 - a. Plastic duct:
 - 1) NEMA TC2 and TC3, EPC-40, Type II.
 - 2) UL 651 and 651A, Schedule 40 Schedule 80 PVC.
 - 3) Duct shall be suitable for use with 75 degree C rated conductors.
 - b. Rigid metal conduit, PVC-coated: UL6 and NEMA RN1 galvanized rigid steel, threaded type, coated with PVC sheath bonded to the galvanized exterior surface, nominal 0.040" thick.
- I. Ground Rods: Per Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

- J. Ground Wire: Stranded bare copper No. 6 AWG minimum.
- K. Conduit Spacers: Prefabricated plastic.
- L. Warning Tape: Standard 4 mil polyethylene 3” wide tape, detectable type, red with black letters, imprinted with “CAUTION BURIED ELECTRIC CABLE BELOW”.
- M. Pull Rope: Plastic with 200 pound minimum tensile strength.

PART 3 - EXECUTION

3.01 TRENCHING

- A. Refer to EARTHWORK section of specification for trenching back-filling, and compaction requirements.
- B. Work with extreme care near existing ducts, conduits, cables, and other utilities to avoid damaging them.
- C. Cut the trenches neatly and uniformly for utility company trenches, notify for inspections by utility company a minimum of 48 hours in advance.
- D. Conduits to be installed under existing paved areas, roads, and railroad tracks which are not to be disturbed shall be protected into place. Conduits shall be minimum 36” cover.
- E. Trench Preparation: A 4” sand bedding is required if trench bottom is not rock free. A 4” sand covering over the cable is required if the native backfill is not rock free. Backfill and compaction should meet City, County, State and utility company requirements. The serving utility company may required 100% sand backfill. All backfill requirements shall also meet or exceed those set forth in the earthwork or civil section of this specification.
- F. Excavation: Provide 6” gravel in bottom of excavated holes for subsurface transformers and all concrete boxes. Spare gravel shall be available for final adjustment. The Contractor is responsible for final grade level of enclosures and boxes. Non-conformance will be corrected by electrical contractor at his expense.
- G. Conduit Routing: Sharp turns, bends, or other irregularities in the conduit must be avoided. Minimum radius bends shall be as required by the serving utility company. Every effort should be made to obtain a straight water tight conduit line. The end of all spare conduits must be capped. The utility company Inspector must approve deviation from layout.
- H. Conformance: All work must conform to the utility company “handout package” and Specification 59 and/or 99. Copies are available from the utility company upon request.
- I. Joint Trenching: Maintain all required depths, clearance and separations as required by code, ordinance or utility company policies. Coordinate with other utilities to confirm requirements.

3.02 OTHER PADMOUNTED EQUIPMENT

- A. Provide adequately sized and reinforced concrete pads with openings for conduit(s) as necessary by the utility company and or the equipment manufacturer.
- B. A grounding system shall be installed at each padmounted piece of equipment including, but not limited to, a ground rod, grounding conductor, ufer, and ground grid (if called for).
- C. Padmounted equipment shall be bolted to concrete pad with minimum 5/8" x 7 1/2" anchor bolts, one in each of 4 corners of each section of padmounted equipment.

END OF SECTION

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SECTION 26 0546.16
TELEPHONE UTILITY SERVICE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Work:
 - 1. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
 - 2. Section 31 2000, EARTHMOVING.

1.02 WORK INCLUDED

- A. Contact the serving utility company at start of construction and again 30 days prior to date that service cable placement will be required.
- B. Compliance with Standards: the serving utility company reserves the right to refuse to use any conduit, pullboxes, manholes or utility boxes that deviate from applicable building codes, plans and/or specifications.

1.03 DEFINITIONS

- A. MTTB: Main Telephone Terminal Board
- B. RNC: Rigid nonmetallic conduit
- C. UFER: concrete-encased electrode

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Main Telephone Terminal Board (MTTB) shall be provided with a #6 THHN solid copper ground wire in 1/2" conduit run to a main electric service ground: either the concrete-encased electrode ("UFER") or the metal underground water pipe. Provide with minimum of 30" clear working space shall be provided in front of MTTB. If in a closet, no door sills or center posts shall obstruct access.
- B. Interior MTTB shall be 3/4" thick plywood sized and located per plan. Fasten securely to wall. Provide with adjacent 120 volt double duplex receptacle on dedicated 20amp circuit.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Service Conduits shall be RNC Schedule 40 or GT-80 below grade except at bends up to and including above grade which shall be RNC Schedule 80. Verify with utility prior to installation.
 - 1. Mandrel and measure conduits end-to-end to facilitate the utility ordering of cables.
 - 2. Provide minimum 3/16" pull rope in each conduit.
 - 3. Minimum cover for conduit shall be 30".
 - 4. Minimum separation from power conduit(s) in joint trench shall be 12" of compacted soil or 3" of concrete.
 - 5. Conduits at backboard shall extend 2" above finish floor or 6" below ceiling and 1" out from face of backboard.
 - 6. Minimum radius of bends from trench to building shall be 36".
- B. 300' Conduit length and bending limits: Unless otherwise shown on the plan, service entrance conduit length shall not exceed for 4" conduit or 250' for 2" conduit. Not including risers, conduits shall have a maximum of 270 degrees total of bending including a maximum of two 90 degree bends. If these limits are exceeded, a pull box will be required.
- C. All manholes, pullboxes and utility boxes shall be sized per plan with cover marked "TELEPHONE" as manufactured by Associated Concrete or Plastic Products "Quikset", Brooks, Christy or equal as approved by the utility company.
 - 1. Pullboxes shall be provided with cable racking and torsion parkway cover. If required by the utility, also provide with 5' ground rod driven 4' into ground.
 - 2. Utility boxes shall be provided with 5' ground rod driven 4' into ground if required by the utility.

END OF SECTION

SECTION 26 0546.19
CABLE TELEVISION (CATV) UTILITY SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Work:
 - 1. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
 - 2. Section 31 2000, EARTHMOVING.

1.02 WORK INCLUDED

- A. Contact the serving Cable Television (CATV) utility company at start of construction and again 30 days prior to date CATV service cable placement will be required.
- B. Compliance with Standards: The utility company reserves the right to refuse to use any conduit, pullboxes, manholes or utility boxes that deviate from applicable building codes, utility standards, plans and/or specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide a complete conduit infrastructure for installation of the utility service cable. Materials shall comply with applicable portions of specification sections 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide all trenching, excavations, and rock-free backfill (1/4" screen) and service conduits. Notify serving company 48 hours before backfill.
- B. Service Conduits shall be RNC Schedule 40 or GT-80 below grade except at bends up to and including above grade which shall be RNC Schedule 80. Verify with utilities prior to installation.
 - 1. Mandrel and measure conduits end-to-end to facilitate installation of CATV cables.
 - 2. Provide minimum 3/16" pull rope in each conduit.
 - 3. Minimum cover for conduit shall be 24".

4. Minimum separation from power conduit(s) in joint trench shall be 12" of compacted soil or 3" of concrete.
 5. Conduits at backboard shall extend 2" above finish floor or 6" below ceiling and 1" out from face of backboard.
 6. Minimum radius of bends from trench to building shall be 36".
- C. Conduit length and bending limits: Unless otherwise shown on the plan, service entrance conduit length shall not exceed 500'. Not including risers, conduits shall have a maximum of 270 degrees total of bending including a maximum of two 90-degree bends. If these limits are exceeded, a pull box will be required.
- D. All manholes, pullboxes and utility boxes shall be sized per plan with cover marked "Cable TV" as manufactured by Associated Concrete or Plastic Products "Quikset", Brooks, Christy or equal as approved by utility company.
- E. Conduits must enter boxes with a 90 degree sweep and shall be no more than a 15 degree angle from the main line trench.
- F. Pullropes: Install 3/16" polypropylene 800 lb. minimum test pull line in 2" conduits and 1/8" polypropylene 200 lb. minimum test pull line in 1" conduits.
- G. Locations of existing underground facilities shall be obtained by calling Underground Service Alert at least 48 hours in advance, 800-642-2444.

END OF SECTION

SECTION 26 0548

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Isolation pads.
 - 2. Channel support systems.
 - 3. Restraint cables.
 - 4. Hanger rod stiffeners.
 - 5. Anchorage bushings and washers.
- B. Related Sections include the following:
 - 1. Section 26 0529 "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.

1.03 DEFINITIONS

- A. The IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.

1.04 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:
 - 1. Site Class as Defined in the IBC: D.
 - 2. Assigned Seismic Use Group or Building Category as Defined in the IBC: II.
 - a. Component Importance Factor: 1.0.
 - b. Component Response Modification Factor: 3.0.
 - c. Component Amplification Factor: 2.5.
 - 3. Design Spectral Response Acceleration at Short Periods (0.2 Second): $S_{DS}=1.361g$.
 - 4. Design Spectral Response Acceleration at 1.0-Second Period: $S_{D1}=0.663g$.

1.05 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
 - 2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.

1.06 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of seismic bracing for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints.
- B. Qualification Data: For testing agency.
- C. Welding certificates.
- D. Field quality-control test reports.

1.07 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
- E. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 VIBRATION ISOLATORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation.
 - 4. Isolation Technology, Inc.
 - 5. Kinetics Noise Control.
 - 6. Mason Industries.
 - 7. Vibration Eliminator Co., Inc.
 - 8. Vibration Isolation.
 - 9. Vibration Mountings & Controls, Inc.
- C. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - 1. Resilient Material: Oil- and water-resistant rubber.

2.02 SEISMIC-RESTRAINT DEVICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Amber/Booth Company, Inc.
 - 2. California Dynamics Corporation.
 - 3. Cooper B-Line, Inc.; a division of Cooper Industries.
 - 4. Hilti Inc.
 - 5. Loos & Co.; Seismic Earthquake Division.
 - 6. Mason Industries.
 - 7. TOLCO Incorporated; a brand of NIBCO INC.
 - 8. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 - 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

- C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
- D. Restraint Cables: ASTM A 492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
- E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod. Do not weld stiffeners to rods.
- F. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.
- G. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices.
- H. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- I. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

2.03 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLICATIONS

- A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.03 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment and Hanger Restraints:
 - 1. Install restrained isolators on electrical equipment.
 - 2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.2 mm).
 - 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- D. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - 5. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.04 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways and cables where they cross seismic joints, where adjacent sections or branches are supported by different structural elements,

and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 - 2. Schedule test with Engineer before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
 - 3. Obtain Engineer's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 - 4. Test at least four of each type and size of installed anchors and fasteners selected by Engineer.
 - 5. Test to 90 percent of rated proof load of device.
 - 6. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.06 ADJUSTING

- A. Adjust isolators after isolated equipment is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION

SECTION 26 0553
IDENTIFICATION OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Nameplates and warning signs where specified herein and as shown on contract documents including the following:
 - a. Nameplates and warning signs permanently installed on all electrical equipment and devices including, but not limited to, the following items:
 - 1) Enclosures for transformers, switchboards, motor control, panels, pullboxes, cabinets, motors, generators, transfer switches.
 - 2) Enclosures for all separately enclosed devices including, but not limited to, disconnect switches, circuit breakers, contactors, time switches, control stations and relays, fire alarm panels and lighting control panel.
 - 3) Wall switches not within sight of outlet controlled.
 - 4) Special systems such as, but not limited to, telephone, fire alarm, warning and signal systems. Identification shall be at each equipment rack, terminal cabinet, control panel, annunciator and pullbox.
 - 5) Devices mounted within and part of equipment including circuit breakers, switches, control devices, control transformers, relays, indication devices and instruments.
 - 2. Conductor and Cable Identification.
- B. Related Work:
 - 1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
 - 2. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
 - 3. Section 26 1302, SWITCHES, MEDIUM VOLTAGE (ABOVE 600 VOLTS).
 - 4. Section 26 2416, PANELBOARDS.
 - 5. Section 26 2413, SERVICE AND DISTRIBUTION SWITCHBOARD.

PART 2 - PRODUCTS

2.01 EQUIPMENT LABEL DESIGNATIONS

- A. Equipment labels indicating equipment designations both emergency and normal. Designation data per drawings or to be supplied with shop drawings approval.

- B. Panelboard labels showing panel designation, voltage, phase and source.
- C. In accordance with CEC 110.16, provide arc flash protection warning labels on all switchboards, panelboards, distribution panels, transformers, safety switches, transfer equipment, etc. Labels shall be per ANSI Z535.4 guidelines.

2.02 MATERIALS

- A. For Labels: Three layer laminated plastic or micarta with engraved white letters over black background.
- B. For Emergency Equipment: Use engraved white letters over red background.
- C. For Warning Signs: Minimum 18 gauge steel with red lettering on white porcelain enamel finish.
- D. Arc flash labels shall be provided as required by CEC Article 70E.
- E. Conductor tape number markers: TayMac MX4280 Series non-fading permanent adhesive.

PART 3 - EXECUTION

3.01 MOUNTING

- A. Equipment labels shall be mounted by self-tapping, threaded screws and bolts, or by rivets. Adhesive types are not acceptable unless specifically noted in this section.
- B. Conductor tape markers shall be consistently placed for ready conductor identification.

3.02 HEIGHTS ON LABELS

- A. Panelboards, Switchboards and Motor Control Centers and Special Systems Enclosures: 1/4" identify equipment designation; 1/8" identify voltage rating and source.
- B. Individual Circuit Breakers, Switches, and Motor Starters in Panelboards, Switchboards, and Motor Control Centers: 3/16" identify circuit and load served, including location of equipment.
- C. Enclosed Circuit Breakers, Enclosed Switches, and Motor Starters: 3/16" identify load served.
- D. Transformers: 3/16" identify equipment designation; 1/8" identify primary and secondary voltages, primary source and secondary load. Include location of primary source or secondary load if remote from transformer.

3.03 WARNING SIGNS

- A. Warning signs shall be permanently mounted with cadmium plated steel screws or nickel-plated brass bolts.
- B. Warning signs to read "DANGER - HIGH VOLTAGE", with letters 1 1/2" high, 3/16" stroke minimum.
- C. Provide warning sign on all doors or immediately next to door for equipment rooms, enclosures or closets containing equipment energized above 150 volts to ground as per CEC, and/or as directed by the Architect. For interior finish spaces and interior doors, signage shall be coordinated and approved with the Architect in advance of installation.

END OF SECTION

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SECTION 26 0573
OVERCURRENT PROTECTIVE DEVICE COORDINATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section specifies the requirements of the Overcurrent Protective Device Coordination.
- B. A short circuit and coordination study shall be prepared for the electrical overcurrent devices to be installed under this project to assure selective coordination, proper equipment and personnel protection.
- C. The study shall present an organized time current analysis of each protective device in series from the individual overcurrent device back to the utility and the on-site generator sources. The study shall reflect the operation of each device during normal and abnormal current conditions.
- D. Implement as part of this contract, all manufacturer's recommendations for maximum protection and best selective coordination at no additional cost to Owner.
- E. The Contractor shall furnish an ARC Flash analysis study per NFPA 70E – Standard For Electrical Safety In The Workplace, Reference Article 130.3 and Appendix D.

1.02 RELATED WORK

- A. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
- B. Section 26 2416, PANELBOARDS: Low voltage panelboards.
- C. Section 26 1300, SWITCHGEAR, HIGH VOLTAGE (ABOVE 600 VOLTS): Primary distribution switchgear.
- D. Section 26 2413, DISTRIBUTION SWITCHBOARDS: Low voltage distribution switchboards.

1.03 SUBMITTALS

- A. In accordance with Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL, submit the following:
 - 1. Complete short circuit and coordination study as described herein.
 - 2. Protective equipment shop drawings shall be submitted simultaneously with or after the protective device study. Protective equipment shop drawings will not be accepted prior to protective device study.
 - 3. Certification: Two weeks prior to final inspection, submit four copies of the following to the Engineer:

- a. Certification by the Contractor that the protective devices have been adjusted and set in accordance with the approved protective device study.
- b. Final setting values for each adjustable trip device.

1.04 REFERENCES

- A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 1. IEEE 141 – Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems
 2. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
 3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis
 4. IEEE 241 – Recommended Practice for Electric Power Systems in Commercial Buildings
 5. IEEE 1015 – Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.
 6. IEEE 1584 - Guide for Performing Arc-Flash Hazard Calculations
- B. American National Standards Institute (ANSI):
 1. ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
 2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures
 3. ANSI C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
 4. ANSI C 37.41 – Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.
- C. The National Fire Protection Association (NFPA)
 1. NFPA 70 - National Electrical Code, latest edition
 2. NFPA 70E – Standard for Electrical Safety in the Workplace

1.05 QUALIFICATIONS

- A. The protective device study shall be prepared by qualified engineers of the high voltage switchgear manufacturer or an approved consultant. The Contractor is responsible for

providing all pertinent information required by the preparers to complete the study. Submit engineer's qualifications with study.

1.06 REQUIREMENTS

- A. The complete study shall include a system one line diagram, short circuit and ground fault analysis, and protective coordination plots.
- B. One Line Diagram:
 - 1. Show on the one line diagram, all electrical equipment and wiring to be protected by the overcurrent devices installed under this project. Clearly show, on the one line, the schematic wiring of the electrical distribution system.
 - 2. Also show on the one line diagram the following specific information:
 - a. Calculated fault impedance, X/R ratios, and short circuit values at each bus.
 - b. Breaker and fuse ratings.
 - c. Generator kW and Transformer kVA and voltage ratings, percent impedance, X/R ratios, and wiring connections.
 - d. Voltage at each bus.
 - e. Identification of each bus.
 - f. Conduit material, feeder sizes, length, and X/R ratios.
 - 3. Short Circuit Study:
 - a. Systematically calculate the fault impedance to determine the available short circuit and ground fault currents at each bus. Incorporate the motor contribution in determining the momentary and interrupting ratings of the protective devices.
 - b. The study shall be calculated by means of a computer program. Pertinent data and the rationale employed in developing the calculations shall be incorporated in the introductory remarks of the study.
 - c. Present the data determined by the short circuit study in a table format. Include the following:
 - 1) Device identification.
 - 2) Operating voltage.
 - 3) Protective device.
 - 4) Device rating.
 - 4. Calculated short circuit current.
 - 5. Coordination Curves:
 - a. Prepare the coordination curves to determine the required settings of protective devices to assure selective coordination. Graphically illustrate on log paper that adequate time separation exists between series devices, including the utility company upstream device. Plot the specific time current characteristics of each protective device in such a manner that all upstream devices will be clearly depicted on one sheet.
 - b. The following specific information shall also be shown on the coordination curves:
 - 1) Device identification.
 - 2) Voltage and current ratio for curves.

- 3) 3-phase and 1-phase ANSI damage points for each transformer.
- 4) No damage, melting, and clearing curves for fuses.
- 5) Cable damage curves.
- 6) Transformer inrush points.
- 7) Maximum short circuit cutoff point.
- c. Develop a table to summarize the settings selected for the protective devices. Include the following in the table:
 - 1) Device identification.
 - 2) Relay CT ratios, tap, time dial, and instantaneous pickup.
 - 3) Circuit breaker sensor rating, long time, short time, and instantaneous settings, and time bands.
 - 4) Fuse rating and type.
 - 5) Ground fault pickup and time delay.

1.07 ANALYSIS

- A. Analyze the short circuit calculations, and highlight any equipment that is determined to be underrated as specified. Propose approaches to effectively protect the underrated equipment.
- B. After developing the coordination curves, highlight areas lacking coordination. Present a technical evaluation with a discussion of the logical compromises for best coordination.

1.08 ADJUSTMENTS, SETTINGS AND MODIFICATIONS

- A. Necessary final field adjustments, settings and minor modifications shall be made to conform with the protective device study without additional cost to the Owner.
- B. All final circuit breaker and relay settings and fuse sizes shall be made in accordance with the recommendations of the protective device study.

PART 2 - PRODUCTS

2.01 STUDIES

- A. Contractor to furnish short-circuit and protective device coordination studies as prepared by equipment manufacturer or an approved consultant.
- B. The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E - Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D.

2.02 DATA COLLECTION

- A. Contractor shall furnish all data as required by the power system studies. The Engineer performing the short-circuit, protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies

as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.

- B. Source combination may include present and future motors and generators.
- C. Load data utilized shall include proposed loads obtained from Contract Documents provided by Owner, or Contractor.
- D. Include fault contribution of existing motors in the study, with motors greater than 25 hp. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements.

2.03 SHORT-CIRCUIT AND PROTECTIVE DEVICE EVALUATION STUDY

- A. Use actual conductor impedances if known. If unknown, use typical conductor impedances based on IEEE Standards 141-1993.
- B. Transformer design impedances shall be used when test impedances are not available.
- C. Provide the following:
 - 1. Calculation methods and assumptions
 - 2. Selected base per unit quantities
 - 3. One-line diagram of the system being evaluated
 - 4. Source impedance data, including electric utility system and motor fault contribution characteristics
 - 5. Typical calculations
 - 6. Tabulations of calculated quantities
 - 7. Results, conclusions, and recommendations.
- D. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each:
 - 1. Electric utility's supply termination point
 - 2. Incoming switchgear
 - 3. Unit substation primary and secondary terminals
 - 4. Low voltage switchgear
 - 5. Motor control centers
 - 6. Standby generators and automatic transfer switches
 - 7. Branch circuit panelboards
 - 8. Other significant locations throughout the system.
- E. For grounded systems, provide a bolted line-to-ground fault current study for areas as defined for the three-phase bolted fault short-circuit study.
- F. Protective Device Evaluation:
 - 1. Evaluate equipment and protective devices and compare to short circuit ratings
 - 2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short-circuit stresses
 - 3. Adequacy of transformer windings to withstand short-circuit stresses
 - 4. Cable and busway sizes for ability to withstand short-circuit heating

5. Notify Owner in writing, of existing, circuit protective devices improperly rated for the calculated available fault current.

2.04 PROTECTIVE DEVICE COORDINATION STUDY

- A. Proposed protective device coordination time-current curves shall be graphically displayed on log-log scale paper.
- B. Include on each curve sheet a complete title and one-line diagram with legend identifying the specific portion of the system covered.
- C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which device is exposed.
- D. Identify device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
- E. Plot the following characteristics on the curve sheets, where applicable:
 1. Electric utility's protective device
 2. Medium voltage equipment relays
 3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands
 4. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands
 5. Transformer full-load current, magnetizing inrush current, and ANSI transformer withstand parameters
 6. Conductor damage curves
 7. Ground fault protective devices, as applicable
 8. Pertinent motor starting characteristics and motor damage points
 9. Pertinent generator short-circuit decrement curve and generator damage point
 10. Other system load protective devices for the largest branch circuit and the largest feeder circuit breaker in each motor control center.
- F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

2.05 ARC FLASH HAZARD ANALYSIS

- A. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D.
- B. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Alternative methods shall be presented in the proposal.
- C. The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and splitters) where work could be performed on energized parts.

- D. The Arc-Flash Hazard Analysis shall include all significant locations in 208 volt systems fed from transformers equal to or greater than 45 kVA.
- E. Safe working distances shall be specified for calculated fault locations based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm².
- F. The Arc Flash Hazard analysis shall include calculations for maximum and minimum contributions of fault current magnitude. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume a minimum motor load. Conversely, the maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.
- G. Arc flash computation shall include both line and load side of main breaker calculations, where necessary.
- H. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2002 section B.1.2.

2.06 REPORT SECTIONS

- A. Input Data:
 - 1. Short-circuit reactance of rotating machines
 - 2. Cable and conduit materials
 - 3. Bus ducts
 - 4. Transformers
 - 5. Reactors
 - 6. Aerial lines
 - 7. Circuit resistance and reactive values.
- B. Short-Circuit Data:
 - 1. Source fault impedance and generator contributions
 - 2. X to R ratios
 - 3. Asymmetry factors
 - 4. Motor contributions
 - 5. Short circuit kVA
 - 6. Symmetrical and asymmetrical fault currents.
- C. Recommended Protective Device Settings:
 - 1. Phase and Ground Relays:
 - a. Current transformer ratio
 - b. Current setting
 - c. Time setting
 - d. Instantaneous setting
 - e. Specialty non-overcurrent device settings
 - f. Recommendations on improved relaying systems, if applicable.
 - 2. Circuit Breakers:
 - a. Adjustable pickups and time delays (long time, short time, ground)
 - b. Adjustable time-current characteristic
 - c. Adjustable instantaneous pickup

- d. Recommendations on improved trip systems, if applicable.
- D. Incident energy and flash protection boundary calculations
 - 1. Arcing fault magnitude
 - 2. Device clearing time
 - 3. Duration of arc
 - 4. Arc flash boundary
 - 5. Working distance
 - 6. Incident energy
 - 7. Hazard Risk Category
 - 8. Recommendations for arc flash energy reduction

PART 3 - EXECUTION

3.01 EQUIPMENT AND FIELD ADJUSTMENTS

- A. Adjust relay and protective device settings according to the recommended settings table provided by the coordination study. Field adjustments to be completed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.
- B. Make modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies and include all recommendations.
- C. Following completion of all studies, acceptance testing and startup by the field engineering service division of the equipment manufacturer, a 2-year warranty shall be provided on all components manufactured by the engineering service parent manufacturing company.

3.02 ARC FLASH WARNING LABELS

- A. The Contractor shall provide a 3.5 in. x 5 in. thermal transfer type label of high adhesion polyester for each work location analyzed, a sample is included in this specification.
- B. The label shall have an orange header with the wording, “WARNING, ARC FLASH HAZARD”, and shall include the following information:
 - 1. Location designation
 - 2. Nominal voltage
 - 3. Flash protection boundary
 - 4. Hazard risk category
 - 5. Incident energy
 - 6. Working distance
 - 7. Engineering report number, revision number and issue date.
- C. Labels shall be machine printed, with no field markings.
- D. Arc flash labels shall be provided in the following manner and all labels shall be based on recommended overcurrent device settings.

1. For each 600, 480 and applicable 208 volt panelboards, one arc flash label shall be provided.
 2. For each motor control center, one arc flash label shall be provided.
 3. For each low voltage switchboard, one arc flash label shall be provided.
 4. For each switchgear, one flash label shall be provided.
 5. For medium voltage switches one arc flash label shall be provided
- E. Labels shall be field installed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.

3.03 ARC FLASH TRAINING

- A. The equipment vendor shall train personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours). Maintenance procedures in accordance with the requirements of NFPA 70E, Standard For Electrical Safety Requirements For Employee Workplaces, shall be provided in the equipment manuals. The training shall be certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET).



WARNING

ARC FLASH HAZARD

LABEL # 0001

LINE SIDE **FLASH PROTECTION BOUNDARY: 40 inches**
of MAIN **HAZARD RISK CATEGORY: CLASS 2**
 INCIDENT ENERGY RANGE: 4 – 8 cal/cm²

LOAD SIDE **FLASH PROTECTION BOUNDARY: 20 inches**
of MAIN **HAZARD RISK CATEGORY: CLASS 0**
 INCIDENT ENERGY RANGE: 0 – 2 cal/cm²

PSE TQS#: #####.#

Date Issued: April 2004

Study Rev.: 0

LOCATION: BUS NAME

PROTECTIVE DEVICE: UPSTREAM DEVICE

END OF SECTION

SECTION 26 0926
LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SYSTEM DESCRIPTION

- A. Install a lighting control system consisting of relay panel(s), control switches, occupancy sensors, photocells and other controlling devices. The devices are connected by low voltage and line voltage wiring. The general operation of lighting and controlled loads shall include:
 - 1. Interior lighting – manual switch and occupancy sensor control on/off with automatic time scheduled shut off.
 - 2. Scheduled on/off loads – time on, time off by automatic time schedule with after hour override capability and shut off.
 - 3. Exterior lighting – photocell or astronomic on/time off, time on/photocell or astronomic off.

1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of lighting control equipment and ancillary equipment, of types and capacities, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. NEC Compliance: Comply with NEC as applicable to electrical wiring work.
- C. NEMA Compliance: Comply with applicable portions of NEMA standards pertaining to types of electrical equipment and enclosures.
- D. Section 26 5670, LIGHTING ACCEPTANCE TESTING.
- E. UL Approvals: UL listed under UL 916 Energy Management Equipment.
- F. FCC Emissions: Compliance with FCC emissions Standards specified in Part 25 Subpart J for Class A application.

1.04 SUBMITTALS

- A. Shop Drawings: Submit dimensional drawings of all lighting control system components and accessories.

- B. One Line Diagram: Submit a one-line diagram of the proposed system configuration if it differs from that illustrated in the riser diagram included in the contract drawings.
- C. Typical Wiring Diagrams: Submit typical wiring diagrams for all components including, but not limited to, relay, contactors, photocells, switches, occupancy sensors and daylighting controls.

PART 2 - MATERIALS AND COMPONENTS

2.01 LIGHTING CONTROL RELAY PANELS

- A. Description
 - 1. Lighting Control Panels shall be UL listed and consist of the following:
 - a. Enclosure/Tub: NEMA 1.
 - b. Cover: Surface or Flush as required, hinged, lockable and shall restrict access to line voltage section.
 - c. Interior: Barrier for separation of high voltage (class 1) and low voltage (class 2) wiring. It shall include intelligence boards, power supply and control relays. Clock display and keypad shall be mounted on interior cabinet door for easy user access and programming.
 - 2. Features
 - a. Panel shall accept a minimum of 8 low voltage relays. Relays shall be individual latching relays with 20 Amp load contacts for ballast (including HID, magnetic or electronic type ballasts), tungsten and general purpose loads. Provide isolated auxiliary contacts for pilot light switching. Relays shall use quick connectors and be individually replaceable to facilitate ease of use.
 - b. The lighting control panel shall provide a stagger up delay, override push buttons, pilot light outputs, and LED status light indicators for each relay.
 - c. The time clock shall have a backlight display, user keypad and shall provide 8 channels of time or astronomical control. Preprogrammed lighting control scenarios shall include: scheduled on/off, manual on/scheduled off, manual on/automatic switch seep off, astronomic or photocell on/off and astronomic of photocell control with scheduled on/off. Time clock shall provide up to 42 holidays, automatic daylight savings adjustment, astronomic coordinates by major cities, and help screens. Program memory shall be non-volatile and clock shall retain time keeping during power outages for at least 48 hours.
 - d. The panel shall have a minimum of 8 universal switch inputs that are low voltage, self-configuring and shall not require programming to accept momentary on/momentary off switch, push button switch (cycling), maintained switch or 24VDC signals from occupancy sensors, photocells or other interfacing devices.
 - e. Occupancy sensor and time control shall be integrated to allow occupancy sensor control after hours with hold on of lighting during occupancy scheduled time. During occupied time, control scenarios shall be selectable for time schedule of lighting on or occupancy sensor detection of lighting on initially and then hold on of lighting during occupied hours. Control shall provide selectable occupancy sensor blink warning prior to shut off and adjustable occupancy sensor time delay from the time clock keypad.
 - f. After-hour interior lighting shut off control shall provide a full duration override time of 1 to 120 minutes with a warning blink five minutes prior to shutting the

lighting off. An impending shut off will be cancelled and the override period re-initialized through the operation of any assigned switch input.

- g. After-hour interior lighting shut off control may be by line voltage power interrupt control to automatic control switches. The lighting control relay panel shall provide a warning blink signal to automatic control switches, thus allowing a five minute delay prior to shutting off lighting. The lighting shut off event may be cancelled by pressing the automatic control switch push button. The lighting control panel time clock shall provide periodic lighting sweep signals to shut off automatic control switches.

2.02 APPROVED MANUFACTURERS

- A. Watt Stopper or Lighting Controls & Design
- B. Watt Stopper catalog numbers:
 - 1. Lighting control relay panel: LP8
 - 2. Low voltage exterior photocell: EM24-A2
 - 3. Automatic Control Switch: AS-100
- C. Lighting Controls and Design catalog numbers:
 - 1. GR1400 relay panel
 - 2. GR 1400 outdoor photocell
 - 3. Chelsea digital control switch

PART 3 - EXECUTION AND SUPPORT SERVICES

3.01 INSTALLATION

- A. All lighting control panels, switches, occupancy sensors, photocells, etc., shall be mounted as indicated on the electrical drawings. All wiring shall be labeled clearly indicating which lighting control panel or device it connects to. Use only properly color-coded, stranded wire as indicated on the drawings. All relays, and switches shall be tested after installation to confirm proper operations, and all connected loads shall be recorded on the lighting control schedule for each panel.

The lighting control panels shall be mounted in electrical closets or other locations as indicated on the drawings. The relay panel shall be wired to control the power of each load as indicated on the Lighting Control Panel Schedules. All power wiring will be identified with the circuit breaker number controlling the load.

3.02 SERVICE AND SUPPORT

- A. Start Up: EC shall contact LC&D at least 7 days before turnover of project. LC&D will remotely dial into the lighting control system, run diagnostics and confirm system programming. EC shall be available at the time of dial in to perform any corrections required by LC&D. EC is responsible for coordinating with GC and the owner the installation of a dedicated telephone line or a shared phone line with an automatic Fax/Modem switch. Phone

jack to be mounted within 12” of Master LCP. Label jack with phone number. EC to connect phone line from jack to Master LCP.

- B. Telephone factory support shall be available at no additional cost to the EC or Owner both during and after the warranty period. Factory to pre-program the lighting control system per plans and approved submittal, to the extent data is available. The specified manufacturer, at no added cost, shall provide additional remote programming via modem as required by the EC or Owner for as long as a phone line is available for the life of the system. Upon request manufacturer to provide remote dial up software at no added cost to system owner. No exceptions.
- C. Provide a factory technician for on-site training of the owners’ representatives and maintenance personnel. Coordinate timing with General Contractor. Provide 1 day of factory on-site training.

3.3 CONTRACTOR PROVIDED INFORMATION

- A. Contractor shall provide system documentation after the equipment has been installed:
 - 1. Lighting control operational summary sheet.
 - 2. Programming record sheet.
 - 3. System Installation and Operation Manual shall be provided to the Owner.

3.4 WARRANTY

- A. Manufacturer shall provide a one year warranty for all system components.

END OF SECTION

SECTION 26 2413
SERVICE AND DISTRIBUTION SWITCHBOARD

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Service and distribution switchboard where shown on the contract drawings and specified herein.

1.03 QUALITY ASSURANCE

- A. Conform to applicable Codes and NEMA, ANSI and IEEE Standards.

1.04 SUBMITTALS

- A. Conform to applicable provisions of Section 01 3300 of Division 01, Submittals and of Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
- B. Shop Drawings shall show and contain the following information:
 - 1. Plans showing top and bottom of switchboards.
 - 2. Front, rear and side elevations of switchboards.
 - 3. Schematic Wiring Diagrams showing the following:
 - a. One-line diagram with each circuit numbered.
 - b. Schedule showing circuit number, description and rating of protective device(s).
 - c. Complete short circuit with standability of bus.
 - 4. One-half inch equal to one-foot scale drawings of electrical rooms or areas overall dimensions for equipment layout including space available for conduits and protective devices.
- C. Manufacturer shall provide certification that the equipment supplied under this Section has been reviewed and certified to meet the current criteria for special seismic certification in compliance with 2013 CBC 1705. Include seismic companion anchorage requirements from the testing and as approved by the manufacturer. The manufacturer shall provide an approved label on the equipment enclosure stating that the equipment has been awarded a certificate of compliance for special seismic certification. The label shall include special seismic certification pre-approval number when relevant.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Each switchboard shall be U.L. listed deadfront, deadrear, completely self-supporting, with the required number of vertical sections bolted together to form one floorstanding switchboard. Construction shall be NEMA Class II with line and load and main bus connections accessible from the front. Provide switchboards of 1000 amperes or greater rating with line and load insulated bus bars. Overcurrent protective devices shall be grouped in convertible type construction. Vertical sections shall have full height bussing and where space for future devices is indicated on the Drawings all the necessary mounting hardware shall be furnished. Switchboards shall include all protective devices and other equipment indicated on the Contract Drawings with the necessary interconnections, instrumentation, and control wiring. Bus shall be copper with plated joints, or tin plated aluminum. Bus bars shall be mounted on supports of high impact-resistant, non-tracking insulating material, and braced to withstand the maximum available fault current as indicated on the Contract Drawings. Other ratings shall be as indicated on the Contract Drawings. Series-connected or "integrated equipment" short circuit ratings shall not be applied in lieu of, or to comply with, short circuit and interrupting capacity ratings indicated on the Drawings, unless specifically approved by the Engineer.
- B. Service and distribution sections shall contain circuit breakers, fusible switches, and combination motor starters, with shunt trips, motor operators, ground fault protection, and other accessories, as indicated on the Drawings, as well as provisions for utility metering in accordance with the serving electric utility requirements. Each disconnecting means shall be provided with a means for individual padlocking. Switches shall be heavy-duty, quick-make and quick-break, and horsepower rated through 500 HP. Switches rated over 600 amperes shall be bolted pressure contact type. Ratings of disconnecting means and overcurrent protective devices shall be as indicated on the Drawings.
- C. Finish: Interior finish shall be a gray lacquer or enamel; exterior finish shall be a gray baked-on enamel or lacquer. Apply all finish coatings over a rust-inhibiting metal primer.
- D. Identification: Each switchboard shall have an engraved laminated plastic nameplate identifying the switchboard as designated and located on the Contract Drawings, and indicating voltage, phase, and number of system conductors. For example, "Switchboard MS 277/480V. 3Ø 4W. Lettering shall be white on black finish and 2" high minimum. Nameplates shall be affixed by a minimum of two escutcheon pins or screws. Each device on the switchboard shall be provided with an engraved plastic nameplate as specified in Section 26 0553, IDENTIFICATION OF ELECTRICAL SYSTEMS.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

- A. Switchboard(s) shall be securely bolted to the flooring or structure. Final attachment means shall be in compliance with the seismic requirements of governing authority. Shop Drawings indicating the bolt down requirements shall be provided by the manufacturer along with all

necessary calculations and shall be submitted with the Shop Drawings of the switchboard equipment. Refer to other Sections of the Specifications related to seismic requirements.

- B. Switchboard(s) shall be installed on a level floor, with shims provided where necessary to attain both horizontal and vertical "plumb" conditions.
- C. Switchboard(s) equipment shall be protected during construction in such a manner to prevent plaster, paint, dust, etc. from defacing the finish of equipment. Prior to final acceptance of the equipment, the interior of the equipment shall be cleaned of all foreign materials and debris. Any blemishes or defects on the exterior of the equipment shall be repaired by painting the equipment with paint supplied by the manufacturer of the equipment to match the factory finishes.
- D. All floor mounted switchgear and panelboards shall be sealed with caulking between bottom of metal housing and the concrete pad or slab to prevent entrance of dust and debris.
- E. All openings in switchgear and panelboards that are unused shall be sealed with bolts and washers. Use caulking where holes or openings cannot be sealed by way of a washer, or bolts or conduit seals.
- F. All ventilated openings in panelboards and switchboards shall be furnished with dust filters to prevent entrance of dust and debris.
- G. No operating handles in any switchboard shall be located above 6'- 6" above finish floor. Code clearances on all sides of the switchboard equipment shall be maintained.
- H. Switchboards shall be mechanically grounded to the grounding system.
- I. Furnish ammeters, voltmeters, current and potential transformers, test blocks, control switches, fuses and circuit breakers, and other devices as indicated on the Drawings. Meters shall be switchboard type semi-flush mounted, with phase selector switches. The height of all devices shall comply with Code and utility company requirements with the switchboard installed on a 2" high concrete pad.
- J. For solidly grounded "wye" services of more than 150 volts to ground, but not exceeding 600 volts phase to phase, provide ground fault protection of equipment for each service disconnecting means for services rated 1000 amperes or more, without a single main disconnecting means. Provide ground fault protection of equipment for other systems as indicated on the Drawings.
- K. Ground fault sensors shall be zero sequence type unless indicated otherwise on the drawings. Trip settings shall be as indicated on the drawings or as directed by the Engineer.
- L. Protection: Keep switchboards covered during construction operations. Clean interior and exterior after all connections are completed. Factory connections shall be checked and re-torqued tight as required. Damage shall be field or factory repaired to a condition acceptable to the Engineer at no added cost to the Owner.
- M. Operational Test of the ground fault protection system using the primary current injection method shall be performed by qualified personnel with suitable testing/recording equipment in

the presence of the Owner. Provide the Owner with a "Certified Test Report" including test parameters.

3.02 ACCEPTANCE TESTING OF SWITCHGEAR AND SWITCHBOARD ASSEMBLIES

A. General:

1. Inspect for physical damage.
2. Compare equipment nameplate information with latest single line diagram and report discrepancies.
3. Inspect for proper alignment, anchorage and grounding.
4. Check tightness of accessible bolted bus joints by calibrated torque wrench method. Refer to manufacturer's instruction for proper foot pound levels.
5. Key interlock systems shall be physically tested to insure proper function.
 - a. Closure attempt shall be made on locked open devices. Opening attempt shall be made on locked closed devices.
 - b. Key exchange shall be made with devices operated in off-normal positions.
6. All doors, panels and sections shall be inspected for paint, dents, scratches.

END OF SECTION

SECTION 26 2416
PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Panelboards.
 - 2. Manufacturer shall provide certification that the equipment supplied under this Section has been reviewed and certified to meet the current criteria for special seismic certification in compliance with 2013 CBC 1705. Include seismic companion anchorage requirements from the testing and as approved by the manufacturer. The manufacturer shall provide an approved label on the equipment enclosure stating that the equipment has been awarded a certificate of compliance for special seismic certification. The label shall include special seismic certification pre-approval number when relevant.
- B. Related Work:
 - 1. Division 09 "PAINTING": Identification and painting of panelboards.
 - 2. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
 - 3. Section 26 0573 OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Requirements for the over current protective devices to be installed to ensure proper equipment and personnel protection.
 - 4. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
 - 5. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.
 - 6. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.03 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. Underwriters Laboratories, Inc. (UL):
 - 1. No. 50-1995 Enclosures for Electrical Equipment
 - 2. No. 67-1993 Panelboards
 - 3. No. 489-1991 Molded Case Circuit Breakers and Circuit Breaker enclosures
- C. National Fire Protection Association (NFPA):

1. No. 70-2010 California Electrical Code (CEC)
- D. National Electrical Manufacturers Association (NEMA):
 1. No. PB-1-2002 Panelboards.
 2. No. AB-3-1996 Molded Case Circuit Breakers and Their Application.

PART 2 - PRODUCTS

2.01 PANELBOARDS

- A. Panelboards shall be in accordance with UL, NEMA, NEC, CEC and as shown on the drawings. Approved manufacturers are Cutler Hammer, Square D, Seimens, General Electric.
- B. Panelboards shall be standard manufactured products. All components of the panelboards shall be the product and assembly of the same manufacturer. All similar units of all panelboards to be of the same manufacturer.
- C. All panelboards shall be dead front safety type. Arrange sections for easy removal without disturbing other sections.
- D. All panelboards shall be completely factory assembled with molded case circuit breakers. All factory wiring shall be checked for correct tightness and visually inspected to insure that bussing and terminations have not become loose in transit to job site.
- E. Panelboards shall have main breaker or main lugs, bus size, voltage, phase, top or bottom feed, and flush or surface mounting as scheduled on the drawings. Refer to single line diagram and panel schedules on drawings. Terminals shall be minimum 75 degree rated. Back fed main circuit breakers are not allowed. Main circuit breakers shall be vertically mounted.
- F. Panelboards shall have the following features:
 1. Nonreduced size copper bus bars, and connection straps bolted together and rigidly supported on molded insulators. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of branch circuit devices.
 2. Full size neutral bar, mounted on insulated supports.
 3. Ground bar and isolation ground bar (where called for in panel schedule) with sufficient terminals for all grounding wires. Buses braced for the available short circuit current.
 4. All breakers and phase bus connections shall be arranged so that it will be possible to substitute a 2-pole breaker for two single pole breakers, and a 3-pole breaker for three single pole breakers, when trip is 30 amps or less and frame size is 100 amperes or less, without having to drill and tap the main bus bars at bus straps. Where used for heating and air conditioning, and refrigeration equipment, use only HACR type U.L. listed circuit breakers.
 5. Design interior so that protective devices can be replaced without removing adjacent units, main bus connectors, and without drilling or tapping.
 6. Where designated on panel schedule as "space", include all necessary bussing, device support and connections. Provide blank cover for each space.

7. In two section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed lugs on the line side with cable connections to the second section. Panelboard sections with tapped bus or crossover bus are not acceptable.
 8. Series rated panelboards are not permitted.
 9. Label all panels in accordance with Section 26 0553, IDENTIFICATION OF ELECTRICAL SYSTEMS.
 10. Recessed panel space conduit: Provide (1) ¾ inch spare conduit stubbed to accessible ceiling space and/or interstitial space below floor for every (5) spaces and spares indicated on panel schedules.
- G. Panelboards serving as building mains shall be “service entrance rated” and UL Listed as “service equipment”.

2.02 CABINETS AND TRIMS

A. Cabinets:

1. Provide galvanized steel cabinets to house panelboards. Cabinets for outdoor panels shall be factory primed and suitably treated with a corrosion-resisting paint finish meeting UL standard for outdoor applications.
2. All ventilated openings in panelboards and switchboards, shall be furnished with dust filters to prevent entrance of dust and debris.
3. Cabinets for panelboards may be of one piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.
4. Provide necessary hardware for "in" and "out" adjustment of panel interior.
5. Cabinets for two section panelboards shall be arranged side by side, and shall be the same height. Flush mounted cabinets should be 1 1/2" apart and coupled by conduit nipple if necessary.
6. Gutter size in panel boxes, on all sides, shall be in accordance with the CEC. Penetrations through gutter to live area of the panelboard shall incorporate approved non-metallic-grommet type of insulation to protect wire passing through.

B. Trims:

1. Fabricate trim of sheet steel consisting of frame with door attached by concealed hinges. Provide flush or surface trim as shown on the drawings.
2. Flush trims shall overlap the box by at least 3/4" all around.
3. Surface trim shall have the same width and height as the box.
4. Flush or surface trims shall not have ventilating openings.
5. Secure trims to back boxes by indicating trim clamps.
6. Provide a welded angle on rear of trim to support and align trim to cabinet.
7. Provide separate trims for each section of multiple section panelboards. Trims and doors of sections shall be of the same height.

C. Doors:

1. Provide doors with flush type latch and manufacturer's standard lock. Doors over 48 inches in height shall have a vault handle and a three-point catch, arranged to fasten door at top, bottom, and center.
2. In making switching devices accessible, doors shall not uncover any live parts.
3. Provide concealed hinges welded to the doors and trims.

4. For lighting or power contactors incorporated in panelboards, provide separate doors for the contactors.
 5. Provide keyed alike system for all panelboards.
 6. Provide a directory card, metal holder, and transparent cover. Permanently mount holders on inside of doors.
- D. Painting:
1. Thoroughly clean and paint trims and doors at the factory with primer and manufacturer's standard finish.

2.03 MOLDED CASE CIRCUIT BREAKERS FOR PANELBOARDS

- A. Breakers shall be UL listed and labeled, in accordance with the CEC, as shown on the drawings, and as specified.
- B. Circuit breakers in panelboards shall be bolt on type on phase bus bar or branch circuit bar.
1. Molded case circuit breakers for lighting and appliance branch circuit panelboards shall have minimum interrupting rating as indicated or as dictated by Section 26 0573 OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY.
 2. Molded case circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for 100 ampere frame or less. Magnetic trip shall be adjustable from 3 times to 10 times for breakers with 600 ampere frames and higher. Factory setting shall be HI, unless otherwise noted.
- C. Breaker features shall be as follows:
1. Integral housing of molded insulating material.
 2. Silver alloy contacts.
 3. Arc quenchers and phase barriers for each pole.
 4. Quick-make, quick-break, operating mechanisms.
 5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
 6. Electrically and mechanically trip free.
 7. An operating handle which indicates ON, TRIPPED, and OFF positions.
 - a. Line connections shall be bolted.
 - b. Interrupting rating shall not be less than the maximum short circuit current available at the line terminals as indicated on the drawings, and as shown on the electrical system protective device study as required in Section 26 0573 OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY. The interrupting rating shall not be less than the minimum identified requirement.
 8. An overload on one pole of a multipole breaker shall automatically cause all the poles of the breaker to open.

2.04 SEPARATELY ENCLOSED MOLDED CASE CIRCUIT BREAKERS

- A. Where separately enclosed molded case circuit breakers are shown on the drawings, provide circuit breakers in accordance with the applicable requirements of those specified for panelboards.

- B. Enclosures are to be of the NEMA types shown on the drawings. Where the types are not shown, they are to be the NEMA type most suitable for the environmental conditions where the breakers are being installed.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be in accordance with CEC, as shown on the drawings, and as specified.
- B. Locate panelboards so that the present and future conduits can be conveniently connected. Coordinate the sizes and layout of cabinets within the designated spaces. All equipment must be dimensioned in order to physically fit in the spaces provided and to comply with all code required clearances.
- C. Install a typewritten schedule of circuits in each panelboard. Include the room numbers (as finally described by the Owner) and items served on the cards. Obtain final room numbers from Architect prior to creating schedule.
- D. Mount the panelboard so that maximum height of the top circuit breaker above finished floor shall not exceed 78 inches.
- E. For panelboards located in areas accessible to the public, paint the exposed surfaces of the trims, doors, and boxes with finishes to match surrounding surfaces after the panelboards have been installed.
- F. Circuit numbers shall correspond to the approved panel schedule. Provide as-built drawings showing the actual circuit numbers being used for each device on each branch circuit if changes are required.
- G. Verify depth of all flushmounted enclosures in walls to be certain wall depth will accommodate panel depth prior to installation.
- H. All openings in switchgear and panelboards that are unused shall be sealed with bolts and washers. Use caulking where holes or openings cannot be sealed by way of a washer, or bolts or conduit seals.
- I. Contractor shall include the services of an independent testing company to test GFI circuit breakers in distribution and main panelboards.

END OF SECTION

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SECTION 26 2726
WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Wiring devices.
- B. Related Work:
 - 1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
 - 2. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
 - 3. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
 - 4. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

PART 2 - PRODUCTS

2.01 RECEPTACLES

- A. General: All receptacles shall be listed by Underwriters Laboratories, Inc.
 - 1. Mounting straps shall be plated steel, with break-off plaster ears and shall include a self-grounding feature (this feature does not substitute for a grounding conductor terminated on grounding strap of device). Terminal screws shall be brass, brass plated or a copper alloy metal.
 - 2. Receptacles shall be of a screw terminal type, “pressure type quick wire” terminations are not allowed.
- B. Duplex receptacles shall be premium specification grade single phase, 20 ampere, 120 volts, 2-pole, 3-wire, and conform to the NEMA 5-20R configuration in NEMA WD 6. The duplex type shall have bussing break-off feature for two-circuit operation. The ungrounded pole of each receptacle shall be provided with a separate terminal.
 - 1. Bodies shall be white.
 - 2. Switched duplex receptacles shall be wired so that only the top receptacle is switched. The remaining receptacle shall be unswitched.
 - 3. Receptacles powered by Arc Fault circuit breakers must be tamperproof outlets.
 - 4. Ground Fault Interrupter Duplex Receptacles: Shall be an integral unit suitable for mounting in a standard outlet box.
 - a. Ground fault interrupter shall be commercial grade and consist of a differential current transformer, solid state sensing circuitry and a circuit interrupter switch. It

shall be rated for operation on a 60 Hz, 120 volt, 20-ampere branch circuit. Device shall meet CEC requirements. Device shall have a minimum nominal tripping time of 1/30th of a second. Devices shall meet UL 943.

- C. Receptacles; 20, 30 and 50 ampere, 250 volts: Shall be complete and match with appropriate cord grip plug. Devices shall meet UL 231.
- D. Weatherproof Receptacles: Shall consist of a listed weather resistant duplex receptacle, mounted in box with a gasketed, while in use weatherproof, cast metal cover plate and cap receptacle opening. The cap shall be permanently attached to the cover plate by a spring-hinged flap. Approved manufacturers: Intermatic WP10 Series, Thomas & Betts/Red Dot 2CK Series, or engineer approved equal.

2.02 SWITCHES

- A. Toggle switches shall be totally enclosed tumbler type with bodies of phenolic compound. Toggle handles color to match receptacle device color unless otherwise specified.
 - 1. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self grounding mounting strap with break-off plaster ears and be of a screw terminal type.
 - 2. Shall be color coded for current rating, listed by Underwriters Laboratories, Inc., and meet the requirements of NEMA WD 1, Heavy-Duty and UL 20.
 - 3. Ratings:
 - a. 120 volt circuits: 20 amperes at 120-277 volts AC.
 - b. 277 volt circuits: 20 amperes at 277 volts AC.
 - 4. The switches shall be mounted on the strike plate side of doors.
 - 5. Incorporate barriers between switches with multi-gang outlet boxes where required by the CEC.
 - 6. All toggle switches shall be of the same manufacturer.

2.03 WALL PLATES

- A. Wall plates for switches and receptacles shall be type 302 stainless steel at Apparatus Bay, Kitchen, and Shop. Thermoplastic everywhere else.
- B. Standard NEMA design, so that products of different manufacturers will be interchangeable. Dimensions for openings in wall plates shall be accordance with NEMA WD1.
- C. For receptacles or switches ganged together, wall plates shall be a single ganged plate.
- D. Wall plates for data, telephone or other communication outlets shall be as specified in the associated specification.
- E. Surface mounted boxes, NEMA1, shall be industrial grade raised galvanized steel covers. In shop areas all receptacles shall be dust proof and or waterproof where applicable.
- F. Waterproof device covers shall be cast iron, 4-corner screw type, for FS and FD type mounting. Device covers shall be zinc galvanized finish. Weatherproof covers shall be lockable.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Switches installed in hazardous areas shall be explosion proof type in accordance with the CEC and as shown on the drawings.
- B. Installation shall be in accordance with the CEC, NECA “Standard of Installation”, and as shown as on the drawings.
- C. Ground terminal of each receptacle shall be bonded to the outlet box with an approved green bonding jumper, and also be connected to the green equipment grounding conductor.
- D. General: Devices shall be of the type specified herein. All devices shall be installed with “pigtailed” leads from the outlet box. No device shall be used in the “feed through” application. Screw terminals shall be used to connect all devices to the circuit and shall be grounded by means of a ground wire where grounding terminals are provided in the device.
- E. Installation: Devices and plates shall be installed in a “plumb” condition and must be flush with the finish surface of the wall where boxes are recessed.
- F. Mounting heights: All control and convenience devices shall comply with California Code of Regulations Title 24 and ADA with respect to accessibility requirements. Mounting heights indicated on plans shall have precedence.
- G. Install switches with the off position down.
- H. Clean debris from outlet boxes.
- I. Provide extension rings as required to bring outlet boxes flush with finished surface or casework.
- J. Test each receptacle device for proper polarity.

END OF SECTION

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SECTION 26 2816
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Disconnect and safety switches where shown on the contract drawings and specified herein.
- B. Related Work:
 - 1. Section 26 0553, IDENTIFICATION OF ELECTRICAL SYSTEMS.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Approved Manufacturers: Cutler Hammer, General Electric, ITE-Siemens and Square-D.
- B. Disconnect Switches: Provide with devices enabling the switch to be locked in the open or closed positions.
- C. Manual Motor Switches: Tumbler type rated 3HP, 240 Volts with or without overload heaters as required to protect equipment served.
- D. Externally Operable Safety Switches: To have quick-make, quick-break mechanism, capable of switching 10 times switch rating, with cover interlock to prevent opening with switch in ON position and defeat mechanism for maintenance.
- E. Switches: Shall be general duty (GD) for 240 volt and below and heavy duty (HD) for 277/480 volt type unless otherwise indicated. Provide NEMA 1 enclosures for interior locations and NEMA 3R enclosures for exterior or wet locations. Provide with number of poles, ampacity, voltage and HP rating, fusible or nonfusible as indicated. Copper blades shall be visible in off position.
- F. Fusible Switches: Equip them with rejection clips for UL Class R fuses. Switches having a dual rating when used with dual element fuses shall have a rating so indicated and shall be confirmed by equipment vendor being connected.

- G. 600 Amperes or Less Fuses: UL Class RKI with a minimum interrupting rating of 200,000 Amperes, Bussmann "Low-Peak Type" or equal.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

- A. Locations: Install switches, disconnects and safety where indicated on the Contract Drawings or as required by CEC.
- B. Fastenings: Securely fasten switches to structural members or unistrut support as directed by the manufacturer.
- C. Manual Motor Switches: Install flush mounted in finished areas.
- D. Manual Motor Switches: Install surface mounted in equipment rooms and non-finished areas. Where installed above inaccessible ceilings provide access panels.
- E. Label all disconnect switches in accordance with Section 26 0553, IDENTIFICATION OF ELECTRICAL SYSTEMS.
- F. Fuse: All fuses shall be as indicated on the plan or as required by the equipment. Verify fuse size with equipment manufacturer requirements, prior to installation. Use current limiting fuses as indicated on plan. Provide one spare fuse cabinet in each electrical room with one complete set of spare fuses for all sizes of main fuses, subpanel fuses, HVAC equipment fuses and fire alarm.
- G. Terminals shall be minimum 75 degree rated.

END OF SECTION

SECTION 26 3213
GENERATOR SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Applicable Codes and Standards:
 - 1. California Electrical Code (CEC).
 - 2. NFPA 110 – Emergency and Standby Power Systems.
 - 3. NFPA 37 – Installation and Use of Stationary Combustion Engines.
 - 4. NFPA 30 – Flammable and Combustible Liquids Code.
 - 5. UL 2200 – Standard for Safety of Stationary Engine Generator Assemblies.
 - 6. U.S. EPA – New Source Performance Standards.
 - 7. CEC Articles 700, 701, 702.
 - 8. International Standards Organization, ISO 9001.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. An electric generating system or Emergency Power Supply (EPS), consisting of a prime mover, generator, governor, coupling and controls, must have been tested, as a complete unit, on a representative engineering prototype model of the equipment to be sold.
- B. The generator set must conform to applicable California Electrical Code and applicable authorities having jurisdiction including DSA and CSFM.
- C. The generator set must be available with the Underwriters Laboratories listing (UL 2200) as a stationary engine generator assembly.
- D. The generator shall meet all of the following standards: The generator set shall be EPA and CARB Emissions Certified for non-road applications and meet all local emission standards and requirements. It shall meet all local County or Regional APCD requirements.
- E. The generator control and remote annunciation shall be compatible with the transfer microprocessor based logic controller integrated in the main switchboard. The transfer controller shall communicate through open protocol to energy management system or data network to provide remote status indication.

1.03 MANUFACTURER QUALIFICATIONS

- A. This system shall be supplied by Cummins or engineer approved equal, who has been regularly engaged in the production of engine-alternator sets and associated controls for a minimum of twenty years, thereby identifying one source of supply and responsibility.

- B. To be classified as a manufacturer, the builder of the generator set must manufacture, at minimum, engines or alternators.
- C. The manufacturer shall have printed literature and brochures describing the standard series specified, not a one of a kind fabrication.
- D. Substitutions: The emergency power system has been designed to the specified manufacturer's electrical and physical characteristics. The equipment sizing, spacing, amounts, electrical wiring, ventilation equipment, fuel and exhaust components have all been sized and designed around equipment. Should any substitutions be made, the contractor shall bear responsibility for the installation, coordination and operation of the system as well as any engineering and redesign costs which may result from such substitutions. Alternate equipment suppliers shall follow all submittal requirements outlined in the general conditions as part of the submittals, the substitute manufacturer shall supply as a minimum engine, alternator and control panel wiring diagrams and schematics. A separate list of all printed circuit boards with part numbers and current pricing must also be included.
- E. Manufacturer shall provide certification that the equipment supplied under this Section has been reviewed and certified to meet the current criteria for special seismic certification in compliance with 2013 CBC 1705. Include seismic companion anchorage requirements from the testing and as approved by the manufacturer.

1.04 UNIT TESTING

- A. Before shipment of the equipment, the engine-generator set shall be tested under rated load and rated power factor for performance and proper functioning of control and interfacing circuits. Tests shall include:
 - 1. Verifying all safety shutdowns are functioning properly.
 - 2. Verify single step load pick-up per NFPA 110 Paragraph 7.13.7.
 - 3. Verify transient and voltage dip responses and steady state voltage and speed (frequency) checks.
 - 4. Submit the certification of the factory test, including recorded ambient temperature, altitude, and fuel grade.

1.05 SUBMITTALS

- A. Owner's Manuals: provide three (3) sets of owner's manuals specific to the product supplied must accompany delivery of the equipment. General operating instruction, preventive maintenance, wiring diagrams, schematics and parts exploded views specific to this model must be included.
- B. Submittals: Provide complete sets of Engineering Submittal for approval, prior to production release, showing all components, in addition to the engine and generator. Submittals shall include compliance with these specifications. Refer to general requirements for quantities of submittals and additional requirements.

1.06 WARRANTY

- A. Warranty: The standby electric generating system components, complete engine-generator and instrumentation panel shall be warranted by the manufacturer against defective materials and factory workmanship for a period of 5 years. Such defective parts shall be repaired or replaced at the manufacturer's option, free of charge. Travel and labor shall be included for the first 36 months. The warranty period shall commence when the standby power system is placed into service and accepted by the Owner or Owner's Representative. Multiple warranties for individual components (engine, alternator, controls, etc.) will not be acceptable. Satisfactory warranty documents must be provided. Also, in the judgment of the specifying engineer, the manufacturer supplying the warranty for the complete system must have the necessary financial strength and technical expertise with all components supplied to provide adequate warranty support.

1.07 SERVICE CONTACT

- A. Service: Supplier of the electric plant and associated items shall have permanent service facilities in this trade area. These facilities shall comprise a permanent force of factory trained service personnel on 24 hour call, experienced in servicing this type of equipment, providing warranty and routine maintenance service to afford the owner maximum protection. Delegation of this service responsibility for any of the equipment listed herein will not be considered fulfillment of these specifications. Service contracts shall also be available.

PART 2 - ENGINE-GENERATOR SET

2.01 ENGINE

- A. The prime mover shall be a liquid cooled, diesel fueled, naturally aspirated engine of 4-cycle design with a minimum of 6 cylinders. The unit requires a minimum rated output at an operating speed of 1800 RPM per single line diagram.
- B. The engine is to be cooled with a unit mounted radiator, fan, water pump, and closed coolant recovery system providing visual diagnostic means to determine if the system is operating with a normal engine coolant level. The radiator shall be designed for operation in 110 degrees f, 43 degrees c ambient temperature.
- C. The intake air filter(s) with replaceable element must be mounted on the unit. Full pressure lubrication shall be supplied by a positive displacement lube oil pump. The engine shall have a replaceable oil filter(s) with internal bypass and replaceable element(s). Engine coolant and oil drain extensions, equipped with pipe plugs, must be provided to outside of the mounting base for cleaner and more convenient engine servicing. A fan guard must be installed for personnel safety.
- D. The engine shall have a battery charging DC alternator with a transistorized voltage regulator. Remote 2-wire starting shall be by a solenoid shift, electric starter.

- E. Engine speed shall be controlled by isochronous governor to maintain alternator steady state frequency within 0.25% from no load to full load alternator output. Steady state regulation is to be 0.5%.
- F. The engine fuel system shall be designed for operation using No. 2 diesel fuel. A primary fuel filter, water separator, manual fuel priming pump, fuel shutoff solenoid and all fuel lines must be installed at the point of manufacture.
- G. The primary diesel fuel filter shall be capable of removing contaminants of 10 microns. Element shall be replaceable paper type.
- H. The engine shall have (a) unit mounted, thermostatically controlled water jacket heater(s) to aid in quick starting. The wattage shall be as recommended by the manufacturer. The contractor shall provide proper branch circuit from normal utility power source.
- I. Sensing elements to be located on the engine for low oil pressure shutdown, high engine temperature shutdown, low coolant level shutdown, overspeed shutdown, overcrank shutdown, remote E-stop shutdown and air shutdown damper when used. These sensors are to be connected to the control panel using a wiring harness with the following features: wire number labeling on each end of the wire run for easy identification, a molded rubber boot to cover the electrical connection on each sensor to prevent corrosion and all wiring to be run in flexible conduit for protection from the environment and any moving objects.
- J. Provide the following items installed at the factory:
 - 1. The manufacturer shall supply its recommended stainless steel, flexible connector to couple the engine exhaust manifold to the exhaust system.

2.02 ALTERNATOR

- A. The alternator shall be a 4 pole revolving field type, 12 lead, wired for 120/208vac 3 phase 4 wire, 60 hz, with a brushless exciter. Photosensitive components will not be permitted in the rotating exciter. The stator shall be direct connected to the engine to insure permanent alignment. The generator shall meet temperature rise standards for Class "H" insulation; operate within Class "F" standards for extended life. All leads must be extended into an AC connection panel. The alternator shall be protected by internal thermal overload protection and an automatic reset field circuit breaker.
- B. One step load acceptance shall be 100% of engine-generator set nameplate rating and meet the requirements of NFPA 110 Paragraph 7.13.7. The generator set and regulator must sustain at least 90% of rated voltage for 10 seconds with 250% of rated load at near zero power factor connected to its terminals when equipped with direct or brushless excitation. 300% short circuit current must be selectable on units equipped with permanent magnet exciters. Generators equipped with permanent magnet exciters not allowing the selection of the short circuit current ratings are not allowed.
- C. A solid state voltage regulator designed and built by the alternator manufacturer must be used to control output voltage by varying the exciter magnetic field to provide + or - 1% regulation during stable load conditions. Should an extremely heavy load drop the output frequency, the regulator shall have a voltage drop of 4 Volts/Hertz to maximize motor starting capability. The

frequency at which this droop operation begins must be adjustable, allowing the generator set to be properly matched to the load characteristics insuring optimum system performance. Additional rheostats for matching generator voltage, droop, and stability characteristics to the specific load conditions must be available.

- D. A NEMA 1 panel that is an integral part of the generator set must be provided to allow the installer a convenient location in which to make electrical output connections. A fully rated, isolated neutral must be included by the generator set manufacturer to insure proper sizing.
- E. The electric plant shall be mounted with vibration isolators on a welded steel base that shall permit suitable mounting to any level surface.
- F. Provide the following items installed at the factory:
 - 1. A main line, molded case type, generator mounted circuit breaker carrying the UL mark shall be factory installed per single line diagram. The breaker shall be rated per the manufacturer's recommendations. Circuit breaker shall be mounted in the genset connection box. The line side connections are to be made at the factory. Output lugs shall be provided for load side connections. A system utilizing manual reset field circuit breakers and current transformers is unacceptable

2.03 CONTROLS

- A. All engine alternator controls and instrumentation shall be designed, built, wired, tested and shock mounted in a NEMA 1 enclosure to the engine-generator set by the manufacturer. It shall contain panel lighting, a fused DC circuit to protect the controls and a +/-5% voltage adjusting control. This panel must be able to be rotated 90 degrees in either direction for correct installation.
- B. The engine-generator set shall contain a complete 2 wire automatic engine start-stop control which starts the engine on closing contacts and stop the engine on opening contacts. A cyclic cranking limiter shall be provided to open the starting circuit after eight attempts if the engine has not started within that time. Engine control modules must be solid state plug-in type for high reliability and easy service.
- C. The panel shall include; analog meters to monitor AC voltage, AC current and AC frequency with a phase selector switch, an emergency stop switch, an audible alarm, battery charger fuse, and a programmable engine control and monitoring module.
- D. The programmable module shall include: a manual, off, auto switch; four LEDs to indicate 1) Not In Auto, 2) Alarm Active, 3) Generator Running, 4) Generator Ready; a data entry keypad and a digital display panel.
- E. The module will display all pertinent unit parameters including:
 - 1. Generator Status
 - a. Current unit status in real time
 - 2. Instrumentation
 - a. Real time readouts of the engine and alternator analog values
 - 1) Oil pressure
 - 2) Coolant temperature

- 3) Fuel level
 - 4) DC battery voltage
 - 5) Run time hours
 - 3. Generator Commands
 - a. Current engine start/stop status
 - 4. Alarm Status (Safety Indications and Shutdowns as required by NFPA 110 Table 5.6.5.2 for the level of EPS being installed)
 - a. Current alarm(s) condition
 - LEVEL 2 SYSTEM**
 - 1) Low oil pressure pre-alarm
 - 2) Low oil pressure
 - 3) Low coolant level
 - 4) Low water temperature
 - 5) Overcrank
 - 6) Overspeed
 - 7) Lamp test
 - 8) Contacts for local and remote common alarm
 - 9) Air shutdown damper when used
 - 10) High or low AC voltage
 - 11) High or low frequency
 - 12) High or low battery voltage
 - 13) High, low and critical low fuel levels
 - 14) *8 user programmable digital channels
 - 15) *4 user programmable analog channels
 - 5. Alarm Log
 - a. Memory of last fifty alarm events
 - 6. Operating parameters
 - a. Access to and manipulation of the current operating parameters and alarm limits
 - 7. Software Information
 - a. Version information and module display test function
- F. The panel must be accessible by PC based software via either standard RS232, RS485 or modem. The software must display the module face, be updated in real time and allow for complete access to all module functions. Communication output and its software must be fully compatible and allow for incorporation in the system control program.
- G. The following equipment is to be installed at the engine-generator set manufacturer's facility:
- 1. A DPDT relay shall be socket mounted in the generator control panel and operate on engine start and run for customer connection.
- H. The following equipment is to be provided by the engine-generator set manufacturer and shipped loose with the unit:
- 1. A (20) light remote annunciator panel flush mounted where shown on drawings.
 - 2. A weather proof tamper resistant remote emergency power off (EPO/E-Stop) mushroom type push button labeled "Generator Emergency Stop".

2.04 UNIT ACCESSORIES

- A. The following equipment is to be installed at the engine-generator set manufacturer's facility:
 - 1. Weather Protective Enclosure: The engine-generator set shall be factory enclosed in a Level II sound attenuated weather housing. The enclosure is to have large, hinged doors to allow access to the engine, alternator and control panel. The doors must lift off without the use of tools. Each door will have stainless steel hinges and locking hardware with identical keys. Padlocks do not meet this specification. The exhaust silencer(s) shall be provided of the size as recommended by the manufacturer and shall be of critical grade. It shall be connected to the engine with a flexible, seamless, stainless steel exhaust connection. A rain cap will terminate the exhaust pipe. All components must be properly sized to assure operation without excessive back pressure when installed. Enclosure shall have an externally mounted emergency stop button.
 - 2. A heavy duty, lead acid battery set rated at 90AH (27F) shall be installed by the generator set manufacturer. Provide all intercell and connecting battery cables as required.
 - 3. Provide a 2 amp automatic float battery charger manufactured by the engine-generator set supplier. It is to be of a solid state design and self-regulating to prevent overcharging the system battery. The battery charger is to be factory installed on the generator set. Due to line voltage drop concerns, a battery charger mounted in the transfer switch will be unacceptable.
- B. The following equipment is to be provided by the engine-generator set manufacturer and shipped loose with the unit:
 - 1. Spring type vibration isolators to mount between the mounting base and pad to reduce noise and transmitted vibrations shall be supplied by the manufacturer.
 - 2. Pad type vibration dampeners.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Contractor shall install the complete electrical generating system including the indicated shipped-loose accessories and all fuel connections in accordance with the manufacturer's recommendations as reviewed by the Engineer.
- B. Contractor shall provide complete conduit infrastructure for power and low voltage/communications wiring to generator system and all accessories.

3.02 STARTUP AND CHECKOUT

- A. The supplier of the electric generating plant and associated items covered herein shall provide factory trained technicians to checkout the completed installation and to perform an initial startup inspection to include:
 - 1. Provide all required fluids (oil, coolant, lubricants, and fuel) and ancillary equipment for full function of the Emergency Power Supply.
 - 2. Ensuring the engine starts (both hot and cold) within the specified time.
 - 3. Verification of engine parameters within specification.

4. Verify no load frequency and voltage, adjusting if required.
5. Test all automatic shutdowns of the engine-generator.
6. Perform a 4 hour load test of the electric plant, per NFPA 110 Section 7.13. Observe and record results of test in the presence of the AHJ / IOR. Provide a portable load bank, cables and connections as required to conform to testing requirements. Correct defects which become evident during this test. Supply fuel for test. Include the complete emergency system (consisting of generator, emergency distribution equipment and automatic transfer switches, and the like) in final test operations. Top off fuel tank at end of test.
7. Include 4 hour on-site meeting / training with Owner's representative prior to final acceptance. Schedule training with Owner (minimum) one week in advance by mutual agreement of Owner and manufacturers representative.

END OF SECTION

SECTION 26 3623
AUTOMATIC TRANSFER SWITCHES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Furnish and install automatic transfer switches (ATS) with number of poles, amperage, voltage, and withstand current ratings as shown on the plans. Each automatic transfer shall consist of an inherently double throw power transfer switch unit and a microprocessor controller, interconnected to provide complete automatic operation. All transfer switches and control panels shall be the product of the same manufacturer.
 - 2. Manufacturer shall provide certification that the equipment supplied under this Section has been reviewed and certified to meet the current criteria for special seismic certification in compliance with 2013 CBC 1705. Include seismic companion anchorage requirements from the testing and as approved by the manufacturer. The manufacturer shall provide an approved label on the equipment enclosure stating that the equipment has been awarded a certificate of compliance for special seismic certification. The label shall include special seismic certification pre-approval number when relevant.

1.03 ACCEPTABLE MANUFACTURERS

- A. Automatic transfer switches shall be ASCO Series 300. Any alternate switch or manufacturer shall meet and follow the general conditions procedure for substitution, and be in all respects compatible with the generator and switchgear as described and as depicted on the plans. Each alternate bid must list any and all deviations from this specification.

1.04 CODES AND STANDARDS

- A. The automatic transfer switches and accessories shall conform to the requirements of:
 - 1. UL 1008 - Standard for Automatic Transfer Switches
 - 2. NFPA 70 - National Electrical Code and California Electrical Code (CEC)
 - 3. NFPA 110 - Emergency and Standby Power Systems
 - 4. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
 - 5. NEMA Standard ICS10-1993 (formerly ICS2-447) - AC Automatic Transfer Switches
 - 6. NEC Articles 700, 701, 702
 - 7. International Standards Organization ISO 9001

PART 2 - PRODUCTS

2.01 MECHANICALLY HELD TRANSFER SWITCH

- A. The transfer switch unit shall be electrically operated and mechanically held. The electrical operator shall be a single-solenoid mechanism, momentarily energized. Main operators which include overcurrent disconnect devices will not be accepted. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.
- B. The switch shall be positively locked and unaffected by momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life.
- C. All main contacts shall be silver composition.
- D. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The handle shall permit the operator to manually stop the contacts at any point throughout their entire travel to inspect and service the contacts when required.
- E. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.
- F. Where neutral conductors are to be solidly connected, a neutral terminal plate with fully-rated AL-CU pressure connectors shall be provided.

2.02 MICROPROCESSOR CONTROLLER WITH MEMBRANE INTERFACE PANEL

- A. The controller shall direct the operation of the transfer switch. The controller's sensing and logic shall be controlled by a built-in microprocessor for maximum reliability, minimum maintenance, and inherent serial communications capability. The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance.
- B. The controller shall be enclosed with a protective cover and be mounted separate from the transfer switch unit for safety and ease of maintenance. Sensing and control logic shall be provided on printed circuit boards. Interfacing relays shall be industrial grade plug-in type with dust covers.
- C. The controller shall meet or exceed the requirements for Electromagnetic Compatibility (EMC) as follows:
 - 1. ANSI C37.90A/IEEE 472 Voltage Surge Test
 - 2. NEMA ICS – 109.21 Impulse Withstand Test
 - 3. IEC801-2 Electrostatic discharge (ESD) immunity
 - 4. ENV50140 and IEC 801 – 3 Radiated electromagnetic field immunity

5. IEC 801 – 4 Electrical fast transient (EFT) immunity
6. ENV50142 Surge transient immunity
7. ENV50141: Conducted radio-frequency field immunity
8. EN55011: Group 1, Class A conducted and radiated emissions
9. EN61000 –4 – 11 Voltage dips and interruptions immunity

2.03 ENCLOSURE

- A. The ATS shall be furnished in a NEMA type 3R enclosure unless otherwise shown on the plans.
- B. Controller shall be flush-mounted display with LED indicators for switch position and source availability. It shall also include test and time delay bypass switches.

PART 3 - OPERATION

3.01 VOLTAGE AND FREQUENCY SENSING

- A. The voltage of each phase of the normal source shall be monitored, with pickup adjustable to 95% of nominal and dropout adjustable from 70% to 90% of pickup setting.
- B. Single-phase voltage and frequency sensing of the emergency source shall be provided.

3.02 TIME DELAYS

- A. An adjustable time delay shall be provided to override momentary normal source outages and delay all transfer and engine starting signals.
- B. An adjustable time delay shall be provided on transfer to emergency, adjustable from 0 to 5 minutes for controlled timing of transfer of loads to emergency.
- C. An adjustable time delay shall be provided on retransfer to normal, adjustable to 30 minutes. Time delay shall be automatically bypassed if emergency source fails and normal source is acceptable.
- D. A 5-minute cool down time delay shall be provided on shutdown of engine generator.
- E. All adjustable time delays shall be field adjustable without the use of tools.

3.03 ADDITIONAL FEATURES

- A. A set of gold-flashed contacts rated 10 amps, 32 VDC shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down setting, regardless of whether the normal source restores before the load is transferred.
- B. A push-button type test switch shall be provided to simulate a normal source failure.

- C. A push-button type switch to bypass the time delay on transfer to emergency, the engine exerciser period on the retransfer to normal time delay whichever delay is active at the time the push-button is activated.
- D. Terminals shall be provided for a remote contact which opens to signal the ATS to transfer to emergency and for remote contacts which open to inhibit transfer to emergency and/or retransfer to normal.
- E. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of one contact, closed when the ATS is connected to the normal source and one contact, closed, when the ATS is connected to the emergency source.
- F. Indicating lights shall be provided, one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red). Also provide indicating lights for both normal and emergency source availability.
- G. Terminals shall be provided to indicate actual availability of the normal and emergency sources, as determined by the voltage sensing pickup and dropout settings for each source.
- H. Engine Exerciser - An engine generator exercising timer shall be provided, including a selector switch to select exercise with or without load transfer.
- I. Inphase Monitor - An Inphase monitor shall be inherently built into the controls. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The inphase monitor shall be specifically designed for and be the product of the ATS manufacturer.
- J. Selective Load Disconnect - A double throw contact shall be provided to operate after a time delay, adjustable to 20 seconds prior to transfer and reset 0 to 20 seconds after transfer. This contact can be used to selectively disconnect specific load(s) when the transfer switch is transferred. Output contacts shall be rated 6 amps at 28 VDC or 120 VAC.
- K. Communications Interface - Serial Module (5110) to allow local or remote communications with ASCO PowerQuest or Siteweb communication products. To connect Series 300 Automatic Transfer Switches, and ASCO ATS Annunciators to the serial network via an RS485 interface (Accessory 72A) shall be routed to Ethernet portion in Bldg M IDF.
- L. Programmable Engine Exerciser - A seven or fourteen day programmable engine exerciser with digital readout display. Shall include one form C contact for availability of normal and emergency. Include “with or without” load control switch for exerciser period. The exerciser shall be backed up by a permanent battery. (Accessory 11BG).

PART 4 - ADDITIONAL REQUIREMENTS

4.01 WITHSTAND AND CLOSING RATINGS

- A. The ATS shall be rated to close on and withstand the available rms symmetrical short circuit current at the ATS terminals with the type of overcurrent protection shown on the plans. WCR ATS ratings as be as follows when used with specific circuit breakers:

ATS Size	Withstand & Closing Rating MCCB	W/CLF
225 – 400	42,000A	200,000

4.02 TESTS AND CERTIFICATION

- A. The complete ATS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
- B. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.
- C. The ATS manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001.

4.03 SERVICE REPRESENTATION

- A. The ATS manufacturer shall maintain a national service organization of company-employed personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.
- B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.
- C. For ease of maintenance and parts replacement, the switch nameplate shall include drawing numbers, part numbers for main coil and control.

END OF SECTION

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SECTION 26 5100
INTERIOR LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Interior lighting systems, including luminaires, ballasts, lamps and emergency lighting equipment.
- B. Related Work:
 - 1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
 - 2. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings, and boxes for raceway systems.
 - 3. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low voltage power and lighting wiring.
 - 4. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
 - 5. Section 26 5600, SITE LIGHTING.
 - 6. Section 26 5670, LIGHTING ACCEPTANCE TESTING.

1.03 SUBMITTALS

- A. Submit in accordance with Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include electrical ratings, dimensions, mounting, details, materials, terminations, wiring and connection diagrams, photometric data, ballasts, luminaires, lamps and controls.

1.04 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM).

- C. American National Standards Institute (ANSI).
- D. Aluminum Association Inc. (AA).
- E. Illuminating Engineering Society of North America (IESNA).
- F. National Electrical Manufacturers Association (NEMA).
- G. National Fire Protection Association (NFPA).
- H. Underwriters Laboratories, Inc. (UL).

1.05 DEFINITIONS

- A. Lighting terminology used herein is defined in IES
- B. Exception: The term “driver” is used herein to cover both drivers and power supplies, where applicable.
- C. Clarification: The term “LED light source(s)” is used herein per IES to cover LED package(s), module(s), and array(s).

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be in accordance with CEC, UL, ANSI, and as shown on the drawings and specified.

2.02 LIGHTING FIXTURES (LUMINAIRES)

- A. Shall be in accordance with NFPA 70, UL 1598 and shall be as shown on drawings and as specified. All luminaires shall have been certified to the California Energy Commission by its manufacturer to comply with the efficiency standards as per California Code of Regulations Title 24, Part 6, Section 111 referencing the Appliance Efficiency Regulations in Title 20. Post certification with building permit.
- B. Sheet Metal:
 - 1. Shall be formed to prevent warping and sagging. Housing, trim and lens frame shall be true, straight (unless intentionally curved) and parallel to each other as designed.
 - 2. Wireways and fittings shall be free of burrs and sharp edges and shall accommodate internal and branch circuit wiring without damage to the wiring.
 - 3. When installed, any exposed fixture housing surface, trim frame, door frame and lens frame shall be free of light leaks; lens doors shall close in a light tight manner.
 - a. Hinged door closure frames shall operate smoothly without binding when the fixture is in the installed position, and latches shall function easily by finger action without the use of tools.

- C. Ballasts shall be serviceable while the fixture is in its normally installed position, and shall not be mounted to removable reflectors or wireway covers.
- D. Recessed fixtures shall be of the type approved for the ceiling and insulation conditions and appropriate for the installation location. Insulation must be held back from the fixture to provide manufacturers' recommended clearances for proper operation. Thermal tripping shall be the installer's responsibility to correct. Where installed in fire rated ceilings, coordinate installation of fire rated enclosures around the ceiling penetrations. Fixtures shall contain the proper through wiring capacity for that which is shown on the plans.
- E. Recessed fixtures shall be provided with the appropriate trims and hardware compatible with the ceiling type shown. Plaster frames are required where plaster or gypsum board ceilings are encountered.
- F. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by captive screws, chains, captive hinges or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.
- G. Metal Finishes:
 - 1. The manufacturer shall apply standard finish (unless otherwise specified) over a corrosion resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping or shearing processes shall be finished in a similar corrosion resistant manner to match the adjacent surface(s). Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking.
 - 2. Interior light reflecting finishes shall be white with not less than 85 percent reflectances, except where otherwise specified on the drawing.
 - 3. Exterior finishes shall be as shown on the drawings.
- H. Provide all lighting fixtures with a specific means for grounding metallic wireways and housings to an equipment grounding conductor.
- I. Light Transmitting Components for Fluorescent Fixtures:
 - 1. Shall be 100 percent virgin acrylic plastic or water white, annealed, crystal glass.
 - 2. Flat lens panels shall have not less than 1/8 inch of average thickness. The average thickness shall be determined by adding the maximum thickness to the minimum unpenetrated thickness and dividing the sum by 2.
 - 3. Unless otherwise specified, lenses, diffusers and louvers shall be retained firmly in a metal frame by clips or clamping ring in such a manner as to allow expansion and contraction of the lens without distortion or cracking.
- J. Recessed compact fluorescent or LED fixtures shall be manufactured specifically for compact fluorescent or LED lamps with ballasts or drivers integral to the fixture. Assemblies designed to retrofit fixtures are prohibited except when described in this fashion. Fixtures shall be designed for lamps as specified.
- K. Provide wire lamp guard on all exposed lamp fixture/luminaires.
- L. Provide fixtures with a U.L. listing for shower or shower rating above shower or tub areas.

2.03 LED LUMINAIRE REQUIREMENTS

- A. General Requirements:
 - 1. Luminaire shall have an external label per ANSI C136.15
 - 2. Luminaire shall have an internal label per ANSI C136.22.
 - 3. Luminaires shall start and operate in -20°C to +40°C ambient.
 - 4. LED light source(s) and driver(s) shall be RoHS compliant.

2.04 LED DRIVER

- A. Driver
 - 1. Rated case temperature shall be suitable for operation in the luminaire operating in the ambient temperatures as indicated.
 - 2. Shall accept the voltage or voltage range indicated, and shall operate normally for input voltage fluctuations of plus or minus 10 percent. Consistent with NEMA SSL 1.
 - 3. Shall have a minimum Power Factor (PF) of 0.90 at full input power and across specified voltage range.
- B. Electromagnetic interference
 - 1. Shall have a maximum Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.
 - 2. Shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.
- C. The following shall be in accordance with corresponding sections of ANSI C136.37
 - 1. Wiring and grounding
 - 2. All internal components shall be assembled and pre-wired using modular electrical connections.
 - 3. Mounting provisions
 - 4. Terminal blocks for incoming AC lines
 - 5. Latching and hinging
 - 6. Ingress protection

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation and furnishing of lighting fixtures shall be in accordance with the CEC, manufacturer's instructions and as shown on the drawings or specified. Fixtures damaged in transit and storage prior to completion shall be replaced at Contractor's expense.
- B. Align, mount and level the lighting fixtures uniformly.
- C. Avoid interference with and provide clearance for equipment. Where the indicated locations for the lighting fixtures conflict with the locations for equipment, change the locations for the lighting fixtures by the minimum distances necessary as approved by the Architect. The Architectural reflected ceiling plan will take precedence over electrical plans.

- D. For suspended lighting fixtures, the mounting heights shall provide the clearances between the bottoms of the fixtures and the finished floors as shown on the drawings.
- E. Lighting Fixture Supports:
 - 1. Contractor shall provide support for all of the fixtures independent of suspended ceilings. Supports may be anchored to channels of the ceiling construction, to the structural slab or to structural members within a partition, or above a suspended ceiling.
 - 2. Shall maintain the fixture positions after cleaning and relamping.
 - 3. Shall support the lighting fixtures without causing the ceiling or partition to deflect.
 - 4. Hardware for recessed fluorescent fixtures:
 - 5. Fixtures shall be supported as detailed on drawings and as required by DSA standards.
 - 6. Installation: Fixtures shall be securely mounted on ceilings and walls with appropriate fastening devices. "Drop-in" type T-bar fixtures shall be secured with #12 gauge safety "earthquake wires" as described by California Code of Regulations Title 24 Part 2, Chapter 47. "Earthquake clips" will be required for fastening to the T-bar system in addition to safety wire. Surface mounted fluorescent fixtures shall be solidly screwed or clipped into framing above drywall with 4-#10 sheet metal screws into each fixture. Provide blocking for screw supports behind all surface mounted lighting fixtures weighing more than 15 lbs.
 - 7. Surface mounted lighting fixtures:
 - a. Fixtures shall be bolted against the ceiling independent of the outlet box at four points spaced near the corners of each unit. The bolts shall be minimum 1/4-20 bolt, secured to structural ceiling. Non-turning studs may be attached to the building structure by 12 gauge safety hangers.
 - 8. Fixtures mounted in open construction shall be secured directly to the building structure with approved bolting and clamping devices.
 - 9. Single or double pendent mounted lighting fixtures:
 - a. Each stem shall be supported by an approved outlet box, mounted swivel joint and canopy which holds the stem captive and provides spring load (or approved equivalent) dampening of fixture oscillations. Outlet box shall be supported vertically from the building structure and be allowed to swing to a 45 degree angle.
 - 10. Outlet boxes for support of lighting fixtures (where permitted) shall be secured directly to the building structure with approved devices or supported vertically in a hung ceiling from the building structure with a nine gauge wire hanger, and be secured by an approved device to a main ceiling runner or cross runner to prevent any horizontal movement relative to the ceiling.
- F. Furnish and install the specified lamps for all lighting fixtures as part of this project.
- G. Coordinate between the electrical and ceiling trades to ascertain that approved lighting fixtures are furnished in the proper sizes and installed with the proper devices (hangers, clips, trim frames, flanges), to match the ceiling system being installed.
- H. Bond lighting fixtures and metal accessories to the grounding system as specified in Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- I. At completion of project, relamp all fixtures which have failed/burned-out lamps. Clean all fixtures, lenses, diffusers and louvers that have accumulated dust/dirt during construction.

- J. Provide unswitched leg of interior lighting branch circuit to integral emergency battery pack light fixtures, exit signs and night lights as applicable per lighting plans.
- K. Wallmount fixtures in walkway areas shall not project more than 4 inches from wall when projection occurs lower than 80 inches.

END OF SECTION

SECTION 26 5600
EXTERIOR LIGHTING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section specifies the furnishing, installation, and connection of exterior luminaires, controls, poles and supports.

1.02 RELATED WORK

- A. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
- B. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings, and boxes for raceway systems.
- C. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low voltage power and lighting wiring.
- D. Section 26 0546.13, ELECTRIC UTILITY SYSTEMS: Underground handholes and conduits.
- E. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- F. Section 26 5100, INTERIOR LIGHTING.
- G. Section 26 5670, LIGHTING ACCEPTANCE TESTING.

1.03 SUBMITTALS

- A. Submit in accordance with Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include electrical ratings, dimensions, mounting, details, materials, required clearances, terminations, wiring and connection diagrams, photometric data, ballasts, poles, luminaires, effective projected area (EPA), lamps and controls.

1.04 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM).
- C. American Concrete Institute (ACI).
- D. American National Standards Institute (ANSI).
- E. Aluminum Association Inc. (AA).
- F. Illuminating Engineering Society of North America (IESNA).
- G. National Electrical Manufacturers Association (NEMA).
- H. National Fire Protection Association (NFPA).
- I. Underwriters Laboratories, Inc. (UL).

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Poles: Do not store poles on ground. Store poles so they are at least one foot above ground level. Do not remove factory-applied pole wrappings until just prior to installation of pole.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be in accordance with CEC, UL, ANSI, as shown on the drawings and as specified.

2.02 POLES

- A. General:
 - 1. Poles shall be steel or aluminum as specified in fixture schedule and as shown on the drawings. Finish shall be as approved by the Architect. Assume custom color for bidding.
 - 2. The pole and arm assembly shall be designed for wind loading of 100 miles per hour, with an additional 30 percent gust factor, supporting luminaire(s) having the effective projected areas indicated as per manufacturer data.
 - 3. Poles shall anchor-bolt type designed for use with underground supply conductors. Poles shall have gasketed handhole with a minimum clear opening of 2.5" x 5". Handhole cover shall be secured by stainless steel captive screws.
 - 4. Provide a steel grounding stud opposite hand hole openings.

- B. Provide a base cover matching the pole in material and color to conceal the mounting hardware pole-base welds and anchor bolts.
- C. Hardware: All necessary hardware shall be 300 series tamperproof stainless steel.
- D. Types:
 - 1. Aluminum: Provide aluminum poles manufactured of corrosion resistant AA AAH35.1 aluminum alloys conforming to AASHTO LTS-4 for Alloy 6063-T6 or Alloy 6005-T5 for wrought alloys, and Alloy 356-T4 (3,5) for ASTM B108-01 cast alloys. Poles shall be seamless extruded or spun seamless type. Provide a pole grounding connection designed to prevent electrolysis when used with copper ground wire. Base covers for aluminum poles shall be cast from 356-T6 aluminum alloy in accordance with ASTM B108-01.
 - 2. Steel: Provide steel poles having minimum 11-gage steel with minimum yield/strength of 48,000 psi and iron-oxide primed factory finish. Base covers for steel poles shall be structural quality hot-rolled carbon steel plate having a minimum yield of 36,000 psi.

2.03 FOUNDATIONS FOR POLES

- A. Foundations shall be cast-in-place concrete.
- B. Foundations shall support the effective projected area of the specified pole, arm(s), luminaire(s), and all accessories specified under wind conditions as specified in this section.
- C. Place concrete in spirally wrapped treated paper forms for round foundations, and construct forms for square foundations.
- D. Rub-finish and round all above-grade concrete edges to approximately 1/4" radius unless otherwise detailed.
- E. Concrete shall have 3000 psi minimum 28 day compressive strength.
- F. Anchor bolt assemblies and reinforcing of concrete foundations shall be as shown on the drawings and meet ACI 318. Anchor bolts shall be in a welded cage or properly positioned by the tie wire to stirrups.
- G. Install a copperclad ground rod, not less than 5/8" diameter by 8' long in pullbox adjacent to each fixture. Where rock or layered rock is present, drill a hole not less than 2" in diameter and 6' deep, backfill with tamped fine sand and drive the rod into the hole. Bond the rod to the pole with not less than number 6 AWG bare copper wires. The method of bonding shall be approved for the purpose.
- H. After leveling of pole grout base solid between plate and footing with dry pack concrete for vibration reduction.

2.04 LUMINAIRES

- A. UL 1598 and ANSI C136.17. Luminaries shall be weatherproof, heavy duty, outdoor types designed for efficient light utilization, adequate dissipation of lamp and ballast heat and safe cleaning and relamping.

- B. Light emitting diode (LED)-based solid state lighting (SSL) products shall be factory tested in accordance to the International Engineering Society (IES) LM-79 recommendations and meet ANSI C78.377-2008 standards.
- C. LED light sources shall be factory tested in accordance to IES LM-80 recommendations.
- D. LED-based SSL product shall incorporate an external heat sink, integral to the luminaire.
- E. IESNA HB-9 and RP-8 light distribution pattern types shall be as indicated on the drawings.
- F. Incorporate associated ballasts and drivers within the luminaire housing.
- G. Lenses shall be frame-mounted heat-resistant, borosilicate glass, prismatic refractors. Attach the frame to the luminaire housing by hinges or chain.
- H. Pre-wire internal components to terminal strips at the factory.
- I. Bracket mounted luminaires shall have leveling provisions and clamp type adjustable slip-fitters with locking screws.
- J. Materials shall be rustproof. Latches and fittings shall be non-ferrous metal.
- K. LED-based SSL luminaires shall be manufactured specifically for LED lamps with drivers integral to the luminaire housing.

2.05 LAMPS

- A. Luminaires shall be listed for the lamp specified on the associated electrical plans. Install the proper lamps in every luminaire installed.
- B. Lamps shall be clear or coated as recommended by luminaire manufacturer to provide for maximum luminaire efficiency in fixture used.

2.06 LED-BASED SOLID STATE DRIVERS

- A. Shall be listed by either U.L. or equal listing agency and comply with IEEE C.62.41-1991, Class A operation.
- B. Provide a minimum power factor of 0.9.
- C. Minimum operating temperature appropriate for outdoor environments.
- D. Shall operate at a frequency greater than or equal to 120Hz.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install lighting in accordance with the CEC, as shown on the drawings, and in accordance with manufacturer's recommendations.
- B. Poles:
 - 1. Provide pole foundations with galvanized steel anchor bolts, threaded at the top end and bent 1.57 rad 90 degrees at the bottom end. Provide galvanized nuts, washers, and ornamental covers for anchor bolts. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath and the end of conduit elbow. Adjust poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location.
 - 2. After the poles have been installed, shimmed and plumbed, grout the spaces between the pole bases and the concrete base with non-shrink concrete grout material. Provide a plastic or copper tube, of not less than 3/8" inside diameter, through the grout tight to the top of the concrete base for moisture weeping.
 - 3. Attach pole base cover to pole flange with set screws.
- C. Foundation Excavation: Depth shall be as indicated on drawings. Dig holes large enough to permit the proper use of tampers to the full depth of the hole. Place backfill in the hole in 6" maximum layers and thoroughly tamp. Place surplus earth around the pole in a conical shape and pack tightly to drain water away.

3.02 GROUNDING

- A. Ground noncurrent-carrying parts of equipment including metal poles, luminaries, mounting arms, brackets, and metallic enclosures as specified in Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or alloyed connectors suitable and listed for this purpose.

END OF SECTION

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SECTION 26 5670
LIGHTING ACCEPTANCE TESTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. The Contractor shall be responsible for the Certificate of Acceptance, but coordinate with the Certified California Lighting Controls Test Technician to assure that all required documents have been filed with and approved by the enforcement agency prior to receiving a final occupancy permit. The Certificate of Acceptance will indicate that the Contractor has demonstrated acceptance requirements of the plans and specifications, that current requirements for installation certificates are met, and that currently required operating and maintenance information (as well as the Certificate of Acceptance) were provided to the building Owner.
 - 2. Testing, evaluation and calibration of lighting controls equipment provided, installed and connected in Division 26.
 - 3. Documentation of test results, completion of “Certificate of Acceptance” and “Certificate of Installation” forms and filing with the enforcement agency for approval.
 - 4. Specific Jobsite Conditions:
 - a. Acceptance testing must be tailored for each specific design, job site, and climactic conditions. While the steps for conducting each test remain consistent, the application of the tests to a particular site may vary. The Contractor shall review the construction documents and include all required time, material, testing equipment, etc. as required to complete the requirements of this section.
- B. Related Work:
 - 1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
 - 2. Section 26 5100, INTERIOR LIGHTING.
 - 3. Section 26 5600, EXTERIOR LIGHTING.
 - 4. Section 26 0926, LIGHTING CONTROL SYSTEM.
 - 5. Section 26 0900, CONTROLS AND INSTRUMENTATION.
 - 6. Section 26 0923, OCCUPANCY SENSORS.

1.03 REFERENCES

- A. Acceptance Testing Criteria: 2013 Building Energy Efficiency Standards Non-Residential Compliance Manual.

1.04 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. All material, equipment, labor and technical supervision to perform tests, calibrations and documentation specified herein.
- B. Scope of Testing, Evaluation and Calibration (as applicable):
 - 1. Automatic (master) time switches.
 - 2. Occupancy sensors.
 - 3. Automatic daylighting controls.
 - 4. Photo electric sensors.
 - 5. Daylighting controls.
 - 6. Outdoor astronomical time switches.
 - 7. Area controls.

1.05 SUBMITTALS

- A. Test Reports:
 - 1. Written record of all tests and completion of forms included in this section.
 - 2. At completion of project, assemble a final test report. Submit report to the enforcement agency and the Owner prior to final occupancy to include:
 - a. Summary of project.
 - b. Description of systems and equipment tested.
 - c. Visual inspection report.
 - d. Description of tests.
 - e. Test results.
 - f. Conclusions and recommendations.
 - 3. Report shall be bound in booklet form, include on the Contractor's letterhead the title of the report and the systems tested.
- B. Constructability Plan Review
 - 1. The Contractor shall review the construction drawings and specifications to understand the scope of the acceptance tests and raise critical issues that might affect the success of the acceptance tests prior to starting construction. Any constructability issues associated with the lighting system should be forwarded to the design team for review/modifications prior to equipment procurement and installation. The Contractor shall submit on company letterhead, with the lighting control equipment required by Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL, 1.4B, a letter confirming that the constructability review has been completed and their company has reviewed and is prepared to complete the lighting acceptance testing required by this section.

PART 2 - PRODUCTS

2.01 FORMS

- A. Lighting Installation forms and verification procedures for lighting systems that require acceptance testing can be downloaded from the following website:
www.energy.ca.gov/title24/2013standards/nonres_compliance_forms/
- B. Lighting Acceptance forms are to be provided by a Certified California Lighting Controls Acceptance Test Technician. The California Energy Commission adopted changes to the California building Efficiency Standards (Title 24, Parts 1 and 6) that require lighting controls and devices to be certified as properly installed and operational, prior to issuance of occupancy permits. All Acceptance Technicians must be employed by an Acceptance Test employer that provides support as well as quality control. Certified California Lighting Controls Acceptance Test Technicians can be found at the following website: www.calctp.org/acceptance-technicians/contractors
- C. These completed forms will be the deliverable product to the enforcement agency and Owner as described in 1.4 of this section.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Tests:
 - 1. Contractor's Responsibilities:
 - a. Perform all required tests required by this section.
 - b. Schedule testing with building Owner.
 - c. Provide Installation forms
 - d. Acceptance forms provided by California Certified Lighting Controls Technician hired by Contractor.
 - e. Calibration of equipment such as light meters, photo electric controls, etc.
 - f. Programming of time switches (interior/exterior lighting) for operations as directed by the Owner.

3.02 ADJUSTING

- A. Final Settings: The Contractor shall be responsible for implementing all final settings and adjustments on controls equipment as required for a complete and operating system.

END OF SECTION

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Section 27 0547

Tower for Communication System

PART 1 GENERAL

THIS SPECIFICATION COVERS THE DESIGN, SUPPLY, ERECTION AND OUTFITTING OF A SELF-SUPPORTING ANTENNA TOWER THAT IS 140 FEET HIGH. THE TOWER IS IN A SEISMIC ZONE 4. IT IS PART OF A CRITICAL INFRASTRUCTURE AND IS IN AN RURAL SETTING.

2.01 Work Included

Work includes, but is not necessarily limited to:

- A. Tower structural analysis and design.
- B. Soils analysis and foundation design based on existing documents.
- C. Supply of documentation to support zoning and permitting.
- D. Fabrication of tower and associated parts.
- E. Delivery and erection of the tower.
- F. Installation of antennas, mounts and associated parts.
- G. Grounding of the tower to site ground system.
- H. Installation and testing of the transmission lines and antennas.
- I. Installation of transient Voltage Suppression Devices.

2.02 Related Work Described Elsewhere

The work in specification is dependent on work specified in, but not limited to, the following additional specifications.

- A. Section 05 5000 Metal Fabrications
- B. Section 26 0526 Grounding and Bonding for Electrical Systems
- C. Section 03 3000 Cast-in-Place Concrete
- D. Division 26 Electrical

2.03 References

In addition to complying with all pertinent codes and regulations:

- A. ANSI/EIA STANDARD 222 - F
- B. FAA AC70/7460-1 latest revision.
- C. Code of Federal Regulations, 47CFR§17, Construction, Marking and Lighting of antenna structures.

2.04 Submittals

- A. The Vendor will provide, for Owner review and approval, the structure analysis of the tower and its foundation prior to commencement of the work. Such structural analysis will be sealed by a Professional Structural Engineer, Registered in the State of California. The submittal will attest that the design is in full compliance with the mechanical and structural parameters established by these specifications.
- B. The Vendor will provide, for Owner review and approval, complete and detailed drawings of the structure, its foundation, and all appurtenances prior to commencement of the work. Such drawings will be sealed by a Professional Structural Engineer, Registered in the State of

California. The submittal will attest that the design is in full compliance with the mechanical, structural and electrical parameters established by these specifications.

2.05 Warranty

- A. Contractor will guarantee structural integrity of the tower for a period of not less than 20 years from the date of acceptance. For additional details see Section 01700.

2.06 Environmental

- A. Comply with all Federal, State and local codes and regulations.

PART 2 PRODUCTS

2.01 General

- A. This specification is for a complete, self-supporting steel communications tower, including procurement, foundation and tower design, inspection, construction and installation of tower and related equipment as described herein.
- B. This specification includes supply of all antennas, transmission lines, mounting hardware, connectors, grounding and TVSS devices for a complete, working antenna system.
- C. This tower is based on the Rohn Products LLC - Standard SSB - #SS140D70 - 140' High

2.02 Materials

- A. Tower structural steel work will be governed by the AISC Specifications, the AISC Code, and the EIA/ TIA 222-F Standard. Where applicable, the EIA/TIA Standard will supersede AISC requirements.
- B. All concrete and structural steel reinforcement used in the foundation will meet or exceed tower manufacturer foundation design requirements.
 - 1. Contractor to design and install a complete foundation system that works with the site conditions - Drilled Pier Foundation is expected.
- C. Antenna and dish fasteners will be of stainless or galvanized steel.
- D. Provide weatherproofing kit at all connections.
- E. Two Polyphaser CU-SPGP Copper Single Point Ground Panels or approved equivalent will be supplied.

2.03 Construction

- A. The self-supporting tower structure will be designed and installed in accord with latest ANSI/EIA 222-F Standard and meeting the specifications as detailed in this document.
- B. All tower sections will be attached to each other by use of flange plates.
- C. All welding must be done in the factory prior to the galvanizing process. Field welding is not acceptable.
- D. Each tower foundation flange must be bonded to structural steel in the foundation using #2 AWG ground conductors.
- E. Straight (non-tapered) tower is preferred to minimize the site footprint and simplify installation of antenna mounts and antennas.

2.04 Tower Loading

- A. The tower will be designed as a 140-foot high tower that will support all of the antennas, transmission lines and mounting hardware as described in the Tower Loading List. For detail specifications for antennas and dishes, refer to the Tower

Loading List and the Tower Construction List - To be provided by owner.

- B. The structure will be designed and installed to withstand a minimum of 70 MPH winds at ten meters (32.8 Feet) above with NO radial ice or the requirements in the ANSI/EIA- 222- F Standard, whichever is greater.
- C. The tower analysis will be based on allowing the stress to be increased by 1/3 as define in EIA/TIA-222-F, Paragraph 3.1.1.1.
- D. The tower is part of a municipal Public Safety communications system and is considered a vital structure. The site is in an rural setting, in a valley surrounded by hills.
- E. The tower will be structurally analyzed and fabricated based on the installation of all of the antennas and associated hardware on the Tower Loading List.

2.05 Climbing Access

- A. A ladder, beginning at a point at least ten feet off the ground, will be provided as an integral part of the tower to permit access by authorized personnel.
- B. The tower will be equipped with an OSHA approved anti-fall safety device in accordance with EIA-222. This device must not interfere with the climber's ease of reach by hand or foot from one rung of the ladder to the next, either going up or coming down. Two climbing safety belts will be supplied.

2.06 Antenna Mounting

- A. All UHF and VHF antennas will be secured to the tower using galvanized or stainless steel hardware. The antennas will be offset from the tower face by no more than 6 feet and no less than 3 feet. The antennas will be attached so as to locate the feed connector at the elevation listed on the Tower Construction List. The antennas will be oriented in the direction indicated on the Tower Construction List.
- B. For the purpose of tower loading, all microwave dishes will be attached to the tower using standard pipe mounts. The orientation of the antenna will be stabilized by the use of at least one side strut from the tower to the antenna rim.

2.07 Tower Grounding

- A. The tower and all hardware on the tower will be effectively grounded.
- B. Each of the legs of the tower will be connected to a site ground conductors provided by others. Three #2 AWG ground conductors will be present. The tower leg ground cables will be exothermically bonded to the tower using a suitable, non-structural component that was welded to the tower before galvanizing. Precautions will be taken to protect the tower leg ground cables from mechanical damage.
- C. A ground bar will be located at the bottom of the tower in close proximity to the cable ladder. This bar will be made of tinned copper and will be suitably drilled and tapped. The bar will be exothermically bonded to a fourth #2 AWG ground cable to be

provided by others. The bar will be mounted between three and six feet above the foundation.

2.08 Lighting and Painting

- A. There will be no tower lighting or painting.

PART 3 EXECUTION

3.01 Construction Coordination

- A. The construction of the Tower and foundation will be coordinated with all other site construction functions including but not limited to:
1. Site Grading
 2. Site ground system
 3. Conduit installation
 4. Site paving
 5. Existing landscaping
- B. Construction work of the tower and the installation of equipment and antennas on the tower will be coordinated with other site construction to avoid any unacceptable hazard of falling objects.
- C. Should the Contractor, in the process of digging the foundation, find a condition that makes use of the proposed foundation unsuitable, the Contractor will do the following:
1. Notify the Project Director or designee.
 2. Provide drawings and specifications for a revised foundation as designed by the Contractor's certified engineer.
 3. Provide a written quotation of the cost for the revised foundation.
- D. Upon receipt of the notice, drawings, specifications and price quote the Owner may do any or all of the following:
1. Issue a change order reflecting the revised cost and authorize the Contractor to proceed with the work.
 2. Based on the change order pricing, owner may elect to solicit competitive bids for the foundation using the drawings and specifications provided by the Contractor's certified engineer. This action may result in another contractor doing the foundation work. However, this will not have an adverse affect on the warranty of the tower or the foundation.
 3. Any reasonable amount of time lost due to redesign and acquisition of the revised tower foundation will not be charged against the time allocated for completion.
- E. Prior to erecting steel on the foundation, the Contractor will provide to the Project Director a sample of each truck load of concrete that has been tested for compliance with the foundation specifications set forth by the tower engineer. Written reports certifying the strength of the concrete are to accompany each test cylinder.
- F. If any concrete used in the foundation does not meet specifications, the Contractor will remove the foundation and pour one using compliant materials, at no expense to the owner.

3.02 Qualifications

- A. The tower is supporting vital public safety communications for the City. The tower contractor, its employees and any subcontractors must have extensive experience in constructing foundations, self-supporting towers of at least 140 feet, and installation and testing of radio frequency transmission line and antenna systems in the 30 to 512 MHz range.

3.03 Tower Signage

- A. A sign indicating the Antenna Structure Registration Number shall be permanently mounted in a conspicuous place on the tower so that it is readily visible near the base of the antenna structure. Materials used to display the Antenna Structure Registration Number must be weather-resistant and of sufficient size to be easily seen at the base of the antenna structure.

3.04 Clean-up

- A. After insulation has been installed, remove all scraps and debris per specification section 01700.

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Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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SECTION 27 1300
INTERCOMMUNICATION SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Telecommunications Cabling at the new or remodeled buildings for the project. Backbone and horizontal cabling comprised of copper and fiber cabling, and support systems are covered under this document.
 - 2. The Horizontal (workstation) Cabling System shall consist of a minimum of two (2) 4-pair Unshielded Twisted Pair (UTP) Copper Cables to each work area outlet unless otherwise noted for specific locations. The cables shall be installed from the Work Area Outlet to the Telecommunications Room (TR) located on the same floor, and routed to the appropriate rack serving that area and terminated as specified in this document.
 - 3. All cables and related terminations, support and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the Telecommunications contractor as detailed in this document.
 - 4. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types will be provided as an attachment to this document. If the bid documents are in conflict, this specification shall take precedence. The successful vendor shall meet or exceed all requirements for the cable system described in this document.

1.03 REGULATORY REFERENCES

- A. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the local Electrical Code and present manufacturing standards.
- B. All materials shall be UL Listed and shall be marked as such. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.
- C. All modular jacks, patch cords, consolidation point, and patch cords performance shall be verified (not just tested) by a third party to be category 6 component and channel compliant.

- D. The cabling system described in this is derived from the recommendations made in recognized telecommunications industry standards. The following documents are incorporated by reference:
1. ANSI/TIA/EIA - 568-C.0, Generic Telecommunications Cabling for Customer Premises
 2. ANSI/TIA/EIA - 568-C.1, Commercial Building Telecommunications Cabling Standard.
 3. ANSI/TIA/EIA - 568-C.2, Balanced Twisted Pair Cabling Components, Addendum 1 –
 4. ANSI/TIA/EIA - 568-C.3, Optical Fiber Cabling Components
 5. ANSI/TIA/EIA – 569-A, Commercial Building Standard for Telecommunications Pathways and Spaces, February, 1998.
 6. ANSI/TIA/EIA – 606-A, Administration Standard for Telecommunications Infrastructure of Commercial Buildings, February, 2002.
 7. ANSI/TIA/EIA – 607-A, Commercial Building Grounding and Bonding Requirements for Telecommunications, August, 1994.
 8. ANSI/ TIA/EIA – 758, Customer-Owned Outside Plant Telecommunications Cabling Standard, April 1999.
 9. BICSI - TDMM, Building Industries Consulting Services International, Telecommunications Distribution Methods Manual (TDMM) – 10th Edition, 2003.
 10. National Fire Protection Agency (NFPA – 70), National Electrical Code (NEC) –2002.
- E. If this document and any of the documents listed above are in conflict, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.
- F. This document does not replace any code, either partially or wholly. The contractor must be aware of local codes that may impact this project.

1.04 APPROVED CONTRACTOR

- A. The Telecommunications Contractor must be a Certified Installer for the products and/or system being supplied. A copy of certification documents must be submitted with the quote in order for such quote to be valid. The Telecommunications contractor is responsible for workmanship and installation practices in accordance with said certification. At least (1) for every (3) members of the copper installation and termination crew must be certified to a Technician Level of training by the product manufacturer or BICSI. At least (1) for every (5) members of the optical fiber installation and termination crew must be certified by the product manufacturer or other approved organizations in Optical Fiber installation and termination practices.

1.05 WORK INCLUDED

- A. The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations necessary to complete the installation of this structured cabling system in compliance with the specifications and drawings. The Telecommunications contractor will provide and install all of the required material to form a complete system.
- B. The work shall include, but not be limited to the following:

1. Furnish and install a complete telecommunications wiring infrastructure as described on the plans and in these specifications.
2. Furnish, install, and terminate all UTP and Optical Fiber cable.
3. Furnish and install all wall plates, jacks, patch panels, and patch cords.
4. Furnish and install all required cabinets and/or racks as required and as indicated.
5. Furnish any other material required to form a complete system.
6. Perform link testing (100% of horizontal and/or backbone links) and certification of all components.
7. Furnish test results of all cabling to the owner on disk and paper format, listed by each closet, then by workstation ID.
8. Adhere and comply with all requirements of the product certification programs.
9. Provide owner training and documentation. (Testing documentation and As-built drawings).

1.06 SUBMITTALS

- A. Under the provisions of this request for proposal, prior to the start of work the telecommunications contractor shall:
 1. Submit copies of the certification of the company and names of staff that will be performing the installation and termination of the installation to provide proof of compliance of this spec.
 2. Submit proof from manufacturer of contractor's good standing in manufacturer's program.
 3. Submit appropriate cut sheets and samples for all products, hardware and cabling.
- B. Work shall not proceed without the Owner's approval of the submitted items.
- C. The telecommunications contractor shall receive approval from the Owners on all substitutions of material. No substituted materials shall be installed except by written approval from the Owner.

1.07 QUALITY ASSURANCE

- A. The telecommunications contractor shall staff the project with qualified personnel. All products shall be new and in good condition.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Delivery and receipt of products shall be at the site described in the Scope Section.
- B. Cable shall be stored according to manufacturer's recommendations as a minimum. In addition, cable must be stored in a location protected from vandalism and weather. If cable is stored outside, it must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 40 degrees F., the cable shall be moved to a heated (50 degrees F. minimum) location. If necessary, cable shall be stored off site at the contractor's expense.

- C. If the telecommunications contractor wishes to have a trailer on site for storage of materials, arrangements shall be made with the Owner.

1.09 DRAWINGS

- A. It shall be understood that the electrical details and drawings provided with the specification package are diagrammatic. They are included to show the intent of the specifications and to aid the telecommunications contractor in bidding the job. The telecommunications contractor shall make allowance in the bid proposal to cover whatever work is required to comply with the intent of the plans and specifications.
- B. The telecommunications contractor shall verify all dimensions at the site and be responsible for their accuracy.
- C. Prior to submitting the bid, the telecommunications contractor shall call the attention of the Engineer to any materials or apparatus the telecommunications contractor believes to be inadequate and to any necessary items of work omitted.

PART 2 - PRODUCTS

2.01 EQUIVALENT PRODUCTS

- A. The Owner and engineer have selected specific products that achieve the desired level of performance and preference. The project has been designed around said products. Proposed substitutions must demonstrate equivalent performance in all areas to the satisfaction of the Owner and must be submitted for review at least 10 days prior to bid. The Owner shall not be required to entertain substitutions submitted after bid.

2.02 WORK AREA OUTLETS

- A. Work area cables shall each be terminated at their designated work area location in the connector types described in the subsections below. Included are modular telecommunication jacks. These connector assemblies shall snap into a faceplate.
- B. The Telecommunications Outlet Assembly shall accommodate:
 - 1. A minimum of two (2) modular jacks.
 - 2. Additional accommodations for specific locations as noted in the plans for optical fiber and/or additional copper cables as necessary.
 - 3. A blank filler will be installed when extra ports are not used.
 - 4. All modular jacks shall have their circuit number on the faceplate identifier strip.
 - 5. Multiple jacks that are identified in close proximity on the drawings (but not separated by a physical barrier) may be combined in a single assembly. The telecommunications contractor shall be responsible for determining the optimum compliant configuration based on the products proposed.
 - 6. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation. Prior to installation, the telecommunications contractor shall submit the proposed configuration for each outlet assembly for review by the Owner.

7. The modular jack shall incorporate printed label strip on the dust cap module for identifying the outlet. Printed labels shall be permanent and compliant with ANSI/TIA/EIA-606-A standard specifications. Labels shall be printed using a printer such as a Brady hand held printer. Hand printed labels shall not be accepted.

C. Faceplates: The faceplates shall:

1. Be as appropriate to fit the modular jack used.
2. Be UL listed and CSA certified.
3. Be constructed of high impact, ABS plastic UL 94V-0 construction (except where noted otherwise).
4. Shall match the faceplate color used for other utilities in the building or match the color of the raceway if installed in surface raceway.
5. Be compliant with the above requirements along with the following when incorporating optical fiber:
 - a. Be a low profile assembly,
 - b. Incorporate a mechanism for storage of cable and fiber slack needed for termination,
 - c. Position the fiber optic couplings to face downward or at a downward angle to prevent contamination and,
 - d. Incorporate a shroud that protects the optical couplings from impact damage.
6. Be available as single-gang or dual-gang.
7. Provide easy access for adds, moves, and changes by front removal of jack modules.
8. Possess recessed designation windows to facilitate labeling and identification.
9. Include a clear plastic cover to protect labels in the designation window.
10. Have mounting screws located under recessed designation windows.
11. Comply with ANSI/TIA/EIA-606-A work area labeling standard.
12. Allow for the UTP modules to be inverted in place for termination purposes.
13. Be manufactured by an ISO 9001 registered company.

D. Voice / Data Jacks

1. Voice/Data jacks shall be 8-position modular jacks and shall be Category 6 performance as defined by the references in this document including ANSI/TIA/EIA-568-C.2. All pair combinations must be considered, with the worst-case measurement being the basis for compliance. Modular jack performance shall be third-party verified by a nationally recognized independent testing laboratory.
2. The modular jack shall use dual reactance modular contact array.
3. The modular jack shall be both component, link and channel compliant to category specifications in ANSI/TIA/EIA-568-C.
4. The modular jack's performance shall be third-party verified to ANSI/TIA/EIA-568-C Category 6 specifications.
5. The modular jack shall have low emission IDC contacts.
6. The modular jack shall use standard termination practice using 110 impact tool.
7. The modular jack shall be backwards compatible to Category 3, 5, and 5e.
8. The modular jack shall be center tuned to category 6 test specifications.
9. Dust covers shall be used on each termination.

2.03 MODULAR PATCH PANELS

A. The Modular Patch Panels shall:

1. Meet category 6 component compliance and be verified by a third-party nationally recognized independent testing laboratory.
2. Use low emission IDC contacts.
3. Use dual reactance technology to enhance the signal-to-noise ratio.
4. Require standard termination practices using a 110 impact tool.
5. Use a single piece IDC housing designed to accept larger Category 6 conductors.
6. Support both T568B and T568A wiring.
7. Include easy to follow wiring labels.
8. Include label fields.
9. Allow for the use of icons.
10. Include full length metal rear cable management.
11. Be available in standard or high density.
12. Be backward compatible to category 3, 5 and 5e.
13. Be center tuned to category 6 test specifications.

2.04 RACKS

- A. All racks and wire management shall be of one manufacturer or designed specifically to work together. The equipment rack shall provide vertical cable management and support for the patch cords at the front of the rack and wire management, support, and protection for the horizontal cables inside the legs of the rack. Waterfall cable management shall be provided at the top of the rack for patch cords and for horizontal cables entering the rack channels for protection and to maintain proper bend radius and cable support. Wire management shall also be mounted above each patch panel and/or piece of equipment on the rack. The rack shall include mounting brackets for cable tray ladder rack to mount to the top of the rack. Velcro cable ties shall be provided inside the rack channels to support the horizontal cable. Rack shall be black in color to match the patch panels and cable management.
- B. Free-Standing Rack
 1. Free-standing rack shall:
 - a. Provide the necessary strain relief, bend radius and cable routing for proper installation of high performance cross connect products, meeting all specifications of ANSI/TIA/EIA-568-C.
 - 1) Rear channels to securely route distribution cables.
 - 2) Vertical management “cage” to protect patch cords while allowing easy access for moves, adds and change with individual 1-rack unit fingers and double hinged door.
 - 3) Include speednuts to reduce assembly time.
 - b. Have top cable trough with waterfall and built in patch/horizontal cable distribution separator.
 - c. Have EIA hole pattern on front and rear.
 - d. Have rack units stamped on the front, on both sides allowing numbering from top-to-bottom or bottom-to-top.
 - e. Be available with a 10.5” or 16.25” channel depth.
 - f. Be available with hook and loop straps for securing bulk cables inside the vertical U-channels.
 - g. Assemble as 19” (483 mm) or 23” (584 mm) with no additional hardware.
 - h. Be available with three styles of vertical patch cord management: interbay with latches, cable management rings, or fingerduct with covers.

- i. Provide floor and ceiling access for cable management and distribution.
- j. Provide pre-drilled base for floor attachment of rack.
- k. Be available in a 7 foot version (45 rack units) or an 8 foot version (51 rack units).
- l. Be available in standard color of black.
- m. Be manufactured by an ISO 9001 registered company.

2.05 HORIZONTAL DISTRIBUTION CABLE

- A. All horizontal data station cable and voice cable shall terminate on modular patch panels (copper or fiber), 110 cross-connecting blocks (copper), or patch/splice cabinets (fiber) in their respective Telecommunications Room or Equipment Room as specified on the drawings.
- B. 100 OHM Category 6 UNSHIELDED TWISTED PAIR CABLE (UTP)
 - 1. Physical Characteristics:
 - a. Shall be plenum rated and meet applicable requirements of ANSI/ICEA S-80-576. All 4 pairs must be insulated with F.E.P. No 2 x 2 or 3 x 1 constructions will be allowed.
 - b. The diameter of the insulated conductor shall be .023 in. maximum.
 - c. Shall consist of (4) twisted pairs.
 - d. Shall be suitable for the environment in which they are to be installed.
 - e. The color coding of pairs shall be:

Pair 1	Pair 2	Pair 3	Pair 4
W-BL; BL	W-O; O	W-G; G	W-BR; BR
 - f. The overall diameter of the cable shall be 0.2150" nominal.
 - g. The ultimate breaking strength measured in accordance with ASTM D 4565 shall be 400 N minimum.
 - h. Cable shall withstand a bend radius of 1" at -20 degrees Celsius without jacket or insulation cracking.
 - i. Cable shall be third party verified to meet ANSI/TIA/EIA-568-C.2.
 - 2. Transmission Characteristics:
 - a. DC resistance of any conductor shall not exceed 9.38 Ohms per 100m max. at 20°C. Measured in accordance with ASTM D 4566.
 - b. The mutual capacitance of any pair at 1 kHz for 100m of cable shall not exceed 4.4 Nf.
 - c. DC resistance unbalance between any two conductors of any pair shall not exceed 3% when measured at or corrected to 20°C in accordance with ASTM D 4566.
 - d. The capacitance unbalance to ground at 1 kHz of any pair shall not exceed 330 pF per 100m.
 - 3. Cable shall be Berk-Tek LANmark-1000 UTP (Plenum) or approved equal.
 - 4. Cable installed underground/below slab in conduit shall be Berk-Tek LANmark-6 OSP (wet location) or approved equal.

2.06 COPPER CABLE PROTECTION UNITS

- A. All copper circuits shall be provided with protection between each building with an entrance cable protector panel. All building-to-building circuits shall be routed through this protector. The protector shall be connected with a #6 AWG copper bonding conductor between the

protector ground lug and the TC ground point. Approved manufacturer of protection units is Porta Systems.

2.07 PATCH CORDS

- A. The contractor shall provide factory terminated and tested UTP and optical fiber patch cords and equipment cords for the complete cabling system. The UTP patch cables shall meet the requirements of ANSI/TIA/EIA-568-B for patch cord testing.
- B. Copper (UTP) patch cords shall:
 - 1. Use 8-position connector with impedance matched contacts and designed using dual reactance.
 - 2. Be constructed of 100 ohm, 4 pair stranded conductor, unshielded twisted pair copper per the requirements of the ANSI/TIA/EIA-568-B.2 and ANSI/TIA/EIA-568-B.2-1 standard.
 - 3. Meet TIA category 6 component specifications in ANSI/TIA/EIA-568-B.2-1
 - 4. 100% factory tested to meet category 6 performance and
 - 5. ETL or any other nationally recognized 3rd party verification
 - 6. Be center tuned to category 6 performance specifications by using paired bi-level contact array.
 - 7. Be capable of universal T568A or T568B wiring schemes.
 - 8. Modular connector shall maintain the paired construction of the cable to facilitate minimum untwisting of the wires.
 - 9. Have a performance marking indelibly labeled on the jacket (by the manufacturer).
 - 10. Have the ability to accept color-coded labels and icons to comply with ANSI/TIA/EIA-606-A labeling specifications.
 - 11. Have “snagless” protection for the locking tab to prevent snagging and to protect locking tab in tight locations and provide bend relief.
 - 12. Be available in three standard colors.
 - 13. Be available in 3 foot, 5 foot, 7 foot, 9 foot, and 15 foot standard lengths.
 - 14. Be backwards compatible to Category 3, 5 and 5e.
 - 15. Be manufactured by an ISO 9001 registered company.

2.08 GROUNDING AND BONDING

- A. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor. The TBB shall be installed independent of the building’s electrical and building ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA/EIA-607 Telecommunications Bonding and Grounding Standard.
- B. The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding bus bar (TMGB). Each telecommunications room shall be provided with a telecommunications ground bus bar (TGB). The TMGB shall be connected to the building electrical entrance grounding facility. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.

- C. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, ungrounded conduits, etc. entering or residing in the TR or ER shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors.
- D. All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.

2.09 FIRESTOP

- A. A firestop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Firestop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.
- B. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly firestopped.
- C. Firestop systems shall be UL Classified to ASTM E814 (UL 1479) and shall be approved by a qualified Professional Engineer (PE), licensed (actual or reciprocal) in the state where the work is to be performed. A drawing showing the proposed firestop system, stamped/embossed by the PE shall be provided to the Owner's Technical Representative prior to installing the firestop system(s).

PART 3 - EXECUTION

3.01 WORK AREA OUTLETS

- A. Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturer's bend radius. In hollow wall installations where box-eliminators are used, excess wire can be stored in the wall. No more than 12" of UTP and 12" of fiber slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.
- B. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-C.0 document, manufacturer's recommendations and best industry practices.
- C. Pair untwist at the termination shall not exceed 12 mm (one-half inch).
- D. Bend radius of the horizontal cable shall not be less than 4 times the outside diameter of the UTP cable.

- E. The cable jacket shall be maintained to within 25mm (one inch) of the termination point.
- F. Data jacks, unless otherwise noted in drawings, shall be located in the bottom position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the right-most position(s).
- G. Voice jacks shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).

3.02 HORIZONTAL DISTRIBUTION CABLE INSTALLATION

- A. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.
- B. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
- C. Cable raceways shall not be filled greater than the ANSI/TIA/EIA-569-A maximum fill for the particular raceway type or 40%.
- D. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
- E. Where transition points, or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.
- F. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
- G. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60 inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.
- H. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.
- I. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
- J. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.
- K. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.
- L. Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606-A. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.

- M. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.
- N. Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.
- O. Cables installed underground or below slab shall be suitable for use in wet locations and outdoors in duct or conduit. If wet location cable is exposed in the building after exiting the wet area, it must transition to an appropriate category dry cable within 50 feet (15M) of exiting conduit.

3.03 HORIZONTAL COPPER TERMINATION AND INSTALLATION

- A. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-C standard, manufacturer's recommendations and best industry practices.
- B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).
- C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
- D. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
- E. The cable jacket shall be maintained as close as possible (within 25mm – 1 inch) to the termination point.
- F. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.04 BACKBONE CABLE INSTALLATION

- A. Backbone cables shall be installed separately from horizontal distribution cables
- B. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
- C. Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits
- D. Where backbone cables are installed in an air return plenum, riser rated cable shall be installed in metallic conduit.
- E. Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.
- F. All backbone cables shall be securely fastened to the sidewall of the TR on each floor.

- G. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.
- H. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.
- I. Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

3.05 RACKS

- A. Racks shall be securely attached to the concrete floor using a minimum 3/8" hardware or as required by local codes.
- B. Racks shall be placed with a minimum of 36-inch clearance from the walls on all sides of the rack. When mounted in a row, maintain a minimum of 36 inches from the wall behind and in front of the row of racks and from the wall at each end of the row.
- C. All racks shall be grounded to the telecommunications ground bus bar in accordance with Section 9.0 of this document.
- D. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.
- E. Wall mounted termination block fields shall be mounted on 4' x 8' x .75" void free plywood. The plywood shall be mounted vertically 12" above the finished floor. The plywood shall be painted with two coats of white fire retardant paint.
- F. Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame 18" from the finished floor.

3.06 FIRESTOP SYSTEM

- A. All firestop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cable system acceptance.

3.07 GROUNDING SYSTEM

- A. The TBB shall be designed and/or approved by a qualified PE, licensed in the state that the work is to be performed. The TBB shall adhere to the recommendations of the ANSI/TIA/EIA-607 standard, and shall be installed in accordance with best industry practice.
- B. Installation and termination of the main bonding conductor to the building service entrance ground shall be performed by a licensed electrical contractor.

3.08 IDENTIFICATION AND LABELING

- A. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the successful contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme. Labeling shall follow the guidelines of ANSI/TIA/EIA-606-A.
- B. Outside Plant cables passing through a pull box or vault shall have a cable label that is water and mud proof.
- C. All label printing will be machine generated by Ortronics LabelMo, or similar software, using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.

3.09 TESTING AND ACCEPTANCE

- A. General
 - 1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-B. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.
 - 2. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the Certification Program Information Manual provided by the product manufacturer and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.
- B. Copper Link Testing
 - 1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category performance.
 - 2. Horizontal cabling shall be tested using a Level III test unit for category 6 performance compliance.
 - 3. The basic tests required are:
 - a. Wire Map
 - b. Length
 - c. Attenuation
 - d. NEXT (Near end crosstalk)
 - e. Return Loss
 - f. ELFEXT Loss

- g. Propagation Delay
- h. Delay skew
- i. PSNEXT (Power sum near-end crosstalk loss)
- j. PSELFEXT (Power sum equal level far-end crosstalk loss)
- 4. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.
- 5. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-C Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.
- 6. Category 6 performance shall meet the link requirements outlined below for a 90-meter, 4-connector permanent link.

Frequency (MHz)	Maximum Insertion Loss (dB)	Minimum NEXT (dB)	Minimum PSNEXT (dB)	Minimum ELFEXT (dB)	Minimum PSELFEXT (dB)	Minimum Return Loss (dB)
1.0	2.1	69.0	64.0	65.3	62.3	21.0
4.0	4.0	67.0	62.5	53.2	50.2	21.0
10.0	6.3	60.6	46.0	45.3	42.3	21.0
20.0	9.0	55.6	51.0	39.2	36.2	21.0
31.25	11.3	52.4	47.7	35.4	32.4	19.1
62.5	16.4	47.4	42.6	29.3	26.3	16.1
100.0	21.2	43.9	39.1	25.3	22.3	14.0
155.0	26.6	40.7	35.8	21.4	18.4	12.1
200.0	31.5	38.8	33.9	19.2	16.2	11.0
250.0	36.0	37.1	32.4	17.3	14.3	10.0

C. Fiber Testing

- 1. All fiber testing shall be performed on all fibers in the completed end-to-end system. Testing shall consist of an end-to-end power meter test performed per EIA/TIA-455-53A. The system loss measurements shall be provided at 850 and/or 1300 nanometers for multimode fibers and 1310 and/or 1550 nanometers for single mode fibers. These tests also include continuity checking of each fiber.
- 2. Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm (or 1310 and 1550 nm for singlemode) in both directions.
- 3. Test set-up and performance shall be conducted in accordance with ANSI/EIA/TIA-526-14 Standard, Method B.
- 4. Where links are combined to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. **ONLY LINK TEST IS REQUIRED.** The contractor can optionally install patch cords to complete the circuit and then test the entire channel. The test method shall be the same used for the test

described above. The values for calculating loss shall be those defined in the ANSI/TIA/EIA Standard.

5. Attenuation testing shall be performed with an approved hand held tester from an industry recognized test equipment manufacturer.

3.10 SYSTEM DOCUMENTATION

- A. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Engineer for approval. Documentation shall include the items detailed in the sub-sections below.
- B. Documentation shall be submitted within ten (10) working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor, etc.). This is inclusive of all test result and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the request of the Engineer, the telecommunications contractor shall provide copies of the original test results.
- C. The Engineer may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

3.11 TEST RESULTS

- A. Test documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words “Project Test Documentation”, the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.
- B. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-C including applicable TSB’s and amendments. The appropriate Level III tester shall be used to verify Category 6 cabling systems.
- C. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. The telecommunications contractor must furnish this information in electronic form CD-ROM). If needed, provide manufacturers software require to read the test results.

- D. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

PART 4 - WARRANTY AND SERVICES

4.01 WARRANTY

- A. The manufacturer shall provide the warranty directly to the end-user.
- B. An Extended Product Warranty shall be provided which warrants functionality of all components used in the system for a minimum of 20 years from the date of registration. The Extended Product Warranty shall warrant the installed horizontal and/or backbone copper, and both the horizontal and the backbone optical fiber portions of the cabling system.
- C. The Application Assurance Warranty shall cover the failure of the wiring system to support the applications that are designed for the link/channel specifications of ANSI/TIA/EIA–568-C.0. These applications include, but are not limited to, 10BASE-T, 100BASE-T, 1000BASE-T, 155Mb/sATM, and 1Gb/s ATM.
- D. The contractor shall provide a warranty on the physical installation.

4.02 FINAL ACCEPTANCE AND SYSTEM CERTIFICATION

- A. Completion of the installation, in-progress and final inspections, receipt of the test and as-built documentation, and successful performance of the cabling system for a two-week period will constitute acceptance of the system. Upon successful completion of the installation and subsequent inspection, the end user shall be provided with a numbered certificate, from the product manufacturer, registering the installation.

END OF SECTION

SECTION 28 3100
FIRE SPRINKLER MONITORING AND ALARM SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section Includes:
 - 1. Provide a complete sprinkler monitoring and alarm system. The system shall be connected, tested, verified by the Authority Having Jurisdiction (AHJ) to be acceptable and left in first-class operating condition. All equipment herein specified shall be engineer-approved and California State Fire Marshal (CSFM) listed. The entire installation shall conform to the National Fire Protection Association (NFPA) Standard 72, 90A & CEC Article 760 and authorities having jurisdiction as applicable. The system specified and depicted on the plan is a complete and approved system. Substitution of system components or manufacturer will require the contractor to separately obtain approval with the CSFM at Contractor's expense and shall meet all requirements of the system as designed and pre-approved. Any routing of the system wiring that is significantly different than shown on the approved drawings shall have the approval of the engineer and must be obtained prior to construction.
 - 2. Provide all work and material as shown and / or required to provide a fully functional and adequate system as described herein and as required by the AHJ.
 - 3. Supervision: The system shall monitor the integrity of all alarm initiating and indicating appliance circuits and provide local and remote status of all connected systems. The system shall be provided with automatically charged standby batteries to maintain system operation for 24 HRS in the normal supervisory mode and 5 minutes of alarm. Batteries shall be supervised for connection to the system and low voltage threshold. The automatic battery charger shall be capable of charging fully discharged system batteries to 100% in 8 hours.
 - 4. The system wiring and installation shall be as stated in drawings and as required by the manufacturer. All wiring shall be color coded, tagged and verified to assure that it is free from shorts and grounds and shall be rated for the appropriate environmental conditions such as well locations.
 - 5. Testing: The completed system shall be tested in accordance with NFPA Standard 72-7-1.
 - 6. Warranty: The equipment and wiring shall be warranted to be free from electrical and mechanical defects for a period of two (2) years commencing with final acceptance by Owner.
 - 7. All wiring shown in drawings shall be installed in conduit.
 - 8. System Operation shall include:
 - a. Separate zone signaling and device status indication for all initiating devices.

- b. Audible to sound the California uniform fire alarm signal in temporal mode. Devices shall be at least 15dBA above average ambient sound level, but not less than 75dBA at 10' or more than 120dBA.
- c. Supervision of all circuits to indicate any abnormal wiring condition.
- d. One (1) N.O./N.C. integral relay for external device interface or as indicated on drawings.
- e. Central station connection capable of indicating (3) distinct separate signals as being tamper, trouble and alarm with point reporting capabilities.
- 9. All work shall be completed as shown on the plans and or as specified within this specification and shall include the following (but is not limited to):
 - a. Furnishing and installation of equipment and devices.
 - b. Conductors, connections and interconnections where specified and all in conduit system.
 - c. Testing, cleaning and adjusting of completed work.
 - d. Wiring diagrams, as-built drawings and three (3) sets of equipment operations and maintenance instructions for Owner.
 - e. All work and material for complete and operable systems as indicated or specified.
 - f. Permits, inspections and fees.
 - g. Identification and instruction to Owner Representative.
 - h. Coordination with Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
 - i. Furnishing of special back boxes where required for installation of devices.
- 10. Mechanical system duct detectors shall interface with fire alarm system without additional or special control devices.
- 11. All conductors to be installed in conduit pursuant to Specification Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
- 12. Qualifications: Contractor shall receive written approval and verified test results which shall be submitted to the Owner for system from manufacturers recognized representative prior to completion and acceptance.
- 13. All initiating devices shall be separately addressed for individual identification at control panel.
- 14. As-Built Drawings: A complete set of reproducible "as-built" drawings showing installed wiring, color coding, wire tag notations exact locations of all installed equipment, specific interconnections between all equipment and internal wiring of the equipment shall be delivered to the owner upon completion of the system.
- 15. Maintenance Instructions: Three (3) submittals of maintenance instructions shall be provided and shall be complete, easy to read, understandable and shall provide the following information:
 - a. Instructions for replacing any components of the system, including internal parts.
 - b. Instructions for periodic cleaning and adjustments of equipment with a schedule of these functions.
 - c. A complete list of all equipment and components with information as to the address and telephone number of both the manufacturer and local supplier of each item.
 - d. User operating instructions shall be prominently displayed on a separate sheet located next to the control unit in accordance with UL Standard 864. The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defects for two years from the date of final acceptance.

1.03 SUBMITTALS

- A. Comply with applicable provisions of Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
- B. The submittal shall include certification from the manufacturer verifying that the distributor is an authorized agent, who is qualified and trained by the manufacturer in the proper installation, operation and service of the system.
- C. Shop Drawings:
 - 1. A complete list of all supplied equipment including model numbers with catalog data sheets on each component and CSFM number.
 - 2. Provide schematic layout, floor plan, drawings indicating location of all components and equipment, required size and location of conduit and outlets and type and quantity of system conductors. Include voltage drop calculations and battery calculations based on actual number of devices to be installed.
 - 3. Include wiring diagrams for overall system and components including control panels, annunciators, power supplies, initiating circuits, notification appliances, control devices and FATC. Address numbers shall be noted on all appliances.
 - 4. Include physical and electrical characteristics of equipment to indicate conformance with the Specifications.
 - 5. Describe system characteristics and function as well as device wiring diagrams.
 - 6. Voltage drop and battery calculations for each control panel and power supply and initiating circuits.
 - 7. System operational matrix.
- D. Manufacturer shall provide certification that the equipment supplied under this Section has been reviewed and certified to meet the current criteria for special seismic certification in compliance with 2013 CBC 1705. Include seismic companion anchorage requirements from the testing and as approved by the manufacturer. The manufacturer shall provide an approved label on the equipment enclosure stating that the equipment has been awarded a certificate of compliance for special seismic certification. The label shall include special seismic certification pre-approval number when relevant.
- E. Data Sheets: Show California State Fire Marshal Listing, U.L. listing, equipment ratings, dimensions and finishes.
- F. Manufacturer's Certificate: Note whether the system meets or exceeds specified requirements.
- G. Operating and Maintenance Instruction Manual:
 - 1. Manual shall include the following tailored to this specific project:
 - a. Operational description.
 - b. Coded cabling plan.
 - c. Two wire circuit diagrams.
 - d. Wiring destination schedule.
 - e. Schematic component diagrams and PC board layouts.
 - f. Maintenance and alignment procedures.
 - g. Voltage drop and battery calculations.

1.04 COORDINATION

- A. Refer to the electrical and mechanical drawings and specifications to determine quantities and location of devices and required scope of work and coordinate work with mechanical and electrical installers. Provide function described under mechanical section Sequence of Control, for fire and/or emergency conditions. Submit proposed interconnection to elevator supplier. Submit conduit and pathing requirements to electrical installer. For self-contained door release, coordinate with door supplier.

1.05 SYSTEM DESCRIPTION

- A. General: System to be listed by Underwriters Laboratories and the California State Fire Marshal, designed to meet the functional requirements of NFPA 72A, 72B and 72D.

1.06 SYSTEM OPERATION

- A. Wiring, equipment and devices for alarm initiation, annunciation, and audible signaling to be continuously supervised for opens, shorts or grounds (trouble). Each alarm initiating device circuit to be provided with illuminated and audible annunciation of both trouble and alarm conditions. Non-illumination indicates a normal condition.
- B. Any alarm or trouble condition shall sound an audible signal at the panel and the remote annunciator. Signal shall be silenced by a momentary contact switch which shall transfer the signal to a visual indicator. Subsequent trouble conditions shall cause the signal to resound and in turn may be silenced. Upon restoration to normal, the trouble signal silencing indicator shall extinguish automatically.
- C. Activation of any automatic or manual alarm initiating device shall cause the following to occur (where applicable):
 - 1. Sound an audible alarm and illuminate the visual indicator for zone and type of alarm at the fire command center, the remote annunciator and fire alarm control panel.
 - 2. Sound, at building of origin, the audible alarm signal over the system audible device(s).
 - 3. Transmit signal to release the electromagnetic hold open devices on corridor doors.
 - 4. Transmit signal to close smoke dampers.
 - 5. Transmit alarm signal to energy management system for shutdown of building air handler.
 - 6. Transmit alarm signal to the central station office.
 - 7. Release exit door locks.
- D. System shall not incorporate a time delay for any of the alarm initiating devices. All alarms shall be considered confirmed alarms.
- E. Detection shall be addressable and reporting of fire conditions to be accomplished by the following basic methods:
 - 1. Manual stations.
 - 2. Smoke detectors.
 - 3. Heat detectors.
 - 4. Duct detectors.

5. Waterflow switches.
 6. Beam detectors.
- F. Alarm system inputs to be further subdivided as follows, for a more defined indication of the location and nature of the fire or trouble condition:
1. Manual station by device and location.
 2. Smoke/heat detector by device and location.
 3. Waterflow or pressure switch by device and location.
 4. Sprinkler valve position indication by device and location.
- G. Alarm condition shall override trouble indication. Trouble indication shall reappear after alarm reset.

1.07 LOADS OF EQUIPMENT AND COMPONENTS

- A. Follow IEEE Standard where applicable.
- B. Provide fuse protection for equipment and spare fuses.
- C. Design systems for operation at 120 volts, normal or emergency power as indicated, 60 Hz nominal input.
- D. Operating voltage dissipated by resistors shall not exceed 25% of ratings.
- E. Operating voltage of capacitors shall not exceed 80% of rated voltage.
- F. Operating loads and voltages on transistors and solid-state devices shall not exceed manufacturer's recommendation for normal full load operation.
- G. Use electronic components of types and rating commonly available from stock of established commercial distribution.

1.08 GUARANTEE

- A. Conform to applicable provisions of the GENERAL REQUIREMENTS.
- B. Service technicians and replacement components for the system shall be available locally from a service representative of the manufacturer who is able to provide evidence of technical training and authorization by the manufacturer.
- C. For a period of two years from date of final acceptance, the system shall be under full guarantee for materials and labor at no cost to the District. The system shall be under a service contract with a technician authorized by the manufacturer. Replacement parts and labor shall be readily available during normal business hours while the service contract is in effect. A complete system inspection and test shall be performed at five months and again at eleven months after final acceptance. Tests shall include all smoke detector sensitivity settings.
- D. All component failures shall be remedied to the satisfaction of the Owner.

- E. A continuing service contract shall be offered at time of bid to commence at the expiration of warranty included with the system.

PART 2 - PRODUCT

2.01 MATERIALS

- A. Alarm Panel and system shall be UL listed for power-limited application, (as described on the plans). System shall be as manufactured by Fire-Lite or approved alternate.

PART 3 - EXECUTION

3.01 GENERAL

- A. Comply with all applicable paragraphs in Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL, apply as though repeated herein.
- B. Install system(s) in accordance with manufacturer's instructions.
- C. Include services of certified technicians to supervise installation, provide adjustments, provide final connections, system testing and system training to Owner Representative.

3.02 GROUNDING

- A. All equipment to be grounded by means of green ground wire to "U" contact of duplex receptacles and bonded to ground provided under Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

3.03 INSPECTION

- A. Systems to meet all the requirements of the CSFM and IOR and AHJ and shall be approved thereby before installation and prior to final acceptance.

3.04 LOCATION

- A. Before installation, verify exact location of control equipment and outlets. The Owner reserves the right to relocate system components within a radius of 20' at no increase in cost before rough-in work is started for the respective component.

3.05 WIRING

- A. Furnish all conductors, equipment, terminal strips, etc., and labor to install a complete and operable system. All cable conductors shall be color coded and numbered for identification at

all terminals. Green shall be for grounding conductor only. Use red insulation and or red jacketing on all fire alarm cable.

3.06 TESTING

- A. After all equipment specified herein for each system has been installed and is in operating condition, conduct performance tests to determine if the installation and components comply with these specifications. Furnish competent personnel, all test material and approved test instruments and conduct the tests under supervision of factory personnel, in the presence of the Engineer, the building and fire inspecting agencies.
 - 1. The contractor's job foreman, in the presence of a representative of the manufacturer, a representative of the owner, and the fire department shall operate every installed device to verify proper operation and correct annunciation at the control panel.
 - 2. At least on half of all tests shall be performed on battery standby power.
 - 3. Where application of heat would destroy any detector, it may be manually activated.
 - 4. The signaling line circuits and notification appliance circuits shall be opened in at least two (2) locations to verify the presence of supervision.
 - 5. When the testing has been completed to the satisfaction of the Owner's representative a letter attesting to the satisfactory completion of said testing shall be forwarded to the owner and the authority having jurisdiction.
 - 6. The contractor shall leave the alarm system in proper working order, and, without additional expense to the Owner, shall replace an defective materials or equipment provided by him under this contract within two years from the date of final acceptance by the awarding authority.
 - 7. The local responding fire department must be notified prior to the final test in accordance with local requirements and when requested, participate in system testing and evaluation.

3.07 REPORT

- A. Prepare written report of final test results, signed by witnessing parties. Submit to the Engineer in triplicate for final approval.

END OF SECTION

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Section 31 1000

Site Clearing

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clearing and protection of vegetation.
- B. Removal of existing debris.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 1000 - Summary: Sequencing and staging requirements.
- C. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- D. Section 01 5713 - Temporary Erosion and Sediment Control.
- E. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- F. Section 01 7419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.
- G. Section 02 4100 - Demolition: Removal of built elements and utilities.
- H. Section 31 2200 - Grading: Topsoil removal.
- I. Section 31 2200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
 - 1. Vegetation removal limits.

1.05 QUALITY ASSURANCE

- A. Clearing Firm: Company specializing in the type of work required.
 - 1. Minimum of 5 years of documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fill Material: As specified in Section 31 2323 - Fill and Backfill

PART 3 EXECUTION

3.01 SITE CLEARING

- A. Comply with other requirements specified in Section 01 7000.
- B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXISTING UTILITIES AND BUILT ELEMENTS

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Protect existing structures and other elements that are not to be removed.

3.03 VEGETATION

- A. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
 - 1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
 - 2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
 - 3. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.
- B. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to City.

3.04 DEBRIS

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

End of Section

Section 31 2200

Grading

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal of topsoil.
- B. Rough grading the site for site structures.
- C. Finish grading.

1.02 RELATED REQUIREMENTS

- A. Section 31 1000 - Site Clearing.
- B. Section 31 2316 - Excavation.
- C. Section 31 2323 - Fill: Filling and compaction.
- D. Section 31 2316.13 - Trenching: Trenching and backfilling for utilities.
- E. Section 32 9223 - Sodding: Finish ground cover.
- F. Section 32 9300 - Plants: Topsoil in beds and pits.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices, for general requirements relating to unit prices for this work.

1.04 SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with City of Manteca, Public Works Department standards.
 - 1. Maintain one copy on site.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Other Fill Materials: See Section 31 2323.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect from damage above- and below-grade utilities to remain.
- D. Notify utility company to remove and relocate utilities.
- E. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.
- F. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.

- G. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

3.03 ROUGH GRADING

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Do not remove topsoil when wet.
- C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- E. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.04 SOIL REMOVAL

- A. Stockpile excavated subsoil on site.
- B. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.05 FINISH GRADING

- A. Before Finish Grading:
 - 1. Verify building and trench backfilling have been inspected.
 - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.
- C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.
- D. Place topsoil in areas indicated.
- E. Place topsoil to thickness as indicated.
- F. Place topsoil during dry weather.
- G. Remove roots, weeds, rocks, and foreign material while spreading.
- H. Near plants spread topsoil manually to prevent damage.
- I. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- J. Lightly compact placed topsoil.

3.06 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.
- B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).
- C. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.
- D. Top Surface of Finish Grade: Plus or minus 1/4 inch.

3.07 REPAIR AND RESTORATION

- A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.
- B. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.08 FIELD QUALITY CONTROL

- A. See Section 31 2323 for compaction density testing.

3.09 CLEANING

- A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.
- B. Leave site clean and raked, ready to receive landscaping.

End of Section

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Section 31 2316

Excavation

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavating for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures, and utilities within the building.
- B. Trenching for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

- A. Document Geotechnical Services Report Proposed Manteca Fire Station #5 - _____: Geotechnical report; bore hole locations and findings of subsurface materials.
- B. Section 01 5713 - Temporary Erosion and Sedimentation Control: Slope protection and erosion control.
- C. Section 31 2200 - Grading: Grading.
- D. Section 31 2323 - Fill: Fill materials, filling, and compacting.
- E. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for excavation.

1.04 PROJECT CONDITIONS

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.

PART 3 EXECUTION

2.01 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the work are as indicated.

2.02 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 2200 for additional requirements.
- C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

2.03 EXCAVATING

- A. Excavate to accommodate new structures and construction operations.
- B. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- C. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- D. Do not interfere with 45 degree bearing splay of foundations.
- E. Cut utility trenches wide enough to allow inspection of installed utilities.
- F. Hand trim excavations. Remove loose matter.
- G. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323.

- H. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- I. Remove excavated material that is unsuitable for re-use from site.
- J. Remove excess excavated material from site.

2.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

2.05 PROTECTION

- A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

End of Section

Section 31 2316.13

Trenching

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

- A. Document __ Geotechnical Services Report Proposed Manteca Fire Station #5 __ : Geotechnical report; bore hole locations and findings of subsurface materials.
- B. Section 31 2200 - Grading: Site grading.
- C. Section 31 2316 - Excavation: Building and foundation excavating.
- D. Section 31 2323 - Fill: Backfilling at building and foundations.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for earthwork.

1.04 REFERENCE STANDARDS

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2012.
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)); 2012.
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.
- F. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Materials Sources: Submit name of imported materials source.
- C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- D. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. When necessary, store materials on site in advance of need.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. Granular Fill - Fill Type Class 1, 2, and 3 ____ : Coarse aggregate, conforming to City of Manteca Public Works Department standard.

2.02 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.03 TRENCHING

- A. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut trenches wide enough to allow inspection of installed utilities.
- E. Hand trim excavations. Remove loose matter.
- F. Remove excavated material that is unsuitable for re-use from site.
- G. Remove excess excavated material from site.

3.04 PREPARATION FOR UTILITY PLACEMENT

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BACKFILLING

- A. Fill up to subgrade elevations unless otherwise indicated.
- B. Employ a placement method that does not disturb or damage other work.
- C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
- F. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.
- G. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

- H. Correct areas that are over-excavated.
 - 1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- I. Compaction Density Unless Otherwise Specified or Indicated:
 - 1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density.
 - 2. At other locations: 90 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.

3.06 TOLERANCES

- A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180, or ASTM D698 ("standard Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- E. Frequency of Tests: As required by City.

3.08 CLEANING

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

End of Section

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Section 31 2323

Fill

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 01 5713 - Temporary Erosion and Sediment Control: Slope protection and erosion control.
- B. Section 31 2200 - Grading: Site grading.
- C. Section 31 2316 - Excavation: Removal and handling of soil to be re-used.
- D. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.
- E. Section 32 1423 - Asphalt Unit Paving: Leveling bed placement under pavers.

1.02 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for earthwork.

1.03 REFERENCE STANDARDS

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2012.
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)); 2012.
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.
- F. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Materials Sources: Submit name of imported materials source.
- C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.
- D. Compaction Density Test Reports.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. When necessary, store materials on site in advance of need.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. General Fill: Subsoil excavated on-site.
 - 1. Graded.
 - 2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
 - 3. Conforming to Geotechnical Report.

- B. Structural Fill: Subsoil excavated on-site.
 - 1. Graded.
 - 2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
 - 3. Conforming to Geotechnical Report.
- C. Granular Fill : Class I, II, or III. _____ washed stone; free of shale, clay, friable material and debris.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 2200 for additional requirements.

3.02 PREPARATION

- A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

- A. Fill to contours and elevations indicated using unfrozen materials.
- B. Employ a placement method that does not disturb or damage other work.
- C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- F. Correct areas that are over-excavated.
 - 1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- G. Compaction Density Unless Otherwise Specified or Indicated:
 - 1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density.
 - 2. At other locations: 90 percent of maximum dry density.
- H. Reshape and re-compact fills subjected to vehicular traffic.

3.04 FILL AT SPECIFIC LOCATIONS

- A. Use general fill unless otherwise specified or indicated.
- B. Structural Fill at _____:
 - 1. Maximum depth per lift: 8 inches, compacted.
 - 2. Compact to minimum 95 percent of maximum dry density.

3.05 TOLERANCES

- A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

3.06 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- E. Frequency of Tests: Per Geotechnical Engineer.

3.07 CLEANING

- A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

End of Section

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Section 32 1123
Aggregate Base Courses

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aggregate base course.
- B. Paving aggregates.

1.02 RELATED REQUIREMENTS

- A. Section 31 2200 - Grading: Preparation of site for base course.
- B. Section 31 2323 - Fill: Compacted fill under base course.
- C. Section 31 2316.13 - Trenching: Compacted fill over utility trenches under base course.
- D. Section 33 0513 - Manholes and Structures: Manholes including frames.
- E. Section 32 1216 - Asphalt Paving: Finish and binder asphalt courses.
- F. Section 32 1313 - Concrete Paving: Finish concrete surface course.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for earthwork.

1.04 REFERENCE STANDARDS

- A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; 1965 (2004).
- B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.
- C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.
- D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2012.
- E. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.
- F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)); 2012.
- G. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.
- H. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.
- I. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2010.
- J. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

- B. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- C. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. When necessary, store materials on site in advance of need.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Coarse Aggregate Type II: Coarse aggregate, conforming to State of California Highway Department standard.
- B. Coarse Aggregate 3/4" : Natural washed stone; free of shale, clay, friable material and debris.
 - 1. Graded in accordance with ASTM C136/C136M, within the following limits:
 - a. 2 inch sieve: 100 percent passing.
 - b. 1 inch sieve: 100 percent passing.
 - c. 3/4 inch sieve: 90 to 100 percent passing.
 - d. No. 4 sieve: 35 to 60 percent passing.
 - e. 30 sieve: 10 to 30 percent passing.
 - f. No. 200: 2 to 9 percent passing.

2.02 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.
- B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey bench marks and intended elevations for the work are as indicated.
- B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

- A. Under Bituminous Concrete Paving:
 - 1. Compact to 95 percent of maximum dry density.
- B. Under Portland Cement Concrete Paving:
 - 1. Place coarse aggregate to a total compacted thickness of 6 inches.
 - 2. Compact to 95 percent of maximum dry density.
- C. Place aggregate in maximum 6" layers and roller compact to specified density.
- D. Level and contour surfaces to elevations and gradients indicated.
- E. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- F. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

- G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch.
- C. Variation From Design Elevation: Within 1/2 inch.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
- C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D698 ("standard Proctor"), or ASTM D1557 ("modified Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- E. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade.

3.06 CLEANING

- A. Leave unused materials in a neat, compact stockpile.

End of Section

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Section 32 1216

Asphalt Paving

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single course bituminous concrete paving.
- B. Double course bituminous concrete paving.
- C. Surface sealer.

1.02 RELATED REQUIREMENTS

- A. Section 31 2200 - Grading: Preparation of site for paving and base.
- B. Section 31 2323 - Fill: Compacted subgrade for paving.
- C. Section 33 0513 - Manholes and Structures: Manholes, including frames; gutter drainage grilles, covers, and frames for placement by this section.
- D. Section 32 1123 - Aggregate Base Courses: Aggregate base course.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices for requirements applicable to this section. Measurement and payment will be as follows:
- B. Seal Coat: By the square yard. Includes preparing surfaces and applying.

1.04 REFERENCE STANDARDS

- A. City of Manteca Standard Specifications.
- B. AI MS-19 - A Basic Asphalt Emulsion Manual; Fourth Edition.
- C. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction; 2009a.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with City of Manteca.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Asphalt Cement: ASTM D946.
- B. Aggregate for Base Course - Fill Type __Class 2__: Angular crushed washed stone; free of shale, clay, friable material and debris.

2.02 ASPHALT PAVING MIXES AND MIX DESIGN

- A. Submit proposed mix design of each class of mix for review prior to beginning of work.

2.03 SOURCE QUALITY CONTROL

- A. Test mix design and samples in accordance with AI MS-2.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

3.02 BASE COURSE

- A. See Section 32 1123.

3.03 PREPARATION - PRIMER

- A. Apply primer in accordance with manufacturer's instructions.
- B. Apply primer on aggregate base or subbase at uniform rate of 1/3 gal/sq yd.
- C. Use clean sand to blot excess primer.

3.04 PREPARATION - TACK COAT

- A. Apply tack coat in accordance with manufacturer's instructions.
- B. Apply tack coat on asphalt or concrete surfaces over subgrade surface at uniform rate of 1/3 gal/sq yd.
- C. Apply tack coat to contact surfaces of curbs, gutters and .
- D. Coat surfaces of manhole frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.05 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

- A. Place asphalt binder course within 24 hours of applying primer or tack coat.
- B. Place wearing course within two hours of placing and compacting binder course.
- C. Install gutter drainage grilles and frames in correct position and elevation.
- D. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- E. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.06 SEAL COAT

- A. Apply seal coat to surface course in accordance with AI MS-19.

3.07 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- B. Variation from True Elevation: Within 1/2 inch.

3.08 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for quality control.
- B. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.

3.09 PROTECTION

- A. Immediately after placement, protect pavement from mechanical injury for 2 days or until surface temperature is less than 140 degrees F.

End of Section

Section 32 1313
Concrete Paving

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete sidewalks, stair steps, integral curbs, gutters, median barriers, parking areas, and roads.

1.02 RELATED REQUIREMENTS

- A. Section 03 1000 - Concrete Forming and Accessories.
- B. Section 03 3000 - Cast-in-Place Concrete.
- C. Section 31 2200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.
- D. Section 31 2323 - Fill: Compacted subbase for paving.
- E. Section 33 0513 - Manholes and Structures: Manholes, including frames; gutter drainage grilles, covers, and frames for placement by this section.
- F. Section 32 1123 - Aggregate Base Courses: _____ base course.
- G. Section 32 1216 - Asphalt Paving: _____.
- H. Section 32 1726 - Tactile Warning Surfacing: Plastic tactile and detectable warning tiles for pedestrian walking surfaces.
- I. Section 09 9000 - Painting and Coating: Pavement markings.

1.03 PRICE AND PAYMENT PROCEDURES

- A. Concrete paving is to be provided by the unit price method.
- B. See Section 01 2200 - Unit Prices, for additional unit price requirements.

1.04 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- C. ACI 305R - Hot Weather Concreting; 2010.
- D. ACI 306R - Cold Weather Concreting; 2010.
- E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- F. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- G. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.
- H. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.
- I. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- J. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide data on joint filler, admixtures, and curing compound.
- C. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

- A. Comply with applicable requirements of ACI 301.
- B. Concrete Sidewalks and Median Barrier: 3,000 psi 28 day concrete, 4 inches thick, #4 bars @ 2'-0" O.C. buff color Portland cement, exposed aggregate finish.
- C. Parking Area Pavement: 3,500 psi 28 day concrete, 7 thick, #4 bars @ 24" O.C eachway, float finish.

2.02 FORM MATERIALS

- A. Form Materials: As specified in Section 03 1000, conform to ACI 301.

2.03 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) yield strength; deformed billet steel bars; unfinished.
- B. Dowels: ASTM A615/A615M, Grade 40 - 40,000 psi yield strength; deformed billet steel bars; unfinished finish.

2.04 CONCRETE MATERIALS

- A. Obtain cementitious materials from same source throughout.
- B. Concrete Materials: As specified in Section 03 3000.

2.05 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Properties:
 - 1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; 3500 psi.
 - 2. Water-Cement Ratio: Maximum 50 percent by weight.
 - 3. Maximum Slump: 3 inches.

2.06 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

- A. See Section 32 1123 for construction of base course for work of this Section.

3.03 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.

3.04 REINFORCEMENT

- A. Place reinforcement as indicated.

- B. Interrupt reinforcement at expansion joints.

3.05 COLD AND HOT WEATHER CONCRETING

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.06 PLACING CONCRETE

- A. Place concrete in accordance with State of California Highways standards.
- B. Ensure reinforcement, inserts, embedded parts, formed joints and ____ are not disturbed during concrete placement.

3.07 JOINTS

- A. Align curb, gutter, and sidewalk joints.
- B. Place 3/8 inch wide expansion joints at 20 foot intervals and to separate paving from vertical surfaces and other components and in pattern indicated.
- C. Provide scored joints.
 - 1. At 5 feet intervals.
 - 2. Between sidewalks and curbs.
 - 3. Between curbs and pavement.

3.08 FINISHING

- A. Area Paving: Light broom, texture perpendicular to pavement direction.
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.
- C. Curbs and Gutters: Light broom, texture parallel to pavement direction.
- D. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.09 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- B. Maximum Variation From True Position: 1/4 inch.

3.10 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
 - 1. Provide free access to concrete operations at project site and cooperate with appointed firm.
- B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
 - 1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
 - 2. Perform one slump test for each set of test cylinders taken.
- C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.11 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

End of Section

Section 32 1723.13
Painted Pavement Markings

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Parking lot markings, including parking bays, crosswalks, arrows, handicapped symbols, and curb markings.

1.02 RELATED REQUIREMENTS

- A. Section 32 1216 - Asphalt Paving.
- B. Section 32 1313 - Concrete Paving.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2100 - Allowances, for cash allowances affecting this section.

1.04 REFERENCE STANDARDS

- A. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.
- B. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration; Current Edition.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Line and Zone Marking Paint: MPI (APL) No. 97 Latex Traffic Marking Paint; color(s) as indicated.
 - 1. Handicapped Symbols: Blue.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.

- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Clean surfaces thoroughly prior to installation.
 - 1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
- D. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.
- E. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

3.03 INSTALLATION

- A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.
- B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.
- C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.
- D. Comply with FHWA MUTCD manual (<http://mutcd.fhwa.dot.gov>) for details not shown.
- E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.
- F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on the drawings true, sharp edges and ends.
 - 1. Apply paint in one coat only.
 - 2. Wet Film Thickness: 0.015 inch, minimum.
 - 3. Width Tolerance: Plus or minus 1/8 inch.
- G. Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings.
 - 1. Mark the International Handicapped Symbol at indicated parking spaces.
 - 2. Hand application by pneumatic spray is acceptable.
- H. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

End of Section

Section 32 1726
Tactile Warning Surfacing

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 32 1313 - Concrete Paving: Concrete sidewalks.
- B. Section 32 1723.13 - Painted Pavement Markings: Crosswalk and curb markings.

1.02 REFERENCE STANDARDS

- A. 49 CFR 37 - Transportation Services for Individuals with Disabilities (ADA); current edition.
- B. AASHTO LRFD - Bridge Design Specifications, Customary U.S. Units (6th Edition); 2012.
- C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- E. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2011.
- F. ASTM C501 - Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser; 1984 (Reapproved 2009).
- G. ASTM C903 - Standard Practice for Preparing Refractory Castable Specimens by Cold Gunning; 2010.
- H. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine; 2011.
- I. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2014.
- J. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
- K. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.
- L. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2010.
- M. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2010.
- N. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- O. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.
- P. ATBCB PROWAG - Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; 2011.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data, standard details, details specific to this project; written installation and maintenance instructions.
- C. Warranty: Submit manufacturer warranty; complete forms in City's name and register with manufacturer.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company certified in writing by product manufacturer as having successfully completed work substantially similar to the work of this section.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Plastic Tiles: Provide manufacturer's standard five year warranty against manufacturing defects, breakage or deformation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Plastic Tactile and Detectable Warning Surface Tiles:
 - 1. Access Tile, a brand of Access Products, Inc; _____: www.accesstile.com.
 - 2. Armor-Tile, a brand of Engineered Plastics, Inc; _____: www.armortiletransit.com.

2.02 TACTILE AND DETECTABLE WARNING DEVICES

- A. Plastic Tactile and Detectable Warning Tiles: ADA Standards compliant, glass fiber and carbon fiber reinforced, exterior grade, matte finish polyester sheet with truncated dome pattern, solid color throughout, internal reinforcing of sheet and of truncated domes, integral radius cut lines on back face of tile; with factory applied removable protective sheeting.
 - 1. Material Properties:
 - a. Water Absorption: 0.20 percent, maximum, when tested in accordance with ASTM D570.
 - b. Slip Resistance: 0.50 minimum dry static coefficient of friction, when tested in accordance with ASTM D2047.
 - c. Compressive Strength: 25,000 pounds per square inch, minimum, when tested in accordance with ASTM D695.
 - d. Tensile Strength: 10,000 pounds per square inch, minimum, when tested in accordance with ASTM D638.
 - e. Flexural Strength: 25,000 pounds per square inch minimum, when tested in accordance with ASTM D790.
 - f. Chemical Stain Resistance: No reaction to 1 percent hydrochloric acid, motor oil, calcium chloride, gum, soap solution, bleach, or antifreeze, when tested in accordance with ASTM D543.
 - g. Abrasion Resistance: 300, minimum, when tested in accordance with ASTM C501.
 - h. Flame Spread Index: 25, maximum, when tested in accordance with ASTM E84.
 - i. Accelerated Weathering: Delta-E of less than 5.0 at 2,000 hours exposure, when tested in accordance with ASTM G155.
 - j. Adhesion: No delamination of tile prior to board failure in a temperature range of 20 to 180 degrees F, when tested in accordance with ASTM C903.
 - k. Loading: No damage when tested according to AASHTO LRFD test method HS20.
 - l. Salt and Spray Performance: No deterioration or other defect after 200 hours of exposure, when tested in accordance with ASTM B117.
 - 2. Pattern: In-line pattern of truncated domes complying with ADA Standards.

2.03 ACCESSORIES

- A. Fasteners: ASTM A666, Type 304 stainless steel
 - 1. Type: Countersunk, color matched composite sleeve anchors
 - 2. Size: 1/4 inch diameter and 1-1/2 inches long.

- B. Adhesive: Type recommended and approved by surfacing tile manufacturer.
- C. Sealant: Elastomeric sealant of color to match adjacent surfaces; approved by surfacing tile manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. When installation location is near site boundary or property line, verify required location using property survey.
- B. Verify that work area is ready to receive work:
 - 1. If existing conditions are not as required to properly complete the work of this section, notify Architect.
 - 2. Do not proceed with installation until deficiencies in existing conditions have been corrected.
- C. Verify that dimensions, tolerances, and attachment methods for work in this section are properly coordinated with other work on site.

3.02 INSTALLATION, GENERAL

- A. Install in accordance with manufacturer's written instructions.
 - 1. Do not install damaged, warped, bowed, dented, abraded, or otherwise defective units.
 - 2. Do not install when ambient or substrate temperature has been below 40 degrees F during the preceding 8 daylight hours.
- B. Field Adjustment:
 - 1. Locate relative to curb line in compliance with ATBCB PROWAG, Sections 304 and 305.
 - 2. Orient so dome pattern is aligned with the direction of ramp.
- C. Install units fully seated to substrate, square to straight edges and flat to required slope.

3.03 INSTALLATION, SURFACE APPLIED PLASTIC TILES

- A. Cure concrete surfaces for a minimum of 4 days before installing units.
- B. Mechanically roughen surface as required to remove contaminants and prepare surface for adhesive and sealant application.
- C. Drill fastener holes straight, true and to depth recommended by manufacturer.
- D. Apply adhesive to back of unit as recommended by manufacturer.
- E. Mechanically fasten to substrate. Avoid striking or damaging the unit itself during installation.
- F. Apply sealant to edges in cove profile.

3.04 PROTECTION

- A. Protect installed units from traffic, subsequent construction operations or other imposed loads until concrete is fully cured.
- B. Touch-up, repair or replace damaged products prior to Date of Substantial Completion.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 32 3114

Chain Link Fencing and Gates

PART 1 GENERAL

1.01 Work Included – Work includes, but is not necessarily limited to:

- A. Chain link fence
- B. Chain link swing gate

1.02 Related Work Described Elsewhere

- A. Section 05 500 Metal and Fabrications

1.03 Quality Assurance

- A. Manufacturer – As specified.
- B. Installer – Work to be performed only by workers thoroughly skilled and specially trained in the techniques of the manufacturer, and who are completely familiar with the published recommendations of the manufacturer and have at least three (3) years of experience installing the selected system.

1.04 References – In addition to complying with all pertinent codes and regulations:

- A. ASTM A-526 / A-526-M:Steel Sheet, zinc-coated (galvanized) by hot-dip process.
- B. ASTM B117 Test Method:Salt spray (fog) test.

1.05 Submittals

- A. Product Data – Submit material specifications, manufacturer's installation, and maintenance instructions under provisions of Section 01300.
- B. Shop Drawings – Under provisions of Section 01300. Drawings to include:
 - 1. Layout showing all dimensions, sizes, thickness, gauges, finishes, joining, attachments, gate operator and attachments, gate loops, and relationships to adjacent work.
 - 2. Gate elevations indicating the Finish Grade the length of the gate.
 - 3. Post foundations.
 - 4. Product Handling

1.06 Protection

- A. Materials to be stored at the job site in a safe, dry place with all labels intact and legible at time of installation.
- B. Use all means to protect materials before, during, and after installation. Do not allow products to become wet or damp.
- C. Replacements – In the event of damage, including water intrusion, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.07 Operation and Maintenance Manuals – Under provisions of Section 01 7700.

1.08 Warranty – Under provisions of Section 01 7700.

PART 2 PRODUCTS

2.01 Vinyl-Coated Chain Link Gate and Fencing

- A. Manufacturers
 - 1. Anchor Fence Company, Inc.
 - 2. Merchant Metals

3. Or approved equal
4. Swing Gate
 - a. Vinyl-coated swing gate frames shall be constructed of 2" diameter galvanized piping. The fabric shall be attached to the frame on all four sides. All gates shall be equipped with galvanized steel hinges and be ready to receive hardware. The latch shall include a lever that complies with the CBC.
 - b. Posts: 2.88-inch diameter steel pipe, vinyl coated.
 - c. Top and Brace Pad: 1.66-inch diameter, plain end, sleeve-coupled tubing, vinyl coated.
 - d. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners, and fittings are steel, vinyl coated.
 - e. Tension Wire: 6-gauge thick steel, single strand as required, vinyl coated.
 - f. Coatings:
 - 1) Galvanized: Thickness – 2.0 oz. / s.f. coating
 - 2) Vinyl: Thickness – 10 to 14 mils applied by fusion bonding
5. Privacy Slats: Manufacturer's standard slats, color as selected by Architect from standard colors.

PART 3 EXECUTION

- 3.01 Inspection – Examine the areas and conditions under which miscellaneous metal items are to be installed, and correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.**
- 3.02 Preparation – Follow manufacturer's recommendations for installation preparations. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorage, such as steel column, welded angle, and miscellaneous items having integral anchors, which are to be embedded in concrete construction. Coordinate delivery of such items to project site. Verify the gate post is plumb and gate leaf swings freely.**
- 3.03 Installation – Install system in strict accordance with manufacturer's instructions and as supplemented in this section.**
- A. Fastening to In-Place Construction – Provide anchorage devices and fasteners as required by drawings for securing miscellaneous metal fabrications to in-place construction.
 - B. Cutting, Fitting, and Placement
 1. Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications.
 2. Set work accurately in location, alignment, and elevation, and make plumb, level, true and free from rack, measured from established lines and levels.
 3. Provide temporary bracing or anchors in form work for items, which are to be built into concrete or similar construction.
 4. Fit exposed connections accurately together to form tight hairline joints.
 5. Weld connections, which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.
 6. Grind exposed joints smooth, and touch up shop paint coat or galvanizing. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.
 7. Install all railings per approved shop drawings. Install base-mounted railing per manufacturer's recommended methods, using non-shrunk grout.

3.04 Touch-Up Painting

- A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply or brush or spray to provide minimum dry film thickness of 0.051 mm (2.0 mils).
 - 1. At all galvanized products, clean all damaged areas and re-coat using specified galvanizing coating per manufacturer's criteria.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 32 3119

Decorative Metal Fences and Gates

PART 1 GENERAL

1.01 Work Included – Work includes, but is not necessarily limited to:

- A. Decorative steel picket fencing system.
- B. Decorative steel single rolling gate system with perforated screen, rolling gate operator, guide rails and posts, embedded track, one dual keypad/card reader/proximity reader on a pedestal with knox switch, shock absorbers, and safety devices and loops.
- C. Steel fabricated trash enclosure double swing gate with latch, drop bar and hinges - Per City Standard.
- D. Decorative steel picket single swing gate with locking latch and perforated screen.
- E. All hardware, attachments, and accessories as required to provide a complete installation.
- F. Coordination of gate and fencing systems with adjacent building walls, site enclosure walls, pilasters, and all associated finishes.
- G. Coordination of gate operation systems with Division 16 Electrical and as shown on Drawings.

1.02 Related Work Described Elsewhere

- A. Section 32 1216 Asphalt Paving
- B. Section 32 1313 Concrete Paving
- C. Section 03 3000 Cast-in-Place Concrete
- D. Section 04 2200 Concrete Unit Masonry
- E. Section 05 5000 Metal Fabrications
- F. Section 08 7000 Hardware
- G. Section 09 9000 Paints and Coatings
- H. Section 10 1400 Signage
- I. Division 15 Plumbing and Mechanical
- J. Division 16 Electrical

1.03 Quality Assurance

- A. Manufacturer – As specified by Architect.
- B. Installer – Work to be performed only by workers thoroughly skilled and specially trained in the techniques of the manufacturer, and who are completely familiar with the published recommendations of the manufacturer and have at least three (3) years of experience installing the selected system. Installer to be approved by the manufacturer.

1.04 References -- In addition to complying with all pertinent codes and regulations:

- A. ASTM A-526 / A-526-M: Steel sheet, zinc-coated (galvanized) by the hot-dip process, commercial quality.
- B. ASTM B117 Test Method: Salt spray (fog) testing.
- C. ASTM A500, structural tubing
- D. ASTM A513, ornamental tubing
- E. ASTM A36, flats, bars and shapes

F. ASTM A 123

1.05 Submittals

- A. Product Data – Submit material specifications, manufacturer’s installation, and maintenance instructions under provisions of Section 01300.
- B. Shop drawings under provisions of Section 01300. Drawings to include:
 - 1. Layout of fences and gates showing all dimensions, sizes, thickness, gauges, finishes, joining, attachments, gate operator and attachments, gate loops, and relationships to adjacent work.
 - 2. Gate elevations indicating the Finish Grade along the length of the gate.
 - 3. Post foundations details.
 - 4. Gate hardware (including hinges, latches, drop bar for inactive leaf, card reader system, details, etc.).
 - 5. Gate operator details.
 - 6. Opticom layout and details

1.06 Product Handling

- A. Protection
 - 1. Materials to be stored at the job site in a safe, dry place with all labels intact and legible at time of installation.
 - 2. Use all means to protect materials before, during, and after installation. Do not allow products to become wet or damp.
- B. Replacements: In the event of damage, including water intrusion, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.07 Warranty – Under provisions of Section 01 7700.

PART 2 PRODUCTS

2.01 Manufacturers - All selected materials listed in this section are based on the products of Builders Fence Company (www.buildersfence.com) as a standard of quality. Substitutions shall be considered under the provisions of Section 01 2500.

- A. Steel fabricated gate at trash enclosure:
 - 1. To be Per City Standard. See Plans
 - 2. Gate latch: Provide a minimum of one gate latch. Refer to drawings.
 - 3. Gate Hinges: Provide a minimum of two hinges per gate. Refer to drawings.
 - 4. Bracing: Provide diagonal bracing at back side of gate as required to avoid sagging.
 - 5. Color: Custom color as selected by Architect
 - 6. Finish: Galva Guard II hot-dipped galvanized and polyurethane painted. After fabrication materials are hot dip galvanized and finished with one spray coat high solids primer and one spray coat gloss polyurethane.
- B. Decorative Steel Picket Fencing
 - 1. Style: Heavy “Regal” with double top rail
 - 2. Height: 7’-4”, or as shown on Drawings.
 - 3. Posts: 4” x 4”, 11 gauge tube steel, 8’-0” on-center, with welded plate caps.
 - 4. Rails: 1-1/2” x 1-1/2, 14-gauge, tube steel.
 - 5. Pickets: 3/4” x 3/4”, 16-gauge steel tube, at 4-3/4” on-center.
 - 6. Color: Custom color as selected by Architect

7. Finish: Galva Guard II hot-dipped galvanized and polyurethane painted. After fabrication materials are hot dip galvanized and finished with one spray coat high solids primer and one spray coat gloss polyurethane.
 8. Fabrication: Pickets, rails, and fence ends shall be precut to specified lengths and welded into modules. Fence ends and posts shall be supplied with post caps.
- C. Decorative Steel Picket Rolling Gate
1. Style: Heavy "Regal" with double top rail.
 2. Height: 6'-0", or as shown on Drawings.
 3. Posts: Posts: 4" x 4", 11 gauge tube steel, 8'-0" on-center, with welded plate caps.
 4. Pickets: 3/4" x 3/4", 16-gauge steel tube, at 4-3/4" on-center.
 5. Gate: Rolling type (as shown on Drawings to provide coverage for driveways). Provide safety mesh for safe operation.
 6. Double Top Rails: Minimum 2" x 2", 11 gauge, steel tube.
 7. Bottom Rail: Minimum 2" x 8", 11 gauge, steel tube, with wheel housings.
 8. End Verticals: 2" x 2", 11 gauge tube steel.
 9. Guard Posts and Guide Posts: 4" x 4", 11 gauge, steel tube, with welded plate caps. Locate posts as shown on Drawings.
 10. Ground Track: Angle iron (sized per requirements based on gate weight), galvanized, with attachment hooks at 24" on-center.
 11. Wheels: Steel "V" groove-type with grease fitting and needle bearing, 6" diameter.
 12. Upper Guides: Type II roller assemblies with 2" diameter hard rubber rollers, 1/2" diameter axle, and bronze bushings.
 13. Gate Hardware: All other hardware necessary to provide a secure and operational gate assembly.
 14. Color: Custom color as selected by Architect
 15. Finish: Galva Guard II hot-dipped galvanized and polyurethane painted. After fabrication materials are hot dip galvanized and finished with one spray coat high solids primer and one spray coat gloss polyurethane.
 16. Fabrication: Pickets, rails, and fence ends shall be precut to specified lengths and welded into modules. Fence ends and posts shall be supplied with post caps.
 17. Coordinate with rolling gate operator.
- D. Decorative Steel Picket Swing Gates (Double or Single)
1. Style: Heavy "Regal" with double top rail.
 2. Height: 6'-0", or as shown on Drawings.
 3. Posts: 4" x 4", 11 gauge tube steel, 8'-0" on-center, with welded plate caps.
 4. Rails: 1-1/2" x 1-1/2", 14-gauge, tube steel.
 5. Pickets: 3/4" x 3/4", 16-gauge steel tube, at 4-3/4" on-center.
 6. Gates:
 - a. Single swing gates as shown on Drawings, verify width.
 - b. Double swing gates as shown on Drawings, verify width.
 - c. Double swing vehicle gate as shown on Drawings, verify width.
 7. Jambs
 - a. Secure to steel plate at masonry wall jambs as applicable and as shown on Drawings.
 - b. Secure to 4" x 4" tube steel post as applicable and as shown on Drawings.
 8. Gate Hardware: Drop bar for inactive side of double gate, gate hinges, gate latch and lock, and all other hardware necessary to provide an operational and secure gate assembly.

9. Color: – Custom color as selected by Architect.
 10. Finish: Galva Guard II hot-dipped galvanized and polyurethane painted. After fabrication materials are hot dip galvanized and finished with one spray coat high solids primer and one spray coat gloss polyurethane.
 11. Fabrication: Pickets, rails, and fence ends shall be precut to specified lengths and welded into modules. Fence ends and posts shall be supplied with post caps.
 12. Perforated Steel Screen at Trash and Generator Enclosures: Refer to item 2.02.
- E. Perforated Steel Screens
1. Manufacturer: This product is based on the products of McNichols as a standard of quality. Substitutions shall be considered under the provisions of Section 01310.
 2. Perforated Steel Screen: 1/4" diameter round holes, 5/16" staggered rows, 20 gauge, pattern, 58% open area.
 3. Contractor to provide all attachments and sealers necessary to provide a complete screening device.

2.02 Rolling Gate Operator

- A. Manufacturers: All selected materials listed in the section are based on the products of Elite products as a standard of quality. Substitutions shall be considered under the provisions of Section 01310.
- B. Electric Gate Operator: Model No. SL3000UL1HP, two continuous duty 1/2 HP working together to provide 1 hp, 115 volt, motor with built-in cooling fan, industrially rated 30 AMP motor control relays and thermal overload protection.
1. Power: Starting torque is equivalent to a 2-1/4 HP AC motor.
 2. Size: Unit to handle gate length as indicated on Drawings.
 3. Timer: Unit to have adjustable 0-60 second hold open timer.
 4. Cycles: Unit to be rated to 35 cycles per hour.
 5. Parts: Permanently lubricated continuous duty worm gear reduction and reliable rotary limits on output shaft to ensure accurate open and closed gate positions. All bearings to be permanently lubricated.
 6. Braking: Electronic braking system, self-locking in both the open and closed positions. Unit to have full systems capability and soft start/stop protection for mechanical parts.
 7. Housing: Unit to have high density polyethylene plastic and stainless steel housing.
 8. Chassis: Chassis to be welded, anoded and zinc painted.
 9. Safety: Internal safety sensing devices, obstruction sensing in both the opening and closing directions, stop circuit for pedestrian doors, and manual operation switch.
 10. Options: Surge suppression, steel mounting stand, and audible gate movement warning siren.
 11. Keypads: Coordinate gate operator with keypad, card reader, and proximity reader mounted at high/low pedestal, as shown on Drawings.
 12. Opticom: Gate operator systems and controls to be compatible with Opticom system. Refer to item 2.04 for further information.
 13. Warning signs to be provided and installed as part of this work on both sides of each gate controlled by an operator. Sign to be mounted on a minimum of 0.063" aluminum and shall be screen printed.

2.03 Pedestal Stanchion

- A. Manufacturers: All selected materials listed in the section are based on the products of Paragon Metal Products (818) 882-1638 as a standard of quality. Substitutions shall be considered under the provisions of Section 01 2500.
- B. High and Low Mounted: Model #S3S41272/35, 72" and 35" high from the top of footing to the centerline of housing.
- C. Low Mounted: Model #S3S4123636, 36" high from the top of footing to the centerline of housing.
- D. Height: Extend stanchion to 8'-0" high from the top of footing for mounting of Opticom Detector where indicated on the drawings.
- E. Housing: Model #H-5-5-5-SM-WPC or compatible model to accommodate all operating features.
- F. Keypad/Card Reader/Proximity Card Reader System
 - 1. Ingress operation of gates shall be controlled by high and low mounted keypad, card reader, proximity reader and Opticom Detector system. Provide Knox switch at the low keypad per Owner keying requirements.
 - 2. Egress: Egress operation of the gate shall be controlled by loops with closer timer.

PART 3 EXECUTION

3.01 Inspection

- A. Inspection – Examine the areas and conditions under which gate items are to be installed, and correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Preparation

- A. Preparation – Follow manufacturer's recommendations for installation preparations. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorage, such as steel column, welded angle, and miscellaneous items having integral anchors, which are to be embedded in concrete construction. Coordinate delivery of such items to project site. Verify the gate posts are plumb and gate leaf swings freely.

3.03 Swing Gates and Rolling Gates - Preparation and Installation

- A. Preparation: All new gate installation shall be laid out in accordance with the construction plans.
- B. Installation
 - 1. Set gate post(s) at recommended opening pertaining to gate size(s) as specified in drawings.
 - 2. Install male hinges to post(s) and female hinges to gate(s) at a proper height setting(s) that ensures the minimum recommended 2" ground clearance; and install gate by fitting female hinges into male counterparts.
 - 3. Apply coating material to gate framework and pickets prior to assembly.
 - 4. Touch up hardware.
 - a. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply or brush or spray to provide minimum dry film thickness of 0.051 mm (2.0 mils).

- b. At all galvanized products, clean all damaged areas and re-coat using specified galvanizing coating per manufacturer's criteria.
- 5. Adjusting: Adjust gates as required and at the direction of the owner to provide the owner with fully operational gates.

3.04 Gate Operator Preparation

- A. Verify the gate post is plum and gate leaf swings freely.
- B. Perform any required maintenance before continuing.
- C. Verify the commercial power circuit breaker is isolated and rated for the specific load. Visually ensure the circuit breaker is in the "off" position and mark the breaker used.
- D. If any pre-construction wiring has been installed, visually inspect and confirm proper sizing and compliance to code.
- E. Gate Operator Installation
 - 1. Install gate operator per manufacturer's printed instructions
 - 2. Adjust gate operator as per manufacturer's printed instructions

End of Section

Section 32 8423

Underground Sprinklers

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and fittings, valves, sprinkler heads, emitters, bubblers, and accessories.
- B. Control system.

1.02 RELATED REQUIREMENTS

- A. The Standard Plans and Specifications of the City of Manteca take precedence over all specifications in this section. The contractor is required to obtain a copy of the City documents and utilize them in all cases where there is any conflict between these specifications and those of the City.
- B. Section 31 2316 - Excavation: Excavating for irrigation piping.
- C. Section 31 2316.13 - Trenching: Excavating and backfilling for irrigation piping.
- D. Section 31 2323 - Fill: Backfilling for irrigation piping.

1.03 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each of the system components. No substitutions will be allowed without prior approval by the Landscape Architect.
- B. Product Data: Provide component and control system and wiring diagrams.
- C. Shop Drawings: Indicate piping layout to water source, location of sleeves under pavement, location and coverage of sprinkler heads, components, plant and landscaping features, site structures, schedule of fittings to be used.
- D. Operation and Maintenance Data:
 - 1. Provide instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.
 - 2. Provide schedule indicating length of time each valve is required to be open to provide a determined amount of water.
- E. Record Documents: Record actual locations of all concealed components piping system.
- F. Maintenance Materials: Provide the following for City's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Sprinkler Heads: One of each type and size.
 - 3. Extra Valve Keys for Manual Valves: One.
 - 4. Extra Valve Box Keys: One.
 - 5. Extra Valve Marker Keys: One.
 - 6. Wrenches: One for each type head core and for removing and installing each type head.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum ____ years of experience.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for piping and component requirements.

- B. Provide certificate of compliance from authority having jurisdiction indicating approval of products in system.

PART 2 PRODUCTS

2.01 IRRIGATION SYSTEM

- A. All products and materials to be per the Standard Specifications and Details of the City of Manteca. Contact City for copy. If discrepancies exist between these plans and the City Standards, the City Standards shall prevail.

2.02 PIPE MATERIALS

2.03 OUTLETS

2.04 VALVES

2.05 CONTROLS

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify location of existing utilities.
- B. Verify that required utilities are available, in proper location, and ready for use.

3.02 PREPARATION

- A. Piping layout indicated is diagrammatic only. Route piping to avoid plants, ground cover, and structures.
- B. Layout and stake locations of system components.
- C. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system.

3.03 TRENCHING

- A. Trench and backfill in accordance with Section 31 2316 and Section 31 2323.
- B. Trench to accommodate grade changes and slope to drains.
- C. Maintain trenches free of debris, material, or obstructions that may damage pipe.

3.04 INSTALLATION

- A. Install pipe, valves, controls, and outlets in accordance with manufacturer's instructions.
- B. Connect to utilities.
- C. Set outlets and box covers at finish grade elevations.
- D. Provide for thermal movement of components in system.
- E. Use threaded nipples for risers to each outlet.
- F. After piping is installed, but before outlets are installed and backfilling commences, open valves and flush system with full head of water.

3.05 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 4000 - Quality Requirements.
- B. Prior to backfilling, test system for leakage at main piping to maintain 100 psi pressure for one hour.

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- C. System is acceptable if no leakage or loss of pressure occurs and system self drains during test period.

3.06 BACKFILLING

- A. Provide 3 inch sand cover over piping.
- B. Backfill trench and compact to specified subgrade elevation. Protect piping from displacement.

3.07 SYSTEM STARTUP

- A. Prepare and start system in accordance with manufacturer's instructions.
- B. Adjust control system to achieve time cycles required.
- C. Adjust head types for full water coverage as directed.

3.08 CLOSEOUT ACTIVITIES

- A. Instruct City's personnel in operation and maintenance of system, including adjusting of sprinkler heads. Use operation and maintenance data as basis for demonstration.

3.09 MAINTENANCE

- A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide one complete spring start-up and a fall shutdown by installer, at no extra cost to City.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 32 9300

Plants

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of subsoil.
- B. Topsoil bedding.
- C. New trees, plants, and ground cover.
- D. Mulch and Fertilizer.
- E. Maintenance.

1.02 RELATED REQUIREMENTS

- A. The Standard Plans and Specifications of the City of Manteca take precedence over all specifications in this section. The contractor is required to obtain a copy of the City documents and utilize them in all cases where there is any conflict between these specifications and those of the City.
- B. Section 31 2200 - Grading: Topsoil material.
- C. Section 31 2323 - Fill: Topsoil material.

1.03 DEFINITIONS

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.04 REFERENCE STANDARDS

- A. ANSI/AHIA Z60.1 - American National Standard for Nursery Stock; 2014.
- B. ANSI A300 Part 1 - American National Standard for Tree Care Operations -- Tree, Shrub and Other Woody Plant Maintenance -- Standard Practices; 2008.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Maintenance Data: Include cutting and trimming method; types, application frequency, and recommended coverage of fertilizer; and _____.
- C. Submit list of plant life sources.
- D. Maintenance Contract.

1.06 QUALITY ASSURANCE

- A. Nursery Qualifications: Company specializing in growing and cultivating the plants with three years documented experience.
- B. Maintenance Services: Performed by installer.

1.07 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of plants, fertilizer and herbicide mixture.

- C. Plant Materials: Certified by federal department of agriculture; free of disease or hazardous insects.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- B. Protect and maintain plant life until planted.
- C. Deliver plant life materials immediately prior to placement. Keep plants moist.

1.09 FIELD CONDITIONS

- A. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.
- B. Do not install plant life when wind velocity exceeds 30 mph.

1.10 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide one year warranty.
- C. Warranty: Include coverage for one continuous growing season; replace dead or unhealthy plants.
- D. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

1.11 End of Section

- A. Provide a separate maintenance contract for specified maintenance service.

PART 2 PRODUCTS

2.01 PLANTS

- A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

2.02 SOIL MATERIALS

2.03 SOIL AMENDMENT MATERIALS

2.04 MULCH MATERIALS

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

2.05 ACCESSORIES

- A. Wrapping Materials: Burlap.
- B. Stakes: Softwood lumber, pointed end.
- C. Cable, Wire, Eye Bolts and Turnbuckles: Non-corrosive, of sufficient strength to withstand wind pressure and resulting movement of plant life.

2.06 SOURCE QUALITY CONTROL

- A. Provide analysis of topsoil; comply with requirements of Section 01 4000.
- B. Provide testing of imported topsoil.
- C. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared subsoil and planters are ready to receive work.
- B. Saturate soil with water to test drainage.
- C. Verify that required underground utilities are available, in proper location, and ready for use.

3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 3 inches where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- D. Dig pits and beds 6 inches larger than plant root system.

3.03 PLACING TOPSOIL

- A. Spread topsoil to a minimum depth of 4 inches over area to be planted. Rake smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.
- E. Install topsoil into pits and beds intended for plant root balls, to a minimum thickness of 6 inches.

3.04 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after initial raking of topsoil.
- C. Mix thoroughly into upper 2 inches of topsoil.
- D. Lightly water to aid the dissipation of fertilizer.

3.05 PLANTING

- A. Place plants for best appearance.
- B. Place plants for best appearance for review and final orientation by Architect.
- C. Set plants vertical.
- D. Remove non-biodegradable root containers.
- E. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth of 6 inches under each plant. Remove burlap, ropes, and wires, from the root ball.
- F. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch layers. Maintain plant life in vertical position.
- G. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

3.06 PLANT SUPPORT

- A. Brace plants vertically with plant protector wrapped guy wires and stakes to the following:

3.07 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 4000.

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- B. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

3.08 MAINTENANCE

- A. Provide maintenance at no extra cost to City; City will pay for water.
- B. Irrigate sufficiently to saturate root system and prevent soil from drying out.
- C. Cultivate and weed plant beds and tree pits.
- D. Remove dead or broken branches and treat pruned areas or other wounds.
- E. Neatly trim plants where necessary.
- F. Immediately remove clippings after trimming.
- G. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.
- H. Control insect damage and disease. Apply pesticides in accordance with manufacturers instructions.
- I. Remedy damage from use of herbicides and pesticides.
- J. Replace mulch when deteriorated.
- K. Maintain wrappings, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.

End of Section

Section 33 1300

Disinfecting of Water Utility Distribution

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Disinfection of site domestic water lines and site fire water lines specified in Section 33 1416.
- B. Disinfection of building domestic water piping specified in Section 22 1005.

1.02 RELATED REQUIREMENTS

- A. Section 33 1416 - Site Water Utility Distribution Piping.

1.03 REFERENCE STANDARDS

- A. AWWA B300 - Hypochlorites; 2011.
- B. AWWA B301 - Liquid Chlorine; 2010.
- C. AWWA B302 - Ammonium Sulfate; 2010.
- D. AWWA B303 - Sodium Chlorite; 2010.
- E. AWWA C651 - Disinfecting Water Mains; 2005.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Test Reports: Indicate results comparative to specified requirements.
- C. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.
- D. Disinfection report:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Test locations.
 - 4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
 - 5. Date and time of flushing start and completion.
 - 6. Disinfectant residual after flushing in ppm for each outlet tested.
- E. Bacteriological report:
 - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
 - 2. Time and date of water sample collection.
 - 3. Name of person collecting samples.
 - 4. Test locations.
 - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
 - 6. Coliform bacteria test results for each outlet tested.
 - 7. Certification that water conforms, or fails to conform, to bacterial standards of San Joaquin County.

1.05 QUALITY ASSURANCE

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years documented experience.
- B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of the State in which the Project is located.

- C. Submit bacteriologist's signature and authority associated with testing.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

- A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Liquid Chlorine, AWWA B302, Ammonium Sulfate, and AWWA B303, Sodium Chlorite.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping system and water well has been cleaned, inspected, and pressure tested.
- B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

3.02 DISINFECTION

- A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.
- B. Provide and attach equipment required to perform the work.
- C. Inject treatment disinfectant into piping system.
- D. Maintain disinfectant in system for 24 hours.
- E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.
- F. Replace permanent system devices removed for disinfection.
- G. Pressure test system to 200 psi. Repair leaks and re-test.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 4000.
- B. Test samples in accordance with AWWA C651.

End of Section

Section 33 1416

Site Water Utility Distribution Piping

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and fittings for site water lines including domestic water lines and fire water lines.
- B. Valves, Fire hydrants, Domestic water hydrants, and backflow preventors.

1.02 RELATED REQUIREMENTS

- A. Section 09 9113 - Exterior Painting.
- B. Section 31 2316 - Excavation: Excavating of trenches.
- C. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.
- D. Section 31 2323 - Fill: Bedding and backfilling.
- E. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.
- F. Section 33 1300 - Disinfecting of Water Utility Distribution: Disinfection of site service utility water piping.
- G. Section 09 9000 - Painting and Coating.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices, for additional unit price requirements.
- B. Pipe and Fittings: By the linear foot. Includes hand trimming excavation, pipe and fittings, bedding, concrete thrust restraints, connection to building service piping, and to municipal utility water source.
- C. Valves: By the unit. Includes valve, fittings and accessories.
- D. Hydrant: By the unit. Includes hand trimming excavation, gravel sump, hydrant, valve, connection, and accessories.
- E. Backflow Preventors: By the unit. Includes all labor and fittings to meet City Standards. Fire service Backflow Preventor includes integral FDC and swing check valve.

1.04 REFERENCE STANDARDS

- A. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.
- B. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2015.
- C. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2013.
- D. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).
- E. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2010.
- F. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2012.
- G. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2009.
- H. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; 2009.
- I. AWWA C502 - Dry-Barrel Fire Hydrants; 2014.

- J. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS; 2011.
- K. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; 2009.
- L. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; 2010.
- M. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution; 2007.
- N. UL 246 - Hydrants for Fire-Protection Service; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with utility company requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.01 WATER PIPE

- A. Manufacturers:
 - 1. _____.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Ductile Iron Pipe: AWWA C151:
 - 1. Fittings: Ductile iron, standard thickness.
 - 2. Joints: AWWA C111/A21.11, rubber gasket with rods.
 - 3. Jackets: AWWA C105/A21.5 polyethylene jacket.
- C. PVC Pipe: ASTM D1785, Schedule 40.
 - 1. Fittings: ASTM D2466, PVC.
 - 2. Joints: ASTM D2855, solvent weld.
- D. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Water Service" in large letters.

2.02 VALVES

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Gate Valves Up To 3 Inches:
 - 1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, post indicator, valve key, and extension box.
- C. Gate Valves 3 Inches and Over:
 - 1. AWWA C500, iron body, bronze trim, non-rising stem with square nut, single wedge, flanged ends, control rod, post indicator, valve key, and extension box.
 - 2. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flanged ends, control rod, post indicator, valve key, and extension box.
- D. Swing Check Valves From 2 Inches to 24 Inches:
 - 1. AWWA C508, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.

- E. Backflow Preventors
 - 1. Per City Standards.

2.03 HYDRANTS

- A. Hydrants: Type as required by City.
- B. Hydrants: AWWA C502, UL 246, dry barrel type.
- C. Finish: Primer and two coats of enamel in color required by owner.

2.04 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 31 2316.13.
- B. Cover: As specified in Section 31 2316.13.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

3.02 TRENCHING

- A. See the sections on excavation and fill for additional requirements.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.03 INSTALLATION - PIPE

- A. Install ductile iron piping and fittings to AWWA C600.
- B. Route pipe in straight line.
- C. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- D. Slope water pipe and position drains at low points.

3.04 INSTALLATION - VALVES AND HYDRANTS

- A. Set valves on solid bearing.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.
- C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.
- D. Set hydrants to grade, with nozzles at least 20 inches above ground.
- E. Locate control valve 4 inches away from hydrant.
- F. Provide a drainage pit 36 inches square by 24 inches deep filled with 2 inches washed gravel. Encase elbow of hydrant in gravel to 6 inches above drain opening. Do not connect drain opening to sewer.
- G. Paint hydrants in accordance with Section 09 9113.

3.05 SERVICE CONNECTIONS

- A. Provide water service to utility company requirements with reduced pressure backflow preventer and water meter with bypass valves and sand strainer.

3.06 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 4000.

- B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to City.

End of Section

Section 33 3113

Site Sanitary Sewerage Gravity Piping

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary sewerage drainage piping, fittings, and accessories.
- B. Connection of building sanitary drainage system to municipal sewers.
- C. Cleanout access.
- D. Sand, Silt, and Oil Interceptor.

1.02 RELATED REQUIREMENTS

- A. Section 31 2316 - Excavation: Excavating of trenches.
- B. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.
- C. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.
- D. Section 33 0513 - Manholes and Structures.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices, for additional unit price requirements.
- B. Pipe and Fittings:
 - 1. Basis of Measurement: By the linear foot.
 - 2. Basis of Payment: Includes hand trimming excavation, bedding, pipe and fittings, connection to building service piping and to municipal sewer.
- C. Cleanout:
 - 1. Basis of Measurement: By the unit for a nominal depth of 10.
 - 2. Basis of Payment: Includes hand trimming excavating, foundation pad, unit installation with accessories, connection to sewer piping.

1.04 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.05 REFERENCE STANDARDS

- A. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2014.
- B. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping; 2001 (Reapproved 2014).
- C. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

- A. Plastic Pipe: ASTM D2680 Acrylonitrile-Butadiene-Styrene (ABS) material; inside nominal diameter of ____ inches, bell and spigot style solvent sealed joint end.

- B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.02 SAND SILT AND OIL INTERCEPTOR

- A. 1200 Gallon Sand, Silt, and Oil Interceptor Per City Standards.
- B. H-20 Rated.
- C. Includes Interceptor, all accessories, installation, and connection.

2.03 CLEANOUT

- A. Onsite Cleanouts and Risers per City Standards.

2.04 BEDDING AND COVER MATERIALS

- A. Pipe Bedding Material: As specified in Section 31 2316.13.
- B. Pipe Cover Material: As specified in Section 31 2316.13.

PART 3 EXECUTION

3.01 GENERAL

- A. Perform work in accordance with City Standards.

3.02 TRENCHING

- A. See Section 31 2316.13 for additional requirements.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.03 INSTALLATION - PIPE

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
 - 1. Plastic Pipe: Also comply with ASTM D2321.
- C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
- D. Connect to building sanitary sewer outlet, through installed sleeves.

3.04 INSTALLATION - CLEANOUTS

- A. Install Per City Standards.

3.05 INSTALLATION - CLEANOUTS

- A. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.
- B. Establish elevations and pipe inverts for inlets and outlets as indicated.
- C. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.06 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 4000.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to City.

3.07 PROTECTION

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 33 4211
Stormwater Gravity Piping

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Storm drainage piping, fittings, and accessories.
- B. Connection of drainage system to City Storm Drain.
- C. Catch basins, Plant area drains, Paved area drainage, Site surface drainage, and Trench Drain.
- D. Automatic Sewer Disconnect Valve.

1.02 RELATED REQUIREMENTS

- A. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.
- B. Section 33 0513 - Manholes and Structures.
- C. Section 03 3000 - Cast-in-Place Concrete: Concrete for cleanout base pad construction.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

1.04 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.05 REFERENCE STANDARDS

- A. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe; 2015.
- B. ASTM C76M - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric); 2014.
- C. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.
- D. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2014.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories .
- C. Project Record Documents:
 - 1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.

PART 2 PRODUCTS

2.01 STORM DRAIN PIPE MATERIALS

- A. Concrete Pipe: Reinforced, ASTM C76 (ASTM C76M), Class III with Wall type A; mesh reinforcement; inside nominal diameter of 12 inches, bell and spigot end joints.
- B. Plastic Pipe: ASTM D1785, Schedule 40, Poly Vinyl Chloride (PVC) material; inside nominal diameter of ____ inches, bell and spigot style solvent sealed joint end.

2.02 PIPE ACCESSORIES

- A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.03 CATCH BASIN, TRENCH DRAIN, CLEANOUT, AND AREA DRAIN COMPONENTS

- A. Lids and Drain Covers: Cast iron, hinged to cast iron frame.
 - 1. Catch Basin: Per City Standard.
 - 2. Area Drain:
 - a. 6 Inch HDPE Drop-in Type or Similar with Linear Grate.
 - b. Compatible with SDR 35 Drain Pipe.
 - c. All fitting, connections, and addaptors to be included.
- B. Base Pad: Cast-in-place concrete of type specified in Section 03 3000, levelled top surface to receive concrete shaft sections, sleeved to receive storm sewer pipe sections.

2.04 TRENCH DRAIN

- A. 12" Wide Modular HDPE Trench Drain System with Steel Frame, Grate, and Appurtenances.
- B. Bottom slope of 1%.
- C. Ductile Iron Grates, H20 Rated.
- D. Products: Zurn or approved equal.

2.05 AUTOMATIC SEWER DISCONNECT VALVE

- A. Automatic Sewer Disconnect Valve, Boxes, Rain Sensor, and Controls.
- B. Capable of letting low flow discharge directly to sanitary sewer with overflow bypass, rain switch, automated valve, and all boxes, lids, wiring, and control necessary.
- C. Water tite aluminum valve box door by PA Insert Corporation or equal.
- D. Weep hole per plans.
- E. Products: Pyramid Precast, or approved equal.

2.06 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 31 2316.13.
- B. Cover: As specified in Section 31 2316.13.

PART 3 EXECUTION

3.01 TRENCHING

- A. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
 - 1. Plastic Pipe: Also comply with ASTM D2321.
- B. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
- C. Connect to building storm drainage system, foundation drainage system, and utility/municipal sewer system.

3.03 INSTALLATION - CATCH BASINS, TRENCH DRAINS AND CLEANOUTS

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.04 FIELD QUALITY CONTROL

- A. Perform field inspection in accordance with Section 01 4000 - Quality Requirements.

3.05 PROTECTION

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

End of Section

Job Name: Manteca Fire Department – Manteca Fire Station #5

Job Number: 0353-01-CI15

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Section 33 5613

Above Ground Fuel-Storage Tanks

PART 1 GENERAL

1.01 Work Included – Work includes, but is not necessarily limited to:

- A. 1,000-gallon aboveground diesel fuel storage tank with isolated secondary containment system
- B. Pre-cast flat foundation slab
- C. Pump and trim package for dispensing diesel.
- D. Leak detectors and gauges.
- E. Earthquake restraints.
- F. All other attachments, accessories, components and materials required to provide a complete installation.
- G. Contractor to coordinate with the Owner (Fire Department) and prepare, process, and file a "Spill Prevention Management Plan". Contractor to confirm permitting requirements with the Federal Environmental Protection Agency (EPA) and any local agencies and provide all documentation necessary.
- H. Fuel connection package to emergency generator.

1.02 Related Work Described Elsewhere

- A. Section 32 1313 Concrete Paving
- B. Division 15 Plumbing and Mechanical
- C. Division 16 Electrical

1.03 Quality Assurance

- A. Installer – The fuel storage tank system installer shall be currently approved by the manufacturer, and have experience of at least 5 years installing the selected system.
- B. Installation subject to approved shop drawings, inspection, and testing.
- C. Manufacturer will have a minimum of five (5) years of experience in producing specified tank for commercial use and document at least ten (10) installations in satisfactory operation.
- D. The manufacturer must stipulate no AST containment system failure in 24,000 units produced.

1.04 References – In addition to complying with all pertinent codes and regulations:

- A. UL - 142, aboveground steel tanks for flammable and combustible liquids.
- B. UL - 2085, two-hour furnace fire test and two hour simulated pool fire test for insulated and protected tank.
- C. UL - 2085, and UFC Test Standard (Article 79 or APPENDIX #A-II-F-1) for both Vehicle Impact Protection and Projectile Resistance.
- D. UL - 2085, Protected aboveground tanks for flammable and combustible liquids.
- E. UL - 2085, Non-Metallic Secondary Containment protected tanks for flammable and combustible liquids with secondary containment Emergency Venting by "Form of Construction".
- F. The requirement for uniform fire code for two-hour (firewall) test Specifications.
- G. To be tested and certified by the California Air Resources Board (CARB) for Balanced Phase 1 and Phase 2 Vapor Recovery including methanol and ethanol.

1.05 Submittals

- A. Product Data – Submit material specifications, manufacturer’s installation, and maintenance instructions under provisions of Section 01 3300.
- B. Shop drawings under provisions of Section 01 3300.
- C. Indicate system components, size of components, location, and provide full schematic or wiring system showing layout and operations details.
- D. Submit manufacturer’s installation instructions under provisions of Section 01 3300.
- E. Submit manufacturer’s descriptive literature, operating instructions and maintenance and repair data under provisions of Section 01 7700.
- F. Manufacturer to submit on completion of system verification a point-by-point check list indicating the date and time of each item inspected and issue a certificate, under provisions of Section 01 4300, confirming that the inspection has been completed and the system is installed and functioning in accordance with the specifications.

1.06 Product Handling

- A. Protection
 - 1. Aboveground fuel storage system to be stored at the job site in a safe place with all labels intact and legible at time of installation.
 - 2. Use all means to protect aboveground fuel storage system before, during, and after installation. Do not allow products to become wet or damp.
- B. Replacements – In the event of damage, including water intrusion, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.07 Warranty – Under provisions of Section 01780:

- A. Thirty-year (30-year) warranty on aboveground fuel storage tank system.
- B. One-year (1-year) warranty of parts, work quality, and installation.

PART 2 PRODUCTS

2.01 Acceptable Manufacturers

- A. Manufacturer: All the materials listed in this section are based on the products of ConVault () as a standard of quality. Substitutions shall be considered under provisions of Section 01310.

2.02 Above-ground Storage Fuel Tank

- A. Description: Provide the ConVault Aboveground Tank System, which carries listing and label under UL Standard 2085, INSULATED Secondary Containment Aboveground Tank for Flammable and Combustible Liquids, Protected Type with Vehicle Impact and Projectile Resistance. The Tank System will provide Emergency Venting for Secondary Containment by Form-of-Construction. Unit must comply with all provisions of U.F.C. 79-7, Appendix (A-II-F. The Tank System and its enclosure shall be a completed unit at the factory (shop fabricated). The Tank System shall be approved for Phase I and Phase II Vapor Recovery by the California Air Resources Board for gasoline and methanol.
- B. Capacity: 1,000 gallons.
- C. Size: 1,000 (11’-0” long x 5’-8” wide x 4’-4” high)
- D. Empty Weight: 18,000 lbs.
- E. Hose: 20 feet in length.

- F. Diesel Pump and Dispensing package: #PK15DS
- G. The primary steel tank shall be rectangular in shape and have continuous welds on all exterior seams, manufactured in accordance with UL listing requirements and UL Standard 142.
- H. The primary steel tank shall be pressure tested at 5 psig for 24 hours.
- I. The primary steel tanks shall have "emergency vent" system as per NFPA 30 Code requirements.
- J. The protected and insulated AST systems shall have a thru-tank leak detector tube to allow for physical checkup and monitoring capability between the primary and the secondary containment.
- K. The primary steel tank shall be pressurized at 5 psig during concrete encasement.
- L. The outer surface of the primary steel tank shall be covered by a minimum of 1/4" thick (6.4 mm) Styrofoam insulation panels or equally acceptable thermal insulation.
- M. The secondary containment shall consist of a 30 Mil thick (0.76 mm) High-Density Polyethylene membrane enclosing the steel tank and insulation material.
- N. The primary steel tank and the secondary containment shall be encased in six (6) inches of monolithic reinforced concrete, with minimum design strength of 4,000 and 5,000 psi at 28 days depending on the tank size. The concrete design shall include the following for long-term durability: air entrainment, water reducing admixture, and steel reinforcement. Concrete encasements with seams will not be approved.
- O. The protected and insulated AST systems shall be of concrete exterior and a continuous and visually verifiable monolithic (seamless) pour on top, bottom, ends, and sides and contain no cold joints or heat sinks (heat transfer points). The AST must be shop fabricated and tested in accordance with the UL listings. Designs that use two layers of steel with insulation material between them will not be approved.
- P. No steel or insulating material shall come in contact with the concrete or other corrosive material.
- Q. All openings shall be from the top only.
- R. All exposed metal must be powder coated to inhibit corrosion.
- S. The protected and insulated AST systems shall include a minimum 5-15 gallon powder coated UL listed integral spill containment, and shall include normally closed valve to release spilled product into the primary steel tank. Spill containment which route the spilled product into interstitial area will not be approved.
- T. The protected and insulated AST systems shall have a coated concrete exterior to resist weather and reflect sunlight. Models with steel exteriors will not be approved.
- U. The protected and insulated AST systems shall have two (2) lugs for connecting grounding conductors for lightning protection in accordance with NFPA 780.
- V. Fire Resistance: The Tank System shall be designed and tested to provide 2-hour fire protection for the primary tank as per UL 2085 2-hour furnace fire test and 2-hour simulated pool fire test. No steel members shall penetrate the walls or floor of the concrete encasement to assure isolation from pool fire heat.
- W. Bullet Resistance: The primary tank must withstand the U.L./U.F.C. test for ballistics impact of 5 bullets within 9 square feet. The bullets will be 150 grain, M2 balls of ammunition fired at a muzzle velocity of 2,700 feet/second from 100 yards. The primary tank is then pressure tested at 5 psi air pressure to check for leakage.

- X. Vehicle Impact Resistance: Unit must withstand the U.L./U.F.C. test for impact resistance. The impact will be 12,000 pounds at 10 mph with the load applied over 1 square foot. Following the impact, the primary tank is then pressure tested to check for leakage.
- Y. Thermal and Corrosion Protection: The Tank System construction shall include thermal insulation equivalent to .25 inches of polystyrene to protect against temperature extremes, and to protect against corrosion by isolating the steel tank from the concrete or other corrosive material. All steel exterior to the concrete encasement shall be antioxidant powder coated to inhibit corrosion and meet ASTM B117.
- Z. Secondary Containment with Leak Monitoring: Unit construction must provide Emergency Venting for Secondary Containment by Form-of-Construction according to UL Standard 2085 which meets testing criteria. The Tank System shall include an impervious barrier of 30-mil high-density polyethylene to contain leaks from the primary tank. The secondary containment shall be inside of the bullet and vehicle impact material.
- AA. Spill / Overfill Containment: The Tank System shall include a UL listed 7-gallon spill/overflow container manufactured as an integral part of the primary tank, surrounding the fill pipe, and protected by the 2-hour fire rating of the enclosure. The spill/overflow container shall include a stick port and normally closed valve to release spilled product into the main tank. Exterior steel shall be antioxidant powder coated to inhibit rust.
- AB. Overfill Protection: Overfill protection shall be provided by the following methods:
 - 1. Direct reading level gauge visible from fill pipe access;
 - 2. Audible / visual high-level alarm.
- AC. Exterior Finish: The tank's concrete exterior surface shall be finished with off-white STO or Perma-Crete exterior coating system (to be determined by Architect).
- AD. Signage: Tanks shall be marked per state and local codes. Signs will be recessed in concrete exterior to insure against damage during off-loading, refilling, or general functions.
- AE. Venting: Tank system shall include a 2-inch atmospheric vent and emergency venting in accordance with N.F.P.A. 30.
- AF. Anti-Spill Valves: The valve shall be an approved anti-siphon valve or electric solenoid valve.
- AG. Connection of Emergency Generator to Fuel Tank: Contractor shall provide and install all connections required for a complete system to connect the emergency generator to the above ground fuel tank including: termination connection to emergency generator, termination connection to the above ground fuel tank, anti siphon valve, expansion relief, a ball shut off valve at each pipe, and all piping, connections and support required for a complete system.

2.03 Precast Foundation Slab

- A. Size: To accommodate a 1,000-gallon capacity aboveground fuel storage tank. Slab to be 11'-6" long x 6'-2" wide x 8" thick minimum. Contractor to confirm slab size with tank.
- B. Construction, Concrete Requirements, and Reinforcing Steel: Per manufacturer's recommendations.
- C. Precast foundation slab to include a 6" high x 6" wide concrete curb above the surface of the slab, to ensure fuel containment in the event of a spill. Contractor to confirm requirement with local authorities prior to installation.
- D. Earthquake restraints: provide restraints to attach tank to foundation at each end of each storage tank foot per manufacturers recommendation to comply with all code and local jurisdiction requirements.

PART 3 EXECUTION

3.01 Surface Conditions

- A. Inspection
 - 1. Prior to installation of the work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
 - 2. Verify that aboveground fuel storage tank system may be installed in accordance with the approved design.
- B. Discrepancies
 - 1. In the event of discrepancy, immediately notify the Architect.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 - 3. Fabrication – General: Field verify all dimensions prior to fabrication.

3.02 Installation – Install aboveground fuel storage tank system in strict accordance with the manufacturer's current recommendations:

- A. The tank system including accessories shall be installed in strict accordance with the manufacturer's recommendations and applicable fire and environmental codes. Contractor prior to installation shall obtain all state and local permits.
- B. Tanks shall be installed on a reinforced concrete base slab designed to support the fully loaded tank. Protective guard posts shall be installed where required by state and local codes.
- C. Tanks shall be marked with warning signs: "FLAMMABLE" or "COMBUSTIBLE", or "NO SMOKING", product identification, and other signs as required by applicable codes.
- D. Electrical work shall be in accordance with applicable codes and shall be rated for hazardous area as required. Electric fee for dispensing pumps shall include an emergency shutoff switch located per code requirements. Tanks shall be electrically grounded in accordance with N.F.P.A. 78.

End of Section